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EDUCATIONAL TECHNOLOGY

CONTENTS:

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BLOCK I:
CONCEPTUAL BASES OF EDUCATIONAL TECHNOLOGY

UNIT 1:

MEANING, DEFINITION AND SCOPE OF EDUCATIONAL TECHNOLOGY

Unit Structure:

1.1 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.

1.2 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

1.3 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.

Educationist 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.

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?

1.4 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

1: What is meant by educational technology?

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

3: State two characteristics feature of Educational Technology.

1.5 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.

Check Your Progress

4: What are the three major aspects of educational technology?
5: What does the process aspect of educational technology mean?

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.

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.

Self-Asking Question

2. How educational technology is important for teacher education?

1.6 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.

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1.8 Model 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.

1.9 Answer to check your progress/Possible Answers to SAQ

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 Knowledge2. 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:

2.1 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.

2.2 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 ofeducational technology

2.3 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 forms. The following sub-sections will cover these areas.

2.3.1 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.

2.3.2 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.

2.3.3 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 are 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.

2.3.4 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

1: What are the forms of educational technology?

2: What are the contents of teaching technology?

3: State two characteristics of behavioural technology.

4: State two assumption of Instructional Technology.

2.4 Types of Educational Technology

Types of educational technology comprises 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 expenditures 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 days, 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

Self-Asking Question

1. What are the basis of Hardware approach?

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 ofmodern educational technology, system approach is not a newconcept. This approach is significant for technology, commercialand administrative work. The term System approach has been formedby two words: ***system and approach***.

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

According to Keshow and Michean, "Systems approach is one ofthe techniques which aims at finding the most efficient and economicallyintelligent methods for solving the problems ofeducationscientifically."
Again, Hall opined, "A system approach is a set of objects together witha 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 objectivesfrom analysis of environment system.
- This approach is integrated and dynamic.
- Instructional objectives are so set by which their accomplishmentcan be observed easily.
- In this approach, elements are systematically arranged whichfunctions in a specific manner.
- This approach uses the human resource, finance, machineryand material for problem solving in an effective manner.

Check Your Progress
5: What are the major types of educational technology? 6: State two characteristics of Software approach. 7: Define system approach.

2.4.1 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 educational benefits to masses with greater case and economy.	7. It has no such wide application and appeal to masses as found in the case of hardware appliances like radio, telephone, computer application, etc.
8. It has resulted in improving the efficiency of educational, means and reducing the cost of education. A teacher may handle a big class with the help of hardware appliances like microphone, slide and film projectors etc.	8. It works for increasing the efficiency of the teachers as well as learning.

Self-Asking Question

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

2.5 Summing Up

Coming to the last part of this unit, it can be said that this unit has tried to familiarize you with the 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 systemapproach incorporates all the elements of education.

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2.7 Model Questions

1. What are the basic forms of educational technology?
2. Discuss the characterisctis 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.

2.8 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-

D. Hardware Approach
E. Software Approach
F. 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 ofthe techniques which aims at finding the most efficient and economicallyintelligent methods for solving the problems ofeducation 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:

3.1 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.

3.2 Objectives

After going through this unit you are able:

- *to understand* the concept of Distance Education,
- *to analyse* various modes of Imparting Distance Education,
- *to know* the role of educational technology in Distance Education,
- *to understand* the utility of Distance Education,
- *to understand* the role of multimedia and its influence as well as its advantages on Distance Education.

3.3 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

1. What do you understand by Distance Education?

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3.4 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 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

2. What are the modes of Imparting Distance Education?

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3.5 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 kilometers 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 complete 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 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, 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 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 properties 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 upto 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 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 centers 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.

3.6 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 centers 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 ear 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.

3.7 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. **Universalisation 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

3. Write any 3 Multimedia approaches that influence Distance Education?
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3.8 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.

3.9 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.

3.10 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: Hardware Approach and Software Approach

Contents:

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

Acording 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.

4.2 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 Approaches.
- Identify the importance of Hardware and Software Approaches.
- Describe the uses of Educational Technology in India.

4.3 Types of Approaches:

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.

4.3.1 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.

4.3.2 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 assist 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.

4.3.3 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:

Q.1. What is Educational Technology?

Q.2. Define Educational Technology.

Q.3. Why is Hardware Approach called "Borrowed Technology"?

Q.4. What are the other names of Software Approach?

Q.5. What is Systems Approach?

4.4 Differences Between Hardware and Software Approaches:

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:

4.5 Importance of Hardware and Software Approaches:

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 learners continuosly 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) Schooltube 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:

Q.6. Mention three uses of Hardware and Software Approach.

4.6. 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:

Q.7. Mention some uses of Educational Technology in India.

4.7 Summing Up:

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

2. It is the ethical practice of facilitating the learners and teachers to improve the learning environment with the appropriate use of resources.
3. Educational Technology has three approaches namely-Hardware Approach, Software Approach and Systems Approach.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. Hardware and Software Approach although are interrelated yet they differ from each other.
10. 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.
11. 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.

12. 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.

4.8 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 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 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.

4.9 Sample Questions:

Q.1. Explain the meaning of Educational Technology with examples.

Q.2. Discuss the approaches of Educational Technology.

Q.3. Differentiate between Hardware and Software Approach.

Q.4. Mention the significance of Hardware and Software Approach.

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

4.10 References/Suggested Readings:

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UNIT 5
SYSTEM APPROACH

Contents:

5.1 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.

5.2 Objectives:

After going through this unit you will be able to :

- *identify* the meaning, definition, nature and types of system and system approach,
- *discuss* the System approach in Education,
- *elaborate* the components of Instructional System.

5.3 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 Aristotles' 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."

5.4 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.

5.5 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.

5.6 Parameter of 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:

Q.1. Define a system?

Q.2. Write two characteristics of a system.

Q.3. Systems are mainly classified into _____ types.

Q.4. Write the four parameters of a system

5.7 System Approaches:

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.

5.8 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.

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 replanned, and reoperated inorder of achieving better results. This process of operation, evaluation, feedback, modification, restarting and reopertaion is continued till the aim of getting best results in terms of the stipulated objectives with greater economy, exactness and precision is not achieved.

5.9 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.

5.10 Limitations of System Approach:

i. *Resistance to modification:* Old conduct 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:

Q.5. What is a system approach?

Q.6. Mention the steps of system approach.

Q.7. Write three advantages of system approach.

Q.8. Write three limitations of system approach.

5.11 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:

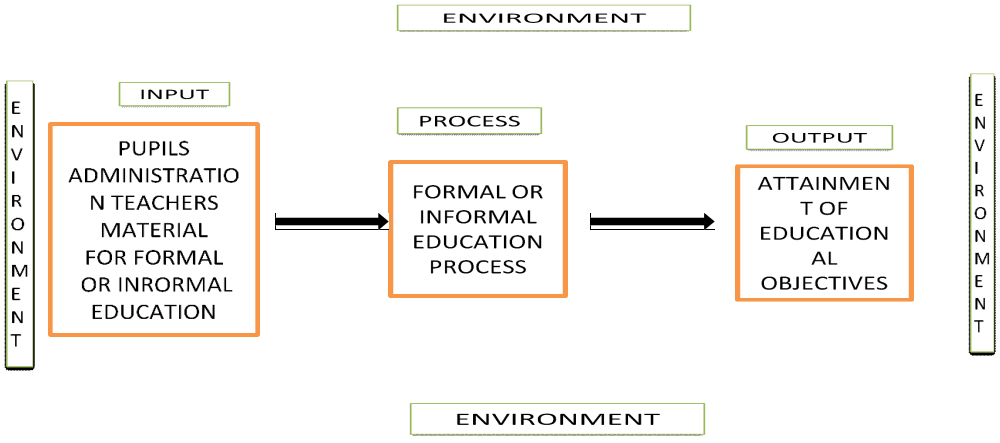


Fig:3.1: Education System

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 themselves.

5.11.1 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 conative 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.

5.11.2 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.

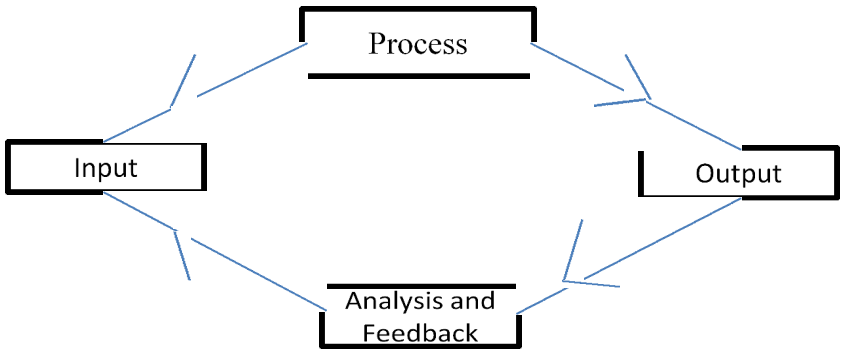
The procedure steps of system approach in education are as follows:

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:

Q.9. Education system is a _____system. (Fill in the blanks)

Q.10. Write three underlying principles of system approach in education.?

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

Q.12. Write three procedure steps of system approach in education.

5.12 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.

5.13 Key Terms:

System Approach: Look at a problem precisely

Instructional Design: Learning Material

5.14 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 conduct 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.

5.15 Essay Type Questions:

Q.1 What do you understand by the term system? Discuss 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) Parameter of a system

(b) System analysis

(c) System operation

(d) System design

(e) System approach to education

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BLOCK II:
PROGRAMMED INSTRUCTION

UNIT 1
MEANING, SCOPE AND IMPORTANCE OF PROGRAMMED INSTRUCTION

STRUCTURE

1.1. INTRODUCTION

Programmed instruction or programmed learning stand for one of the efficient improvement in teaching learning process. As a highly individualized and organized instructional approach, classroom instruction as well as self-learning or auto-instruction has been found quite useful. In a country like India, an attempts has been made for the use of programmed instructions particularly in providing material to the students of distance courses. Suitable self-instructional programmed materials for different subjects and grades have been prepared and it is being used for instructional or self-instructional purposes. Besides its use for instructional purpose, programmed instruction has full potentiality for being used as mechanism of feedback device for the modification of teacher behaviour and improving teaching efficiency.

1.2. UNIT OBJECTIVES

After going through this unit you will be able to :

- Identify the origin, meaning, definition, nature and importance of programmed instruction.

1.3. MEANING AND DEFINITION OF PROGRAMMED INSTRUCTION:

In general, the instructions given by a teaching machine or programmed text book is referred to a s programmed instruction or programmed learning. Let us take into consideration the definitions put forward by the various academicians in understanding the meaning of the term programmed learning or programmed instruction.

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

According to **Jacobs and others (Jacobs, et. al, 1966),** "Self instructional programmes are educational materials from which the students learn. These programmes can be used with many types of students and subject matter, either by themselves, hence, the name "self-instruction" or in combination with other instructional techniques."

According to **Espich and Williams (1967),** "Programmed instruction is a planned sequence of experiences, leading to proficiency, in terms of stimulus responses relationship that have proven to be effective."

According to **Leith (1966),** "Programme is a sequence of small steps of instructional material (called frames), most of which requires a response to be made by completing a blank space in a sentence. To ensure that expected responses are given, a system of cueing is applied, and each response is verified by the provision of immediate knowledge of results. Such a sequence is intended to be worked at the learners' own pace as individualized self instruction."

Susam Markle, (1969) opines that "It is a method of designing a reproducible sequence of instructional events to produce a measurable and consistent effect on the behaviours of each and every acceptable students."

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

According to **N.S. Mavi, (1984),** "Programmed instruction is a technique of converting the live instructional process into self learning or auto-instructional readable material in the form of micro-sequences (the segments of subject matter) which the learners are required to read, make some right or wrong response, correct wrong responses or confirm the right response and attain the complete mastery of the concepts explained in the micro sequences."

To conclude the above definitions may reveal the things given ahead regarding the meaning, nature and characteristics or programmed learning.

Programmed instruction is a technique of self-instruction in which all of the instructional load is carried by teaching machines or programmed texts.

1.4. HISTORY OF PROGRAMMED`INSTRUCTION

Some educators are of the view that the 'Gita' is the first example of programmed learning. They also maintained that the text of the 'Gita' has several ingredients of programming: initial behaviour, small steps, active participation, terminal behaviour, immediate feedback and self-evaluation by the learner.

Several academicians viewed that Socrates as one of the earliest programmers, saying he developed a programme in geometry. This was recorded by Plato in the dialogue MENU.

Socrates used to direct his followers to knowledge by conducting them informally along a pathway from fact to fact and insight to insight.

Programmed Learning as 'Technological Revolution' in Education:

Programmed instruction owes its source to the psychology of learning. First psychologist whose findings bear direct significance to programming is E.L. Thorndike (1874-1949). Thorndike gave some laws of learning. According to one of his laws, the law of effect, a learner likes to replicate his performance or takes more values in further learning if the present learning gives him pleasure or satisfaction. In other words, reward, pleasure or contentment contributes in strengthening the behaviour i.e. providing instant reinforcement. In this way, the law of effect has a close link with the concept of reinforcement, which is regarded as the backbone of programmed instruction.

The name of Sydney L. Pressey (1926), inventor of a teaching machine like devices, is also linked with the source of programmed instruction. His tool contained the format of multiple-choice items having provision for instant feedback. In such a tool out of the several choice provided for answering a question only one is correct and if a student select his correct answer the tool present the next item, if not, he is required to keep on with his selection process till he selects the correct one. Although suffering from some weakness the tool or machine developed by Pressey certainly had the components of programming.

Another leading move in the way of the development of programmed instruction came in middle fifties through the idea of operant conditioning put forward by B.F. Skinner of Hardware University. In operant conditioning, response of the individual is voluntary and natural and the chance of the occurrence of these responses is increased if there is a provision of instant reinforcement. While doing experiments on pigeons, Skinner tried to develop the fundamental principle of human learning and through these principles developed a teaching learning model which is popularly known as ***Skinnarian or Linear model of programmed instruction.***

Inspired with the work of Pressey and Skinner, Norman A, Crowder in 1955, tried to build up another model of programmed instruction widely known as branching.

The sixties witness a great deal of development in the field of programmed instruction. The mentionable are the following:-

1. Near the beginning of sixties, Robert Mager and others developed a method of programmed instruction, theoretically, known as ***"Learner Controlled Instruction".*** In this method, learner and not the programmer or instructor plays the main role. The instructor remains silent while the learner motivates him to respond or help.
2. In 1962, T.F. Gilbert developed a new method of programmed instruction known as Mathetics.
3. In 1965, E.Z. Rothkopt used a new expression '***Mathemagenics'*** for clearing up the progress of learning and put forward suggestion for useful mathemagenic programming.

4. Again in 1965, Lawrence Stolurow tried to reform the field of programmed instruction by bringing the idea of ***Computer Assisted Instruction(CAI).*** CAI tries to use the computer as an all knowing teaching brain in such a way that students can interrelate directly with it without the help of a teacher.

Edward L Thorndike (1912) described the fundamental idea of programmed self-instructional materials in these words," If, by some miracle of mechanical ingenuity, a book can be so arranged that only to him who had done what was directed in page one would page two become visible and so on, much that now requires personal instruction could be managed by print." This 'miracle' later on become a reality.

Thus, the idea of individualized self instruction prompted by programmed instruction approach has reached its height by the introduction of computer assisted instruction.

In this manner, the method of programmed instruction is becoming more and more scientific and practical by using the methodical and objective principles of Mathematics, Applied Sciences and Engineering. Originating from the psychology of learning and instruction it has now been developed as one of the important aspects of instructional technology.

1.5. FEATURES OR CHARACTERISTICS OF PROGRAMMED INSTRUCTION:

1. Programmed instruction is a system or technique of giving or receiving individualised instruction from a variety of sources like programmed text-book, teaching machine, computers etc. with or without the assistance of a teacher.
2. In this system the instructional material is rationally sequenced and broken into appropriate small steps or segments of the subject matter called frames.
3. For sequencing a particular unit of the instructional material, the programmer has to pay consideration for the first or entry behaviour of the learner with which it begins and the terminal or end behaviour or the capability which student is required to attain.
4. In factual operation the starting is made by presenting a frame (a small but meaningful segment of subject matter). The learner is required to read or listen and then respond actively.
5. Programmed instruction system has an adequate provision for immediate feedback which is based on the theory of reinforcement. For example while responding to the first frame of the programmed material the learner is informed about the correctness of his response. In case he is correct, his response is reinforced and if he is wrong, he may correct himself by receiving the correct answer.

The terms Progarmmed Learning and Programmed Instruction have been used interchangeably in educational literature. The English educators prefer the use of programmed learning (PL). On the other hand, the American writers use the term programmed instruction(PI)

6. It is the communication between the learner and learning material or programme which is stressed in the programmed instruction. Here the student is actively encouraged to learn and take action.
7. Programmed instruction provides self pacing and thus learning may occur at individual rate rather than general, depending upon character of the learner, learning material and learning situations.
8. It calls for the overt responses of the learner which can readily be observed, measured and effectively controlled.
9. It has the provision for continuous evaluation which may help in improving the student's act and the quality of programmed material.

On the basis of above features we may define programmed instruction in the following ways:

Programmed instruction is a systematically planned, empirically established and effectively controlled self-instructional technique for providing individualised instruction to the learner through logically sequenced small segments of the subject matter by using the principles of operant conditioning and schedules of reinforcement.

1.6. DIFFERENCE BETWEEN PROGRAMMED INSTRUCTION AND TRADITIONAL METHOD

Sl No.	PROGRAMMED INSTRUCTION	Sl. No	TRADITIONAL METHOD
1.	It is an individualised method of instruction	**1.**	It is group method
2.	It is based on teaching principles that have been known for years.	**2.**	It becomes difficult to apply teaching principles in crowded classrooms.
3.	It presents the instructional matter step by step in logical order	**3.**	It presents the instructional matter as a whole.
4.	The size of the unit of information presented to the pupil is small.	**4.**	The unit is a lengthy one. There is no provision for response from the pupil in the type of answers to questions.
5.	Instant feedback is given to the pupil.	**5.**	The pupil does not get instant feedback.
6.	Objectives are defined very clearly in effective terms.	**6.**	Objectives are not well-defined and are usually unclear.
7.	The programmer prepares his programme with care and precision.	**7.**	Little preparation is made.
8.	The programme is prepared in such a way that the student automatically participates actively by making reactions continuously.	**8.**	The pupil usually remains a passive listener and the teacher himself does the summarizing and reviewing.
9.	A programme is developed practically through a series of tryouts and is refined gradually. Efficient sequences of frames are retained and ineffective one	**9.**	It is usually found to be very difficult to modify traditional instruction on the basis of pupil's reaction.

	discarded.		

1.7. NEED FOR PROGRAMMED INSTRUCTION:

The technology of automation is the only solution to the challenge posed by “knowledge explosion’ and ‘population explosion’. The present era, therefore, is experiencing a silent revolution in the field of education. Programmed instruction is an innovative step in this direction towards automation and individualization of instruction.

Programmed Instruction, as discussed previously, was designed to enable students to work independently at their own pace with minimal repetition of errors while advancing through material only as they prove competency. Upon first introducing programmed instruction, proponents stated its benefits to be:

1. Instruction that was less labor instensive, and therefore, less expensive. The technology of programmed instructive allowed more students to engage in the material without the need for hiring additional human instructors.

2. Programmed instruction enabled students to learn more extensively in a limited amount of time.

3. Programmed instruction utilized 'branching' which tailored instruction and feedback according to the needs and responses of each individual learner.

4. Programmed instruction adhered to Thorndike and Pressey's laws of recency, effect, and exercise by reinforcing the positive/correct responses of students and limiting the repetition of mistakes. In this manner, immediate feedback was given to address and correct student responses in order to support optimal, true learning. (Molenda, 2008)

Other benefits of benefits of programmed instruction included the idea that Pl materials could meet fixative, manipulative, and distributive measures (Uhumuavbi, 2009). For example:

5. Programmed instruction materials could be recorded and used at a later date according to the flexibility needs of each student's schedule (fixative).

6. The focus of instruction and materials could be edited and arranged so that events/subject matter that might have been missed in live instruction could be made more observable and noticeable (manipulative).

7. Programmed instruction materials can be reproduced and displayed to a large group or to mutliple individual as often and in as many various locations as are needed (distribution).

8. The technology of programmed instruction does not treat students any differently based on assumptions of gender or race. According the Uhumuavbi's article on student achievement and programmed instruction "research findings have shown that male and female students have different classroom experiences with regard to science, technology, and math courses

because human teachers tend to treat them differently. Expectations for females in some subjects are usually lower as they are declared to be for certain sex, racial ethnic groups (Uhumuavbi, 2009)".

The benefits of programmed instruction additionally include:

9. Because programmed instruction steps outside of the traditional classroom, it tends to appeal to students and leads to an improved attitude toward studying.

10. Additionally programmed instruction increases student independence and student achievement.

11. When class size increases in a traditional classroom achievement tends to decrease, but with programmed instruction this is not an issue. Student achievement is not affected by an increase in class size. (Boden, 2000)

Based on the multitude of positive effects shared above, one cannot deny that programmed instruction can indeed be very benefial to education for both students and teachers. Although it may not be the end-all answer to educational issues, it can be used as an effective tool for learning in several circumstances.

CHECK YOUR PROGRESS -1

Q.1. Who is the inventor of Teaching Machines?

Q.2. Programmed Instruction owes its origin to the psychology of _____. (Fill in the blanks)

Q.3. Name the first psychologist whose findings bear direct relevance to programming.

Q.4. Programmed Learning/Instruction is an audio-visual device. (Write True or False)

Q.5. Which law of learning is regarded as the backbone of Programmed Instruction?

Q.6. Define educational psychology.

Q.7. Write three characteristics of programmed instruction.

Q.8.Programmed learning is based on operant conditioning.(Write True/False)

1.8. SUMMARY:

- Programmed instruction is a systematically planned, empirically established and effectively controlled self-instructional technique for providing individualised instruction to the learner through logically sequenced small segments of the subject matter by using the principles of operant conditioning and schedules of reinforcement.
- Some educators are of the view that the 'Gita' is the first example of programmed learning. They also maintained that the text of the 'Gita' has several ingredients of programming: initial behaviour, small steps, active participation, terminal behaviour, immediate feedback and self-evaluation by the learner.
- Several academicians viewed that Socrates as one of the earliest programmers, saying he developed a programme in geometry. This was recorded by Plato in the dialogue MENU.
- The name of Sydney L. Pressey (1926), inventor of a teaching machine like devices, is also linked with the source of programmed instruction. His tool contained the format of multiple-choice items having provision for instant feedback.
- While doing experiments on pigeons, Skinner tried to develop the fundamental principle of human learning and through these principles developed a teaching learning model which is popularly known as ***Skinnarian or Linear model of programmed instruction.***

1.9. ANSWERS TO CHECK YOUR PROGRESS:

Answer to Q.No.1.: Sydney L. Pressey (1926)

Answer to Q.No.2.: Learning.

Answer to Q.No.3.: E.L.Thorndike (1874-1949)

Answer to Q.No.4.: False (Strategy)

Answer to Q.No.5.: The Law of Effect

Answer to Q.No.6.: Smith and Moore (1962). "Programmed instruction is the process of arranging the material to be learned into a series of sequential steps, usually it moves the students from a familiar background into a complex and new set of concepts, principles and understanding."

Answer to Q.No.7.: i. Programmed instruction is a method or technique of giving or receiving individualised instruction from a variety of sources like programmed text book, teaching machine, computers etc. with or without the help of a teacher.

ii. In this technique the instructional material is logically sequenced and broken into suitable small steps or segments of the subject matter called frames.

iii. For sequencing a particular unit of the instructional material, the programmer has to pay consideration for the initial or entry behaviour of the learner with which it begins and the terminal behaviour or the competence which student is required to achieve.

Answer to Q.No.8.: True

1.10. ESSAY TYPE QUESTIONS:

Q.1. Define programmed instruction. Discuss its nature.

Q.2. Give five salient features of programmed learning.

Q.3. Write the difference between programmed instruction and traditional method.

Q.4. “The Socratic method reappears and makes its presence felt in the concept of programmed instruction.” Explain the psychological basis of programmed learning.

1.11. FURTHER READING:

- Sampath.K and others *“Introduction to Educational Technology”*
- Chauhan, S.S. “*Advanced educational Psychology”*
- Mangal, S.K. *“Foundations of Educational Technology”*

UNIT 2
FUNDAMENTAL PRINCIPLES OF PROGRAMMED INSTRUCTION

Unit Structure:

2.1.Introduction:

A program is a subject which pupils learn. As far as programmed instruction is concerned, it is a new strategy of teaching. It is a device or strategy to control student's behaviour and help them learn without the supervision of a teacher. It is highly individualised instructional strategy for modification of behaviour.

The programmed instruction is the arrangement of materials which are to be learnt by the pupils in graded steps of difficulty; it is in such a manner and sequence that it will result in the most efficient rate of understanding and retention. It is a method of giving individualised instructions in which the student is active and proceeds at his/her own pace. Physical presence of teacher is not essential in this strategy.

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

Thus, it can be concluded that the programmed instruction is an auto instructional technique. The information is provided in small steps and each learner progresses at his/her own pace.

2.2. Objectives:

After going through this unit you will be able to :

- Identify the principles of programmed instruction
- To know the steps of programme instruction

2.3. PRINCIPLES OF PROGRAMMED INSTRUCTION:

A good programmed instruction is based upon the principles of learning. These principles are based on psychological theories. There are five fundamental principles of programmed instruction. These are the following:

1. ***Principle of small steps:*** Experiments have shown that even the dullest students can learn as effectively as the brightest students if the subject matter is presented to them in suitably small doses, in the form of steps. When we divide the task to be learnt into very small steps, and ask the students to learn only one step at a time, then probably all the students will be able to learn one small step at a time and sequentially learn all the steps. It is a difficult task to climb a mountain, but once steps are cut into it, even a child can climb it easily. This is known as the "Principle of small steps"
2. ***Principle of activity responding:*** The second psychological principle is that the students learn better and faster when they are actively participating in the teaching-learning process In our classroom teaching, the teachers do ask a few questions and the students respond. But it is not possible for the teachers to ask all the students to respond at each small step. A teaching machine text or a programmed text contains a large number of questions - one question at each small step and the students respond actively. This is the principle active responding as used for the programmes. The teaching machines and programmes have proved to be superior because they provide opportunity to every learner to respond t every small step.
3. ***Principle of reinforcement***: Every response, even if approximately correct, must be reinforced immediately. Delayed reinforcement fails to work. This is possible only when teacher has to teach only one student at a time. The ideal situation is where the teacher

can cater to the needs of all his students individually. But in classroom teaching, this is hardly possible. No teacher, however efficient and sincere he may be, can reinforce each correct response of each of his students as soon as it is made in a classroom situation where he has to teach about 40/50 students. The teaching machines and the programmers do the job far more efficiently.

4. ***Principle of self-pacing***: The programmed instruction is based on the basic assumption that learning takes place effectively if the learner is allowed to learn at his own pace. Therefore, a good programme of the material always takes care of the principle of self-pacing A learner moves from one frame to another according to his own speed of learning
5. ***Principle of student-evaluation or student testing:*** Continuous evaluation of the student and the learning process leads to better teaching-learning. In the programmed instruction, the learner has to leave the record of his responses because he is required to write a response for each frame on the response sheet. This detailed record helps in revising the programme.

ANOTHER CLASSIFICATION OF PRINCIPLES OF PROGRAMMED INSTRUCTION :

Prof Edward Fox has classified the principles of programmed instruction in two broad categories: Mandatory Principles and Optional Principles

- **Mandatory Principles**:

1. Principle of objective specification.

2. Principle of empirical testing

It includes: (a) Individual try-out, (b) Small group try-out. (c) Field try-out.3. Self-pacing.

- **Optional Principles**

4. Overt responding

5. Immediate feedback.

6. Small step size.

2.4. RULES CONCERNING THE ART OF PROGRAMMING:

Klaus summed up 12 rules of the art of programming and building instructional frames:

1. ***Active responding***: A learner learns from making a response and not from hearing or seeing it.
2. ***Proper cueing:*** The provision of proper cueing is the main difference between a test question and an auto-instructional frame.
3. ***Appropriate context:*** This is the kind of stimuli that will be capable of evoking the desired response at some time in future.
4. ***Small steps:*** It is very desirable that the subject matter should be divided into as many small steps as possible.
5. ***Sequence of topics:*** The topics of the subject matter should be carefully sequenced so as to provide adequate motivation.
6. ***Frequent repetition:*** Cues associated should be changed and frequent repetition provided in frames.
7. ***Knowledge of subject matter and technical accuracy***: A sound knowledge of these is essential for preparing a suitable and effective programme.
8. ***Lecturing to be avoided:*** The learner should be helped to learn. This is only possible if we provide facts to the learner.
9. ***Evoking a relative response:*** Right kind of illustration should be used for evoking a response.
10. ***Providing cues in adequate number:*** Excess of cues will prevent the learner from making his own generalizations and discovering principles.
11. ***Not assuming too much knowledge:*** The programmer should not assume too much knowledge on the part of the learner.
12. ***Presenting of facts in frames:*** Only one fact should be presented in one frame.

2.5. EFFECTS OF PROGRAMMED LEARNING ON THE TEACHING PROCESS:

(i) Tutorial experiences are provided for individual learners on a large scale, wherein the learner may proceed at his own rate.

(ii) Programmed instruction can exercise control on homework and individual study.

(iii) Programmed instruction can enable the learner to catch up if he has fallen behind in his learning schedule due to absence from school.

(iv) Programmed instruction provides a technological solution to the problem of individual differences. The lack of programmed instructional materials would compel the teacher to design his presentation to cater to what he senses is the student of average

ability. But such a presentation is bound to be too slow for the bright students and too fast for the slow ones.

(v) The availability of instructional material of a programme and its powerful tools allow the teacher to be much more professional in his approach to teaching than he now is.

(vi) By interpreting the feedback obtained through oral questions and discussions in the class, the teacher can intelligently adjust the flow of information or further instruction.

(vii) A basic feature of teaching machines is immediate knowledge of results followed by immediate correction of errors and instant rewards for correct answers. It has been established by research that more frequent the rewards, the better the learner assimilates the material.

(viii) It eliminates cheating because the learner has nothing to gain by it.

(ix) The students prefer the use of machines over studying from a textbook.

(x) It eliminates the influence of teacher variables, as shown by research.

(xi) Immediate scoring promotes the learning process.

(xii) The technique is valuable in giving tests which can be automatically scored.

Professor John Blyth and **John Jacobson** described the following uses of programming

i. No class time is wasted on drill.

ii. Examination of students' work on the programme can enable all concerned to prepare for a class period with prior knowledge of the points that are needed for further clarification.

iii. No time is wasted in locating and correcting misconceptions the students may be entertaining, on account of unchecked practices.

iv. Classroom efficiency may increase by about 30 per cent, since more material can be covered in less time.

v. Individual differences may be reduced to a considerable extent.

vi. Difficulties of the students can be easily diagnosed.

vii. Individual and class differences can be easily located.

viii. There can be a marked increase in the level of interest and overall morale.

2.6. STEPS OF PROGRAMMED INSTRUCTION:

The program process is highly vibrant, demanding and time-consuming exercise. The programmer must be expert person to write the programs. It has three major steps.

Namely:

I. **PREPARATION**: This step involves the following sub-heads.

(a) Selection of theme or units, to be programmed

(b) Preparing a content outline.

(c) Defining objectives in behavioural terms

(d) Constructing a test of entering behaviour.

(e) Constructing a test of terminal behaviour.

II. **WRITING THE PROGRAMME**: This step involves the following sub-headings:

(a) Presenting the material in frames.

(b) Provide for dynamic student response.

(c) Provide for verification or correctness of student response or reinforcement.

(d) Use prompts to direct student response.

(e) Provide careful sequencing of frames.

III. **TRYOUT AND REVISION:** After editing the draft, the program must be read by subject matter for expert to check in accuracy's in the content. Then it is tested validity by administering the program to group of pupils. Based on its evaluation, the revision of program density is calculated as given below.

(1) ERROR RATE: This is calculated on the basis of response given by the learners for each frame in the program. The formula to calculate the error rate is -

$$\text{Error Rate} = \frac{\text{Total Number of errors}}{\text{Total Number of frames X Number of learners taking the program}} \times 100$$

(2) PROGRAMME DENSITY: It is measured in terms of type taken ratio (TTR), which is calculated using the formulae –

$$\text{TTR} = \frac{\text{Number of different responses required in a section of the program}}{\text{Total Number of responses required in a section of the program}}$$

2.7. OUTCOMES OF PROGRAMMED LEARNING ON THE TEACHING PROCESS:

(i). Tutorial experiences are provided for individual learners on a large scale, wherein the learner may proceed at his own rate.

(ii). Programmed instruction can exercise control on assignments and individual study.

(iii) Programmed instruction can facilitate the learner to catch up if he fallen behind in his learning programme due to absence from school.

(iv). Programmed instruction provides a technological explanation to the problem of individual differences. The lack of programmed instructional materials would force the teacher to design his presentation to provide to what he senses is the student of average capability, but such a presentation is bound to be too slow for the bright students and too fast for the slow ones.

(v). The ease of use of instructional material of a programme and its influential tools allow the teacher to be much more professional in his approach to teaching than he now is.

(vi) By interpreting the feedback obtained through verbal questions and discussions in the class, the teacher can intelligently change the flow of information or further instruction.

(vii) A essential quality of teaching machines is 'immediate knowledge of results' followed by immediate correction of errors and instant rewards for correct answers. It has been established by investigate that more frequent the rewards, the better the learner understand the material.

(viii). It eradicate deception because the learner has nothing to gain by it.

(ix). The learners prefer the use of machines over studying from a textbook.

(x). It eradicate the influence of teacher variables, as shown by research.

2.8. MERITS OF PROGRAMMED LEARNING:

Programmed learning is well thought-out to be more well-organized method of teaching-learning. Its advantage is well-established over the conventional methods of teaching-

learning. It is increasingly being used in highly developed countries. It is realised that programmed instruction has the possibility to transformed the theory and practice of teaching.

Following are the principal merits of programmed learning:

(i) A well-programmed learning is a great force in the way of individualised instruction, as it is modified to the needs of the individual learner in the class.

(ii) It allows an individual learner to improvement at his own speed. An intelligent learner no longer needs to be bored or allowed to lose interest on account of slow development of other learners of the class. He can make progress at his own pace, even if it is faster than the rest of the class.

(iii) Since a programme requires constant response from the learner, it overcomes inactivity and passivity on the part of the learner.

(iv) The teacher can give description in the classroom if the error is common, or he may arrange individual conferences on definite points.

(v)Well-programmed instruction is a chief thrust in the way of individualised instruction as it is tailored to cater to the needs of individual students.

(vi) Learning material by way of programmed instruction is presented in such a way that learning look like an interesting game, motivating the learner to meet the challenges as per his own capacities.

(vii) It is the experts who developed the Program. They are experimentally tested and modified till they are standardised. Some learners can use a single good programme and thus save on textbooks.

(viii) In programmed instruction, the learner is instantly reinforced to spot on his response. This reinforcement sustains the motivation of the learner.

(ix) The self-instructional method presents material whose difficulty is simplified through the analysis of the subject matter, into small and more easily assimilated parts of information.

(x) The introduction of programmed instruction is of a great importance for developing countries which need to instruct millions of learners and are short of teachers.

2.9. DEMERITS OF PROGRAMMED MATERIALS:

Programmed materials have been severely criticised as threatening to replace the teacher.

It is argued that there is too much importance in learning facts and very little importance on the mastery of principles and concepts.

Some critics of programmed instruction maintain that the user of a programme does not know where he is moving.

Again they opined that the learners are not aware of the organisation and programmed instruction is unrelated to other features of instruction.

Another demerit of programmed instruction material is that it is very costly and only rich nations can afford it.

It is also stated that the progress and use of programmed instructional material requires expert knowledge and training. An average teacher finds it very hard to make use of this machine.

CHECK YOUR PROGRESS – 1

Q.1. Write three advantages of learning.

Q.2. Write three limitation of programmed instruction.

Q.3. What are the Objectives of Programmed Learning/Instruction?

Q.4. What are the principles of programme learning?

2.10. Summing Up

- Principles of Programme Instruction are: i). Principles of small steps, ii). Principles of active responding, iii). Principle of reinforcement, iv) Principle of self-pacing, v) Principle of student-evaluation or student testing.
- Steps of Programming- (i). Preparation, (ii). Writing the Programme, (iii). Tryout and Revision.

2.11. ANSWERS TO CHECK YOUR PROGRESS:

Answer to Q.No.1.: (i). A well-programmed learning is a great thrust in the direction of individualised instruction, as it is tailored to the needs of the individual learner in the class.

(ii). It permits an individual learner to progress at his own speed. An intelligent learner no longer needs to be bored or allowed to lose interest on account of slow progress of other

learners of the class. He can make progress at his own pace, even if it is faster than the rest of the class.

(iii). Since a programme requires continuous response from the learner, it overcomes inertia and passivity on the part of the learner.

Answer to Q.No.3.: (i). It is also argued that there is too much emphasis in learning facts and very little emphasis on the mastery of principles and concepts.

(ii). Some critics of programmed instruction maintain that the user of a programme does not know where he is headed.

(iii). They also point out that the learners are not aware of the organisation and programmed instruction is unrelated to other aspects of instruction.

Answer to Q.No.3.:

(i) Help students to learn by doing.

(ii). Provide the situation where learning is at learner's own pace.

(iii). Help students to learn without the presence of a teacher.

(iv). Present the content in a controlled manner and in logically related steps

Answer to Q.No.4.:

Principles of Programme Instruction are: i). Principles of small steps, ii). Principles of active responding, iii). Principle of reinforcement, iv) Principle of self-pacing, v) Principle of student-evaluation or student testing

2.12. ESSAY TYPE QUESTIONS:

Q.1. Discuss about the basic principles of programme instruction.

Q.2. What are the rules concerned with the art of programming.

Q.3. Effects of programme learning on the teaching process.

Q.4. Write about the steps of programme instruction.

Q.5. Write the merits and demerits of programme learning.

2.13. References/Suggested Readings

- Sampath.K and others *"Introduction to Educational Technology"*

- Chauhan, S.S. "*Advanced educational Psychology"*
- Mangal, S.K. *"Foundations of Educational Technology"*

UNIT-3
STYLES OF PROGRAMMING.

Unit Structure:

3.1. Introduction

The person most responsible for applying behavioural principles to education is B. F. Skinner (1954) whose theory of operant conditioning provides the basis of developing programmed instruction strategy.

The theory of *operant conditioning* represents the process by which human behaviour becomes shaped into certain patterns by external forces. The theory assumes that any process or activity has observable manifestations and can be behaviourally defined, that is defined in terms of observable behaviours. Either or both of the theory's two major operations, reinforcement and stimulation-control, are emphasised in the educational applications of operant conditioning theory.

Conditioning refers to the process of increasing the probability of occurrence of existing or new behaviour in an individual by means of reinforcement. In operaNt conditioning the response or behaviour operates upon the environment to generate consequences. The consequences are continent upon the emission of a response, and they are reinforcing.

B.F. Skinner and *E.L. Thorndike* are alike in being connectionist theorists who emphasize reinforcement as a basic factor in learning, who take a keen interest in problems of education and who do emphasize theory. Skinner has made it quite explicit in his system.

B.F. Skinner's Theory is called as an operant conditioning. The term operant conditioning is applied by Skinner in (1938) to a procedure of exciting control over the behaviour of an organism in a relatively free environment by means of the appropriate use of reinforcement. In some of its application, operant conditioning represents a maximum of flexibility in contrast to the less flexible behaviour involved in classical conditioning and instrumental conditioning.

Kind of Learning:

B.F. Skinner recognizes two different kinds of learning. They are different because each involves a separate kind of behaviours:

(1) Respondent behaviour, and (2) Operant behaviour.

(1) Respondent Behaviour- This type of behaviours is emitted by presenting the specific stimuli. It is formed of such specific stimulus-response connections-called reflexes. We are born number of reflexes. Skinner emphasizes the reinforcing role of the unconditioned stimulus.

(2) Operant Behaviour-This type of behaviour is of a different kind. Skinner refers to as operant behaviour of this kinds which most occurs. The characteristics of operant is that it occurs in the environment.

There is no specific stimulus which will emit an operant behaviour. Skinner has termed it as operant behaviour as being evoked by the organism rather than elicited by stimuli. Most of

the human behaviours are of this kind e.g. walking, talking, working and playing are all made up operant responses.

Skinner does not mean to say that operant behaviour is no influenced by stimuli. Much of his analysis of behaviour is concerned with ways in which operant behaviour is brought under the control of stimuli. The learning of operant behaviour known as conditioning but it is different from the conditioning reflexes.

THEORY OF OPERANT CONDITIONING:

The theory of operant conditioning is formulated by ***B.F Skinner*** Professor Psychology in Harverd University USA. He conducted experiments on rats and pigeons in developing this theory.

'Operant conditioning is the learning process where by a response is made An operant is strengthened or reinforced.'

The ***S-R theories*** give emphasis on stimulus which helps in respondent behaviour. But Skinner has reversed the sequence and emphasizes the (R-S) theory learning. Because operant behaviour is not emitted through a stimulus. The desirable behaviour is evoked by generating an environment.

Skinner's refusal to ask why a stimulus has reinforcing properties is part of the general resistance to the formulation of theoretical properties. He takes the position that when we known enough exercise control over behaviour. Skinner theorizing about the behaviour, thus remains consistently informed, inductive and implicit rather than formal deductive and explicit. He prefers to develop broad empirical generalization rather than specific constructions. Skinner's theory has no intervening variables, thus it is an empty organism theory of learning. The operant conditioning is represented by the following paradigm of Learning.

The operant conditioning is represented by the following paradigm of learning:

$S_1 \longleftarrow R \longrightarrow S_2$

Stimulus Reinforcement

or $\longleftarrow$ Response $\longrightarrow$ or

Environment Reinforcing STimulus

The stimulus and reinforcement are independent variables upon which the response is dependent as Skinner phrases it "....the stimulus acting prior to the emission of the response, sets the occasion upon which the response is likely to be reinforced." A stimulus is "any condition, event or change in the environment of an individual which produces a change in behaviour." It may be verbal (oral and written) of physical. A response may be defined as

unit of behaviour. It is the basic unit upon which complete performance or response repertories are built. Response may be defined as a unit of behaviour. Response repertories consist of many kinds of responses which are functionally related. The response is an every changing. Some what artificial unit of behaviour. In a classroom the condition upon which reinforcement will occur depends upon the standard set by the teacher, with skill development, for instance, a poor writing performance is acceptable for the beginner. However, with increasing practice the teacher expects greater accuracy.

The initial response must exist in some strength in the individual repertoire, the task of the instructor is to build more complex patterns of responses from this initial response by changing the contingencies. Since behaviour is continuous activity, its breakdown into identifiable units to facilitate analysis is necessarily somewhat artificial, but is useful, especially when simple responses must be built into more complex ones.

According to Skinner, reinforcement must immediately follow response if it is to be effective. Delayed reinforcement is much less effective in modifying behaviour. This contrasts sharply.

Skinner does not ask why a stimulus is reinforcing, he seeks to determine that a stimulus has reinforcing properties can be shown by a simple test. The rate of emission is called the operant level. In Skinner term, reinforcing may be either positive or negative. A positive reinforcing stimulus increases the rate of operant responding when it is applied immediately after each response. Punishment is defined as the removal of a positive reinforcer or application of negative reinforcing stimulus.

3.2 UNIT OBJECTIVES

After going through this unit you will be able to

- Discuss the different types of programmed learning.
- Identify the origin, meaning, definition, nature, merits and demerits of linear programming, branching programming, mathetics programming

3.3 STYLES OF PROGRAMMING:

In programmed instruction the presentation of the learning material or subject matter to the learner in a suitable form is termed as programming. Various types of programming have emerged because of researches and experimental studies in the field of programmed instruction. Some of the mentionable are listed below:

(1) Linear or extrinsic Programming.
(2) Branching or intrinsic Programming.
(3) Mathetics Programming.
(4) Rule system of programming
(5) Computer Assisted Instruction (CAI)

(6) Learner Controlled Instruction (LCI)

The first three types – linear Branching and Mathetics – represents the actual basic formats. The rule system represents inductive and deductive approach. The CAI and LCI are actually the ways and means of providing instructions.

3.3.1. LINEAR OR EXTRINSIC PROGRAMMING:

B.F. Skinner of Harvard University developed linear programming model. Psychologists have defined it as *"A programmed material sequence in which each student proceeds in a straight line through a fixed set of items."* This type of programme is also called Skinnerian type of programming because for the first time he used this type of sequence to form the behaviour of animals and prepared ground for human learning.

The instructional material in Linear programming is sequenced into a number of significant small steps called frames. These frames arranged in sequence are presented one at a time to the learner. The learner is required to act in response actively at each step. Immediately learner gets the feedback regarding the exactness of the response. This reinforces the learner and inspires the learner to process to the next frame at his own pace of learning. By passing through all the frames of the program, the learner acquires the desired learning experiences and changes his behaviour.

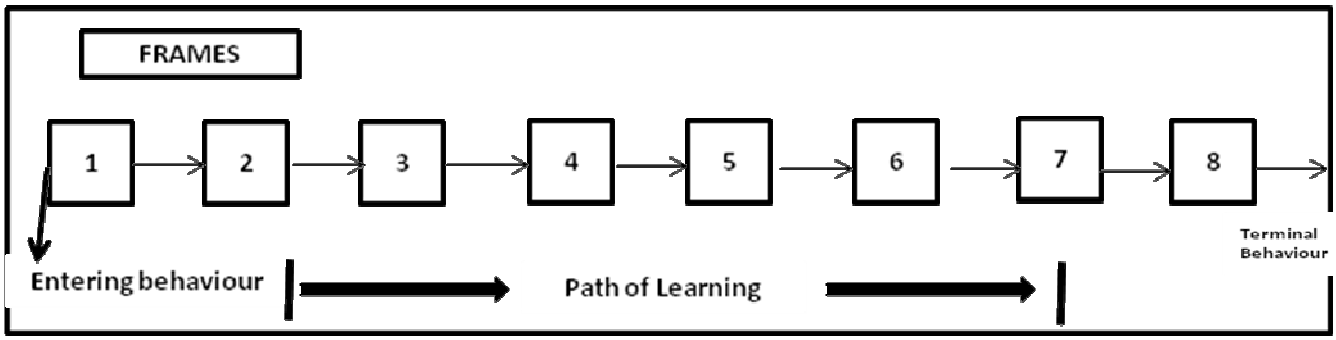

Fig: 3.1: Linear Programming

3.3.1(a) CHARACTERISTICS OF LINEAR PROGRAMMING:

1. Linear means scheduled in a straight line. Generally, in linear programme, information is broken down into small steps of 40 to 50 words in length which is called a frame. The learner must respond to each frame in series by filling in word or phrase in a blank.

2. *Linear arrangement:* In such type of programme, the learner proceed in a single series of short steps which are designed to make sure a high rate of correct responding to the questions

(frames). Each learner follows same path. The learner starts from his first behaviour to the terminal behaviour following straight-line sequence. All learners pass through the same path.

3. *Responses are controlled:* In linear programme, the programmer controls responses. The responses and their order are fixed. The learner has no option to respond in his own way.

4. *Response is emphasised:* In linear programme, the importance is laid on response. The learner must respond to each frame in order the learning to occur.

5. *Feed-back is quick:* As soon as the learner responds the frame he can immediately compare his response with the response of the programme.

6. *Provision for prompt:* In the beginning, prompts or cues are supplied to helps learning to occur.

7. *Cheating* is dejected by not revealing the answer to the learner.

8. S.D. *is important* and is emphasised in linear model.

9. It may be used from first position.

10. Learner can leave out certain frames.

11. Reaction are self-constructed.

3.3.1(b) DEMRITS OF LINEAR PROGRAMMING:

1. N*eed of motivation:* It is assumed that learning becomes boring and learners experience dullness and tediousness. It take too a large amount time to teach very few points.

2. *No place for freedom of choice:* The learner has no alternative of his own to respond, thus, it is alleged that inventive imagination of learner is inhibited.

3. *Expensive:* The researcher found that the preparation of programmed material consumes too much paper and time.

4. Rothkopf that opines that in many programmes, the learners find out the hint as to what is to be filled in blanks and important terms are guessed.

5. It can be used in limited areas where the behaviour is calculable and noticeable such as maths and science.

6. S.L. Pressey and his associates have enquired the value of linear programming format on the following grounds:

(a). Serial Order: The frames are presented in sequential order.

(b). Penetrating of material is not allowed as in a textbook. Judgemental learning is not adapted.

(c). Linear programming does not allow discrimination among responses.

7. Students do not contribute for innovation of answers except to follow a rigid line set by the programme.

8. Programmes are generally designed with a view that learner has no previous background of the subject matter. It is very difficult to find out exactly the background of each learner.

9. In case of book form presentation, learners are likely to be sincere but from all learners we cannot expect sincerity. They can see the right response without reading the frames.

CHECK YOUR PROGRESS-1

Q.1. _____ developed the Linear Programming mode.(Fill in the blanks)

Q.2. According to linear programming Recall is more important than recognition in the learning process. (Write True/False)

Q.3. What are the three major types of programmes for programmed learning.

Q.4. What are the structure of the frames of linear programme?

Q.5. The Linear programme is based on the learning theory of _____. (Fill in the blanks).

Q.6. In linear programme every learner follows the _____ path. (Fill in the blanks)

3.3.2. BRANCHING OR INTRINSIC PROGRAMMING:

Norman A. Crowder originated the branching or intrinsic programming. He has given its definition as: "It is a programme which adapts to the needs of the students without the medium of extrinsic device as a computer." It is called intrinsic because the learner within himself makes the choice, to become accustomed with the instruction to his needs.

The underlying principle of intrinsic programming postulates that the basic learning takes place during the student's exposure to the new material on each page.

3.3.2(a). ORIGIN BRANCHING PROGRAMMING:

Origin Branching programming got started by way of an ordinary practical training problem. In (1954) Norman & Crowder was a psychologist with United State Air He was asked to investigate the training of aircraft maintenance men These technicians were being taught to 'trouble shoot' or repair faults, in a bomber navigation system.

Crowder found that trouble-shooting was best learned through solving problems Using the real equipment, under guidance from a qualified human tator unately qualified tutors were few. He solved his problem with the aid of Spects a screen and a panel of buttons. He built a simulator which stood in the real bomber-navigation system and, at the same time, acted very much like a private tutor.

It makes no assumption about the nature of learning process and further a has no theoretical basic about how education should be conducted. It is a technique for preparing written materials that will accommodate quite a large range of educational purposes. In a branching programme item the student is given a don discussion of the material to be learned Followed by a multiple choice question designed to test the point just discussed. Each answer alternative has a page number beside it. The student chooses what he believes is a correct answer to the question and turns to the page number given for that answer. If he has chosen correctly he is lead to next item and if he has chosen an incorrect answer, he is directed to a page where in the reason for incorrectness is dismissed.

The strategy of Norman, A Crowder formerly U. S. Industries Inc. was also essentially stimulus-centred. For Crowder, 'The essential problem is that of controlling communication process by the use of feedback. The student's response serves primarily as a means for determining whether the communication process has been effective and at the same time allows appropriate corrective or remedial action to be taken when the communication has been ineffective'. Crowder's approach is thus based essentially on a psychology of individual differences. Indeed, he is very little concerned or interested with the nature of the learning process itself.

Thus, the identifying feature of Crowderian programme is the way in which material is presented to the student on the basis of his performance. The branching programming in particularly suitable for dealing with material that involves complex problem solving strategy. The subject matter should have a logical basis or structure which can be systematically developed frame by frame.

3.3.2(b). BASIC THEORY OF BRANCHING PROGRAMMING:

Originally branching programming has no theoretical basis because Crowder develops the strategy on the basis of his training experience. The following theoretical basis may be attributed to this strategy:

(1) This style provides more information per frame. It also employs multiple choice response pattern, i.e. a student is required to discriminate the choose the one right answer which is presented along with a number of other plausible but incorrect answers. Learners who make the wrong choice from among those presented, are asked to follow another trade or branch which corrects their error or further classifies the point in question. The branching sequence may continue for a number of frames, again depending on students responses, before he finds himself on the main track.

(2) The assumption in branching programming, according to David Cram is that a wrong response does not necessarily hinder in learning of a correct response. The responses is useful mainly in guiding the student through the programme. Each response is used to test the success of the latest communication to the student and in that sense, it gets the programme known, where to take the student next. It follows the method of trial and error, learning.

(3) In a branching programme, the response takes the form of a choice of various answers. The student is much more likely to err in this programming. He is almost encouraged to do so. The wrong answers suggested by the programme are certainly chosen to correspond with popular misconception or frequent errors that are shown by experience to be likely to occur at that particular stage of instruction.

(4) Such a programme works like this: we arrange a logical sequence of information, and we put it do the student one point at a time. We give his just as much information as we thing he can handle, this will vary from one sentence to several paragraphs. But each new unit of information is followed by multiple-choice questions, i.e. we ask a questions and allow the student to check his own answer against a list of several alternative answers. Only one of these answers, normally is correct: the other will represent plausible errors which the student could only have reached by following some particular false trial.

The above pattern of multiple-choice question are only necessary whenever we want to say something special to students who can not get the right answer straight away. At other times, we may prefer to use one of the following forms:

(1) Constructed-Response Questions.

(2) Constructed-Choice Questions

(3) Block Questions and

(4) Linear Sequence.

(1) Constructed-Responses Questions- These are the questions to use when we want the student to decide on (construct) his answer without being shown any alternatives. We pose the questions in the normal way and we ask the students to write down his answer. We leave it to the students to decide on the rightness of his answer. We are not offering remedial help against his going wrong but he can return to look over the previous pages.

(2) Constructed-Choice Questions- The students is asked to write down his answer to a direct question and then turn a page to check his answer. When the reaches the next page, he is reminded of the question and is given a set of alternative answers from which he must chooses and the one that most resembles his now. If he chooses an incorrect answer, then we give him remedial help in the usual way.

(3) Block-Questions- These rather like the comprehension questions commonly used to test a passage of reading in an English examination. The student as presented with quite a chunk of information and is expected to answer several gestions about it. This format would be quite wrong for the initial teaching The dent is being asked to process a lot of information and make several quite involved responses Further more, he will be given neither immediate knowledge of result individual remedial help.

(4) Linear Sequences- Some times we may want to use a linear sequence in our basically branching programme-particularly when we have to get the student de some memorising; for mulating symbols, related technical terms, arbitrary but fixed procedures.

This is the kind of learning that will need more practice-much more than will conceptual understanding.

3.3.2(c). FUNDAMENTAL PRINCIPLES OF BRANCHING PROGRAMME:

The branching programme is based on the three fundamental principles:

(1) Principle of Exposition- The learner should perceive the whole phenomena which should be so exposed to him. It means a student learns better if the whole concept is presented to

him. The complete information is provided on Home page. It serves two purposes teaching and diagnosis.

(2) Principle of Diagnosis- The principle refers to identify the weakness of learner. After exposition it is assessed whether he could learn the concept or not if he could not learn what are the causes for it. A multiple choice format is used to diagnose the weakness of the learners.

(3) Principle of Remendiation- The diagnosis provides the basis for remendiation. The remedial instruction are provided on Wrong page. If a learner chooses wrong alternative, he has to move to a Wrong Page Where remedial instruction is provided to him a direction to return to Home Page. He is asked to choose the right response. It is known as a principle of remendiation.

3.3.2(d). CHARACTERISTICS OF BRANCHING MODEL:

1. Material in a frame is larger; a lot information is presented at each step. A step may consist of two to three paragraphs and occasionally a full page.

2. The method of student response is different from the linear model, student has to make choice out of a number of choices. Multiple-choice questions are asked. Each response to the question is keyed to diverse pages. If the learner selects right response, his response is confirmed and in case he selects wrong response, then he is routed to material which clarify as to why he is wrong.

3. Crowder holds that teaching is communication and so he focuses his attention upon the enhancement of communication.

4. Learner has freedom to decide his own path of action according to the background of subject matter. The learner controls the correct sequence that he will follow.

5. The programme has plenty of chance to utilize the literacy style.

6. Students are more aware and deliberate on the subject matter more carefully.

7. Revealing and correction of errors is essential. Crowder holds that making error is necessary to learning. He permits 20 per cent errors in his model. In such a model first the errors are revealed and then corrected. Learner can make out why he is wrong. Crowder says that it is unrealistic to remove errors in the process of learning.

8. The vital and categorizing attribute of branching model is the fact that the material presented to each student is constantly and directly controlled by the learner's performance in answering questions.

9. Intrinsic programmed material when presented in a book form, the book is called scrambled book because the pages do not follow in regular sequence.

10. It is very helpful to concept learning or where the material is given in larger steps.

11. The role of active response is not central in intrinsic theory. Intrinsic programmes offer less direction to learner as to what material in the frame is important.

3.3.2(e) ASSUMPTION OF BRANCHIING:

i. Learning takes place better if the subject matter is presented in its whole form.
ii. Learning takes place better if the subject matter is presented in the form of significant components or units.
iii. Wrong answers do not essentially hamper the learning of a correct answer.
iv. Multiple-choice items assist more in the learning process.
v. It is based on the possibility of revealing and correcting errors.
vi. Vital learning takes place during the learner's disclosure to the new material.
vii. Learning takes place better if the learner is allowed enough freedom to take choices for adopting the instruction to his needs.

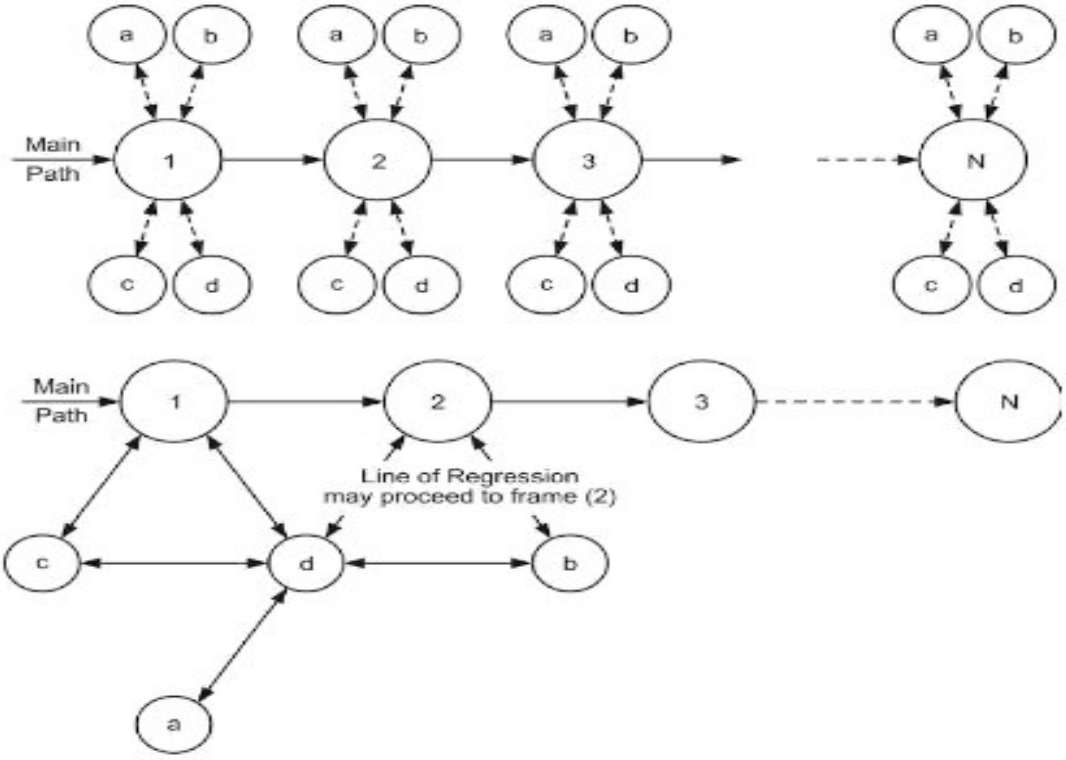

Fig. 3.2.: Main path and branching in branching programme.

3.3.2(f) MERITS OF A BRANCHING PROGRAMME:

i. Big size of a frame as well as the branching reduces unnecessary repetitions and responding, thus reducing the amount of learning time and fatigue.
ii. The drawback and consequences of incorrect logic are usually explained in the remedial frames so that the learner not only gets the correct response but also understands why some other response is not correct.
iii. Instead of simple response, it provides choices in the form of multiple choices.
iv. Through its broad frames, branching programme presents for more freedom to respond and scope of choosing one's own path of learning according to one's need. Thus, it helps in maintaining the interest and initiative of the learner.
v. Branching programme is helpful in the progress of the power of discrimination of the learner.
vi. Branching programme helps in the development of originality and problem-solving capability.
vii. Branching is most useful in the areas beyond facts, definitions and fundamental skills.
viii. The frames, being of larger size, contain a good deal of information and this may enable the programmer to enrich his method and develop his ideas.

3.3.2(g).DEMERITS OF BRANCHING:

1. The learner may guess the right response devoid of understanding the subject matter of the frame.

2. Endless branching cannot be provided. It can not make available to the needs of all individuals. It is very complicated to find out the total number of branches for every individual.

3.Preparation method is very expensive, audio-visual equipments is costly.

4. The programme needs review after every two years which is a very costly affair.

5. Programmes are the product of programmer's imagination and it is who decides analytical questions and level of content.

6. Branching model can be used after VI grade because small children do not understand its mechanism.

7. It is very hard to ask questions on the whole matter of frames because frames are too large and sometimes essential subject matter is left.

3.3.2(h).COMPARISON BETWEEN LINEAR AND BRANCHING PROGRAMMING:

	Linear Programming		Branching Programming
1.	**Exponents** : B.F. Skinner (1954)		Norman A Crowder (1954)
2.	**Source of Origin:** Psychological laboratory experi-ments. Application of operant conditioning learning theory to teaching		Semi-industrial situation with emphasis on efficient instruction to improve job performance. Its origin is form human training technique
3.	**Learning Theories:** It is based on the operant conditioning learning theory its response-centred approach of learning.		It is based on cognitive theories of learning i.e., problem solving approach. It is stimulus-centred strategy of learning.
4.	**Principles:** Has five fundamental principles: Small step, Active responding. immediate confirmation, self pacing and student testing.		It employs three basic principles: principle of exposition, diagnosis and remedation
5.	**Assumptions:** (a) Students learners better if content is presented in the small units. (b) Student's response should be immediately reinforced for learning (c) Students error hinder is learning.		(a) Students learns better if the whole content is exposed. (b) Students errors help in diagnosis and does not necessarily hinder in learning (c) Students learns better if the

	(d) Student learns better if he gets the freedom to learn or own speed.		remedition is provided side by side for weakness of the learner.
6.	**Frame Size:** Small step, may be one sentence or two frame.		Large size, may be para or page in in a frame.
7.	**Frame Structure:** Three aspects: stimulus, response and reinforcement		Three aspects: Exposition or presen tation, diagnosis and remediation
8.	**Types of Frames:** Linear has four types of frames: Introductory, teaching practice and testing frames.		Two types of frames are used in intrinsic programme: (1) Home page teaching and diagnosis. (2) Wrong page Remediation is given.
9.	**Response**: It employs the construct response The response is controlled by programmer not be the learner. Response is the internal part of learning		The multiple choice question is given to select the response. The response is controlled by learning not by the programmer.
10.	**Reinforcement:** This strategy is based on the theory of reinforcement. The confirmation of correct response provides the reinforcement to the learner. The continuous reinforcement is provided. The wrong response is ignored		The correct response is confirmed and approved to provide the reinforcement. The wrong response indicates the weakness of the learner and remediation is given the difficulties of the learner.
11.	**Error:** The student errors hinder in learning. The student will not learn if he commits error. The error-rate should be less than 10 percent in criterion programme.		The student errors do not necessarily hinder in learning but helps in diagnosing the weakness of the learning for which remediation can be provided The error rate should be more than 20 percent.
12.	**Individual Difference:** The principle of self-pacing or freedom of time facilitates the individual variation in learning process.		The branches are provided to choose the path of learning by each and every learner according to his own needs and requirements. Every learner follow his own paths of learning.
13.	**Form of Text:** Linear programme text is same the conventional book. The content matter is presented into small units. The sequence is followed.		Branching programme text is known a scrambled text. It is different from conventional books. The sequence of page is not followed in it.
14.	**Machine:** Linear programme is presented usually rough teaching machine. Very simple		It is rather difficult to use teaching machine in presenting the intrinsic programme A complex and costly

	cheap model of teaching machine is used.		model is required for this purpose.
15.	**Purpose or Use:** a. Modification of behaviour is the focus of linear programme. b. It can be effectively used for secondary level of students. c. Lower objectives of learning can be achieved effectively. d. It is very useful for average and lower intelligence students. It can be used for correspondence education lesson.		a. The main focus is to provide the remediation to the difficulties of the learner. b. It can be used effectively for higher classes. c. Higher objectives are realised by this strategy of programme d. High intelligence student learners better by branching Remedial instruction can be given to correspondence students.
16.	**Limitations:** a. It does not provide the freedom to the student to respond or to learn according to his own. b. It is based on learning theory which bas been formulated be experimentation on animals. Human go through it. The students do not prefer learning is different from animals branching programme learning. c. Every learning has to follow the same path. There is no remedation for wrong response.		a. It does not consider the learning process and its structure. It is problem solving device. b. The sequence of pages are not followed, hence students do not like to go through it. The students do not prefer branching programme. c. It gives more emphasis on remediation rather teaching Hence it is only tutorial approach of learning

CHECK YOUR PROGRESS-2

Q.7. Who developed Branching Programming?

Q.8. Branching programme is _____ centred.

Q.9. What is the basic structure of Branching/Branched programme?

Q.10. What are the major forms of Branching Programme?

Q.11. Branching programme is also called _____

3.3.3 MATHETICS PROGRAMMING:

Thomas P Gilbert (1962) is the originator of the idea of mathetics. According to him, *"Mathetics is the systematic application of reinforcement theory to the analysis and construction of complex behaviour repertories usually Known as subject matter mastery, knowledge and skills. Mathetics, if applied diligently, produces materials that exceed the efficiency of lessons produced by any known method."*

The word 'mathetics' is derived from the Greek word 'mathein' which means 'to learn'.

There are two unique types of programming techniques: one stressing the subject matter and its action and the other stressing the behaviour. Mathetics falls under the second category.

Mathetics is eclectic in nature but it is exceptional in application. It analyses the deficiencies and tries to make up for them. The success of task analysis depends to a great extent on the capability and dependability of data. The term 'task analysis' suggests the breaking down of the task into its basic parts and involves detailed listing of component behavioural elements of a job or task. A task analysis is really an inventory to which knowledge, skills and attitudes are identified and isolated with a view to ultimately synthesising them into a hierarchical organisation relevant to the writing of learning prescription.

Task analysis is of three types:

(i) Analysis of topic, (ii) Analysis of job, and (iii) Analysis of skills.

3.3.3(a) MAIN CHARACTERISTICS OF MATHETICS PROGRAMMING:

(i). Like any other well-thought out instructional plan, a mathetics programme begins with a thorough analysis of what is to be taught.

(ii). In mathetics, an exercise is the mechanical unit of learning instead of a frame as in linear or branching programming.

(iii). No constraint is put on the size of an exercise.

(iv). The size of the exercise is determined by how big a step a learner can practically take at a time.

(v). Each exercise assumes the reinforcement value of completion. In a mathetics style, a different strategy of reinforcement is employed, i.e., other than the 'knowledge' of results, which is the chief source of reinforcement in the linear programming.

(vi). Programme makes use of the techniques of retrogressive or backward chaining.

(vii). Learning instruction involves three principles: (a) Principle of discrimination, (b) Principle of chaining, and (c) Principle of generalisation.

The underlying principle of a mathetics programme is that the closer the learner is to reinforcement when he is taught, the more effectual the reinforcement becomes. The reinforcement, in the case, is the completion of the ask.

3.3.3(b) DIFFERENT AREAS MOST SUITED FOR SHAPING THE BEHAVIOIR THROUGH MATHETICS PROGRAMMING

(i). Behaviour needs chain.

(ii). Skills and multifaceted behaviour repertories.

(iii). Behaviour which shows dependence of one on the other.

3.3.3(c) MERITS OF MATHETICS:

(i). It is a job and task-oriented programme.

(ii). Results can be linked to actual goals which we intend to achieve through a mathetics programme.

(iii). Its stress on learner-success at 90/90 criterion level of mastery to motivates the learner.

(iv). It make use of the principle of backward chaining.

(v). It is relevant, significant, significant and suitable in the eyes of the learner and the programmer.

(vi) It can be applied to a wide range of subject matter but it particularly suits the teaching of skills where the main objective is transfer of training of skills from one condition to another.

3.3.3(d) DEMERITS OF MATHETICS PROGRAMMING:

(i). It is very mechanical in nature and as such demands a lot of expertise, training and labour on the part of the programmer.

(ii). It is not fit for learning the material of all subjects. Only concrete material and subject material involving psycho-motors skills can be gainfully programmed by means of Mathetics.

(iii). This programme makes insufficient provision for individual differences. All learners have to learn the same way.

(iv). It provides very little choice to the learners, as constructed responses are usually required.

(v). The learner encounters complexity in constructing the last response or mastery response in the beginning.

(vi). Mathetics cannot be used for factual content.

(vii). Mathetics cannot be used for higher cognitive and affective learning objectives.

(viii). Mathetics does not provide any curative help for the weaknesses and difficulties of learners.

(ix). Mathetics is not based on any sound learning theory.

CHECK YOUR PROGRESS- 3

Q.12. Who is the originator of mathetics?

Q.13. The term Mathetics is derived from the Greek word _____.

Q.14. What are the areas of behaviour most suited for shaping through mathetics programming?

3.4 .APPLICATION OF PROGRAMMED INSTRUCTION IN INDIA:

Programmed instruction is still in its formative years in India. Programmed instruction as an optional or elective paper has been included at the B.Ed/M.Ed. level in a few universities in India. It also forms a part of the paper of Educational Technology/Educational Innovation. However, its actual classroom use is almost nil.

As far back as 1996, the Kothari Commission had suggested to develop programmed material in different subjects to test the appropriateness of the method in Indian conditions. An Association of Programmed Instruction was formed to organize the research being done at different centres in the country. The association also distributes the information on new studies through its journal issued from time to time. The *National Council of Educational Research and Technology* has also done some work in the field. Inspite of all these efforts, it may be stated that the application of programmed instruction has yet to make any appreciable impact on our classroom teaching. Our methods of teaching remain traditional, largely.

Following are the important factors, which stand in the way of introducing programmed instruction in Indian schools:

(i). Resistance to adjust.

(ii) Lack of good programmes and programmers

(iii). Lack of facilities..

USE OF PRIMES, PROMPTS AND CUES IN PROGRAMMING:

For helping the learner make the correct response and eliminate error, he is assisted in the m of primes' and 'prompts in the introductory frames. Priming is introduced in a frame though a process of copying the response given in the stimulus material.

A prompt, on the other hand, does not indicate to the learner the correct response in the imulus itself. A hint or cue is provided to help the learner to choose the correct response According to Skinner, prompts can be classified into two categories:

i. Formal prompt. (ii) Thematic prompt.

A formal prompt provides an indication of the form of response.

Thematic prompt depends on the general properties of the prompting stimulus.

It may be kept in view that the primes and prompts should be provided only in the initial step and thereafter gradually withdrawn.

ILLUSTRATIVE PROGRAMMES IN SCHOOL SUBJECTS:

PROGRAMME NO I CIVICS CLASS X

Introduction: This is a programme meant for you for the study of salient features of the Constitution of India.

In this programme, you will find paragraphs which are called frames. Study each frame carefully and write down what is required. Answers are given at the end. After stating your answers, check them. If your answer is wrong or you do not understand anything, you can again go back to the frame. It is not a test but instead it is a self-study programme.

Frame 1: The Constituent Assembly of India was set up under the provisions of the Cabinet Mission Plan to frame the Constitution of India which was formally adopted on 26th Nov. 1949 and came into force on 26th January 1950. It took nearly three years to complete the work.

(a) What was the work assigned to the Constituent Assembly?

(b) Under what provision was it formed?

(c) When did our Constitution come into force?

(d) When was it adopted?

(e) How much time did the Constituent Assembly take to complete its work?

[Ans. (a) To frame the Constitution of India. (b) Provisions of the Cabinet Mission Plan. (c) 26th January 1950, (d) 26th November 1949, (e) Nearly 3 years]

Frame 2: The Preamble of the Constitution has a great significance but is not a part of the Constitution. The Constitution was framed by the people of India through their representatives It stresses the fact that the reins of political power ultimately lie in the hands of the people of India.

(a) Is the Preamble a part of the Constitution?

(b) By whom was the Constitution framed?

(c) In whose hands do the reins of political power ultimately lie, in India?

[Ans. (a) No. (b) The people of India through their representatives, (c) The people of India]

Frame 3: The Preamble of our Constitution is as under:

WE THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC and to secure to all its citizens:

JUSTICE, social, economic and political,

LIBERTY of thought, expression, belief, faith and worship:

EQUALITY of status and of opportunity.

and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation: IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do HEREBY ADOPT. ENACT AND GIVE TO OURSELVES THIS CONSTITUTION

Note -Three new terms - Socialist, Secular and Integrity - were added to the original text of the Preamble when it was amended in 1976 by the 42nd Amendment.

The Preamble stresses the democratic basis of the Constitution by stating that the People of India gave to themselves this Constitution. It also states objectives like justice, liberty, equality and fraternity.

(a) Who has given us the Constitution of India?

b) What kind of justice has been ensured by the Preamble?

e) What type of Republic is to be constituted?

(d) What kind of equality has been given to its citizens?

e) How many types of liberty can a citizen enjoy?

Ans. (a) The people of India, (b) Social, economic and political, (c) Sovereign Socialist Secular Democratic, (d) Equality of status, (e) Five]

Frame 4: Another important feature of the Preamble is that the people themselves adopted and enacted the Constitution. Thus, the representatives of the people frame the laws of the country and they have the power to change or amend the Constitution.

a) Who frames the laws of the country?

b) Who has the power to amend the constitution?

[Ans. (a) Representatives of the people, (b) Representatives of the people]

Frame 5: The Constitution of India has many unique features which distinguish it from constitutions of other countries. The framers of the Constitution freely borrowed ideas but took care to adapt these to the needs of the country.

The Constitution makes India a Sovereign, Socialist Secular, Democratic Republic. The word Sovereign means that India is completely free from external control. No outside power has the right to interfere either in her internal administration or direct her in the conduct of her foreign policy.

This was emphasized to ensure that India was no longer 'dependent on the British Empi as she had been before the Indian Independence Act 1947 or a 'dominion' as she had bees from 15th August, 1947 to 26th January 1950.

(a) What kind of status did India enjoy during 15th August 1947 to 26th January 1950?

(b) Was India sovereign between 15th August 1947 to 26th January 1950?

(c) What is the meaning of the word 'sovereign"?

(d) Does the Constitution of India have unique features?

(e) Did the framers of the Constitution borrow ideas?

[Ans. (a) Dominion, (b) No, (c) India is completely free from external control, (d) Yes, (e) Yes]

PROGRAMME No. 2 BIOLOGY TAXONOMIC CATEGORIES CLASS XI

Introduction. (On the pattern of Programme No. 1)

Frame 1: We see several kinds of animals and plants around us. They all exhibit varying degrees of differences and similarities. One feels the need to arrange these numerous living things in some logical sequence. The method of arranging and grouping of animals and plants in various divisions is known as classification.

(a) All animals exhibit various degrees of …… and …….

(b) The numerous organisms can be better studied if they are ..... in some …….. sequence.

(c) ……. is the method by which various organisms are grouped.

[Ans. (a) Differences, similarities, (b) Arranged, logical, (c) Classification]

Frame 2: Organisms are classified according to certain characteristics. First they are placed in bigger groups. All living organisms have been put into two groups, viz., plants and animals. These groups are further divided and sub-divided into various smaller groups.

All these different groups are called categories. These categories have been given different names at different stages, e.g., Kingdom, Phylum, Class, Order, etc.

(a) The assemblage of organisms in the groups according to certain characteristics is said to form a …….

(b) ……. and ……. are names of two categories.

[Ans. (a) Category. (b) Kingdom, Phylum, Class, Order (Any of these)]

Frame 3: In classification, these categories are placed in a definite sequence. Some categories are higher than others, e.g., Kingdom is of a higher category than Phylum. Each higher category contains all the lower categories.

1. Is there any definite sequence in which to arrange the categories?

2 Which category will be studied first while classifying any organism? (higher, lower)

3. Study the sequence of categories given below:

Kingdom, Phylum, Class

(a) If Kingdom is the highest category, which is the lowest?

(b) Category Phylum will contain category ……. also.

(c) Will category Kingdom contain all the classes?

[Ans. 1. Yes, 2. Higher, 3. (a) Class, (b) Class, (c) Yes]

Frame 4: The arranging of the taxonomic categories in a logical sequence is called a hierarchy. Study carefully the list of categories given below in a descending order, i.e., the first one is the highest category.

Kingdom, Phylum, Class, Order, Family, Genus, Species.

This sequence forms a hierarchy.

i. If various categories are arranged in a sequence, it forms a.....

ii. Write whether the sequence of the categories given forms a hierarchy.

Order, Kingdom, Phylum, Genus, Class.

iii. Make a hierarchy of the categories given above.

iv. From the hierarchy made by you, answer the following:

a. …… is the highest category.

b. …… is the lowest category.

[Ans. (1) Hierarchy, (ii) No, (iii) Kingdom, Phylum, Class, Order, Genus, (iv) (a) Kingdom; (b) Genus]

3.6. Summing Up:

- Types of Programmed Instruction: (i) Linear Programming, (ii) Branching Programming and (iii) Mathetics
- Linear programming model was developed by B.F. Skinner of Harvard University. It has been defined by psychologists as "A programmed material sequence in which each student proceeds in a straight line through a fixed set of items." This types of programme is also called Skinnerian type of programming because for the first time he used this type of sequence to shape the behaviour of animals and prepared ground for human learning.
- The branching or intrinsic programming was originated by Norman A. Crowder. He has given its definition as: " It is a programme which adapts to the needs of the students without the medium of extrinsic device as a computer." It is called intrinsic because the learner within himself makes the decision, to adapt the instruction to his needs. The rationale of intrinsic programming postulates that the basic learning takes place during the student's exposure to the new material on each page.
- Thomas P Gilbert (1962) is the originator of the concept of mathetics. According to him, "Mathetics is the systematic application of reinforcement theory to the analysis and construction of complex behaviour repertories usually Known as subject matter mastery, knowledge and skills. Mathetics, if applied diligently, produces materials that exceed the efficiency of lessons produced by any known method."

- The word ‘mathetics’ is derived from the Greek word ‘mathein’ which means ‘to learn’.
- Basic Steps in Mathetical Programmes-

  (i). Data collection and task analysis

  (ii). Prescription for mastery-characteristics of the trainees are assessed.

(iii). Characterisation and lesson plan – deficiency is removed and plan is prepared to overcome the deficiency

3.7. ANSWERS TO CHECK YOUR PROGRESS

Answer to Q.No. 1: B.F. Skinner

Answer to Q.No. 2: True

Answer to Q.No.3: (i). Linear, (ii). Branching, and (iii). Mathetics

Answer to Q.No.4.: (i). Stimulus-Contextual Form, (ii) Response-Desired Behaviour Form and (iii) Reinforcement-Confirmation Form.

Answer to Q.No. 5: B.F. Skinner

Answer to Q.No. 6. Same path

Answer to Q.No. 7.: Norman Crowder

Answer to Q.No. 8: Stimulus

Answer to Q.No. 9.: The basic structure of Branching/Branched programme is:

(i). Home Page and

(ii) Wrong Page

Answer to Q.No.10.: (i) Constructed-Response Question, (ii). Constructed-choice Questions. (iii). Block Questions and (iv) Linear Sequence.

Answer to Q.No. 11.: Intrinsic programme

Answer to Q.No. 12.: Thomas P Gilbert

Answer to Q.No. 13.: Mathein

Answer to Q.No. 14: (i). Behaviour requiring chain.

(ii). Skills and complex behaviour repertories.

(iii). Behaviour which shows dependence of one on the other

3.8. ESSAY TYPE QUESTIONS:

Q.1. Write about the different styles of programming.

Q.2. What is linear programme? Describe its assumptions according to Skinner.

Q.3. What are the characteristics of a good linear programme? How can this programme be used at secondary level?

Q.4. What is branching programme? Discuss its assumptions.

Q.5. Briefly discuss the limitations of branching programme.

3.9. References/Suggested Readings:

- Sampath.K and others *"Introduction to Educational Technology"*
- Chauhan, S.S. "*Advanced educational Psychology"*
- Mangal, S.K. *"Foundations of Educational Technology"*

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UNIT 4

DEVELOPING OF PROGRAMMED INSTRUCTION MATERIALS

Unit Structure:

4.1. INTRODUCTION:

Programmed instruction is based on some psychological principles. Therefore, developing a good programme involves a number of techniques and devices are to be incorporated and requires several specialized skills. The making of a programmer must have mastery over the subject-matter which he is intending to be programmed. He should also be well acquint with a approaches and techniques of programming.

It is the assumption of programmers that a designer should have 75 percent mastery of the content and 25 percent skill and awareness of programming devices. The dynamics of programme development may be considered a cyclic process which never comes to end. The freshers have to be very careful.

There has been a changing emphasis of programmed instruction 1960 to 1970 which has greatly influenced the dynamics of programme development. As a result number of approaches of programme development are available in the literature. Some important approaches have been given in the following paragraphs.

4.2. UNIT OBJECTIVES:

- Discuss about the steps of development of programme instruction.

- To know about the merits and demerits of programme development.

4.3. DESIGN FOR DEVELOPMENT OF PROGRAMMED INSTRUCTION:

It is evident from the details of steps of programme development that none of the approach is complete in itself. With the help of reviews of these approaches and recent terms of programmed instruction, a comprehensive outline has been evolved for preparing a programme most effectively. This approach is much more practical from development of a programme. In writing a programme a programmer has to be very pragmatic and skillful. The important stages in programming are as follows:

I. Preparation
II. Constructing or writing the plan
III. Try-out and revision
IV. Evaluation
V. Preparation of a manual of the programme

I. **Preparation:**

Peter Pipe suggests the following points before getting down to details:

i. Be prepared to find that preparation accounts for at least 25 per cent of your total time.
ii. Do not bother about attaining perfection in one step before you begin the next.
iii. There is no substitute for hard work. Preparation requires hard work.
iv. Do not rely on memory to keep track of new ideas.

Steps at the preparation stage:

These are listed below:

1. Selection of topic is to be programmed.
2. Indentifying objectives in taxonomic categories.
3. Writing objectives (entering and terminal) in behavioural terms.
4. Content analysis and developing instructional sequence.
5. Construction of criterion test.
6. Deciding appropriate strategies and pardigm for the programme.

II. Construction or Developmental Phase (Writing frames and individual try out)
III. Try out and revising, editing and preparation of final draft with the help of group
IV. Evaluation of the programme and master validation.
V. Preparation of a manual of the programme.

Steps 1: *Selection of Topic or Unit to be Programmed :*

Lysaut and Williams have suggested six criteria for the selection of a unit or topic to be programmed:

(1) The topic selected for a programme should belong directly t programmers's own field of study or interest. He should be c enough to handle the topic independently. The programmer should have to the competent the understanding or mastery of the topic.

(2) The topic should be such that it can be handled easily. He should start With a simple and as fundamental approach as possible.

(3) The third criterion for the selection of a unit is its length. The programme length has to be such that desired objectives for the unit can be realized.

(4) Another criterion for most of programmers that has strongly influence the choice of the units to be programmed, has been depressed level of learning shown by many students.

(5) The fifth criterion is to be followed in the selection of a unit to be programmed is the logical order of material. It is very helpful for teacher to select a unit that certain logical sequence can be developed.

(6) Special student needs are also one of the important criterion in selecting a topic for a programme. The topic should be from the specialized field of study.

It addition to these criteria it is also essential that the topic should be stable and programme should be economical.

Step 2: *Identification of Objectives*:

The second step for the development of a programme is to identify the objectives interms of ***Bloom's Taxonomic Categories***. Programmed instruction material is effectively used for achieving the cognitive objectives. Therefore taxonomy of cognitive domain is taken into consideration in identifying the objectives for the programme unit. **Bloom** has classified the *cognitive objectives into six categories-knowledge, comprehension, application, analysis, synthesis and evaluation.* The programmer identifies the objectives in these categories by considering the level of the student, entering behaviours, nature of the unit. The last three categories are also known as creativities categories or higher order of the objectives. The opinion of the subject-specialists can be saught for identifying the objectives of the unit to be programmed. The objectives decide the level and direction of the instruction.

Step 3: *Writing Objectives in Behavioural Terms*:

After identifying the objectives taxonomic categories it is essential to formulate objectives in behavioural terms but **Robert Magers** approach is best fitten into the programme strategy. It was Mager who emphasised the need and important of behavioural objectives in programmed instruction during (1962-63). He defined instructional objectives:

"A statement of instructional objectives is a collection of words or symbols describing one or more educational intents."

"An objective will communicate your intent to the degree you have described what the learner will be doing when demonstrating his achievement and how you will know when he is doing it."

In order to described terminal behaviour what the learner will be doing, the following operations are needed:

(a) Identify and name the over-all behaviour act.
(b) Define the important conditions under which the behaviour is to occur.
(c) Define the criterion as acceptable performance.

The objectives should be stated as specific behaviour which can be observed in student performance. The actual procedure and examples of writing objectives in behavioural terms have been given in the Taxonomy of Educational objectives. The knowledge of taxonomy is essential for this purpose. The objectives are written in two forms:

(i) *Entering behaviours* as pre-requisit skills of the leaner in behavioural terms. It is also known as assumptions about the learners.
(ii) *Terminal behaviours* as desired behaviours which a learner will acquire after completing the programme instruction material.

Robert Mager suggests three questions for writing objectives.

1. What will the student be doing when he is demonstrating his performance?
2. Under what conditions the behaviour will occur?
3. What is the level of acceptable performance?

(i) ***Entering Behaviours***-The entering behaviours include those characteristics which are essential pre-requisites for the programme:

1. The pre-requisites knowledge and skill for programme are clearly identified and stated.
2. The required level of aptitude for the programme is to determined and explained.
3. The pre-requisite abilities are clarified interms of measurement.
4. The motivation level should also be identified and stated in clear term.
5. The pre-requisite informations: age level, language comprehension level of the students are to be determined and stated.
6. The target-population should be defined for the programme.
7. The pre-test is constructed for ascertaining the pre-requisites of the learners who intend to take this programme. The academic records and diagnostic test and personal experiences are the other sources of entering behaviours.

v. ***Terminal Behaviours-***The terminal behaviours include all those responses and behaviours which are helpful for achieving desired objectives. The cognitive objectives are given importance in programmed instruction material. These are also known as output of instructional strategy. The entering behaviours act as input aspect of the instructional technology. **Robert Mager's** approach is generally used in writing objectives in behavioural term. A criterion test is constructed for measuring the terminal behaviours after going through the programme.

Advantage of Behavioural Objectives-

Scofold has enumerated the following characteristics of behavioural objectives:

1. The objectives are specified in terms of behaviours.
2. It helps in preparing items for criterion test.
3. Teaching and learning activities are related easily for effective learning situation.
4. It helps in selecting appropriate devices and tactics for generating conducive learning situations.

The following are the main advantages of behavioural objectives:

(a) The criterion test is made objective-centred.
(b) The testing can be based on instruction or teaching.
(c) The appropriate tactics can be employed for desired learning situations.
(d) The activities of instruction and teaching can be made specific

Step 4: *Content Analysis and Developing Instructional Sequence*:

After writing the specifications of terminal and entering behaviours and the dimensions of the criterion test. It is essential for a programmer to develop a suitable content structure which would go with the programme as such. This task requires an analysis of the various items of information which will go with the subject and also the relationship which may be discovered among them.

The content is analysed into units and units are broken down into its elements. These units are arranged in a logical sequence and elements of a unit are also organised into a learning sequence. Thus, content analysis involves both analysis and synthesis process. The structure of content should be reviewed by an subject expert. The authenticity of subject-matter has to be ensured. ***Peter Pipe*** suggested for developing a list of content:

(1) Concentrate on covering all objectives and on developing points in the right order at the right level.

(2) Comments of experts should also be involved for the instructional sequence.

This may yield useful information about the programme material. In developing a list of content relationship of teaching and learning should be observed. Core material is meant a straight prose narrative that covers all your objectives. It includes two aspects planning subject-matter to present to the student and language a programmer intent to use in preparing the programme. The details of content analysis have been provided in the chapter of *Task Analysis*.

Step 5: *Construction of Criterion Test*:

After writing objectives in behaviour terms and developing instruction sequence of the unit to be taught. It is very essential to construct a criterion test. The purpose of criterion test is to evaluate construct a criterion test. The purpose of criterion test is to evaluate the effectiveness in terms of objectives to be achieved. The criterion test is constructed by employing the four steps; planning, preparing, try out and evaluation. Recently criterion referenced testing approach has be developed for constructing such tests.

Criterion referenced testing means such measures of achievement that can be expressed directly in terms of student performance on clearly specified educational task. It is a test used to a certain

an individual's status with respect to a well-defined behaviour domain? (W. Jomes Papham, 1975). The key word is '**behaviour domain'** which includes the concept of content popularly employed in the *norms referenced testing*. Although there is a relative scarcity of theory and research to guide this process, the following principles given by Norman E. Gronlund (1973) may be considered useful:

(1) Criterion referenced testing requires a clearly defined and delimited domain of learning task.
(2) It requires that instructional objectives be clearly defined in behavioural terms.
(3) It requires that standard or performance be clearly specified.
(4) It requires that student performance be adequately sampled within each area of performance.
(5) It requires that test items be selected on the basis of how well they reflect the behaviour specified in the instructional objectives. It requires a scoring and reporting system that adequately describes student performance on clearly defined learning task.

Generally criterion test includes objective type items. Every item measures one specific objective of the programme. It is objective-centred rather content centred. Achievement test is generally the content-centred. Recall and recognition type of items are prepared. After preparing the items individual try out is done for improving items. The first draft is tried out on a group of subjects and item analysis is done. The items are selected and rejected on the basis of difficulty value and discrimination power of the items. The final draft is prepared and its reliability and validity are estimated. The criterion behaviours are included to measure the terminal behaviours of the programme.

Step 6: *Deciding Appropriate Strategy or Paradigm for the Programme* :

After preparing a criterion test an appropriate strategy is decided regarding the programme. The following aspect are considered in finalizing a paradigm for the programme:

(a) ***Size of Frame***: The size of frame is not fixed in linear programming. The learner takes at a time and comprehends easily, is known a size of a frame. In deciding the size of a frame age, class level, abilities of the students are taken into consideration. The entering behaviours or previous knowledge and understanding is the basis for deciding the size of a frame.
(b) ***Mode of Response***: Various types of response modes are used in instructional frames. In linear programming usually construct response is used, but discriminant response, multiple

choice response are also used. Multiple-choice response is employed in branching programming. The mode of response is decided by strategy of instruction and also by the content of the unit. The learning objectives are one of the most important consideration in finalizing mode of response.

(c) ***Types of Prompts***: The additional or supplementary stimuli are used for assisting the learner for emitting correct response. It is known as prompt. In teaching frames formal and thematic prompts are used. Priming are used in introductory frames but no prompt is used in testing frames. There should be gradual withdrawal of the prompts.

(d) ***Ruleg System:*** The structure of the frame is developed with the help of 'ruleg system'. A frame consists of rule and example. The rule is given complete form and example is given incomplete form, the learner has to complete it by emitting a response. The form of a frame is also vice-versa. The learner acquires new knowledge by emitting a correct response.

(e) ***Provision for Correct Response***: A learner has to confirm his response by comparing with correct response. It is given somewhere in instructional material It may be given along with the frame, or beneath of the frame or along with next frame or on the next page. This is also decided so that learner cannot copy down easily.

These are the important aspects for developing instructional material effectively. These are helpful in the deciding the paradigm of instructional material and specifying the strategy.

II. Construction or Developmental Phase (Writing frames and individual try out):

It is very challenging job to the programmer. It is therefore obligatory for a programmer, to take the preparation phase very seriously. In writing a programme he has to take his decision in respect of:

(1) Entering behaviours,
(2) Content structure,
(3) Strategy of instruction, and
(4) Terminal behaviours.

This needs mastery of content and skill of programmed strategy. In order that the desired terminal behaviours are produced, an appropriate programme paradigm has to be selected and employed. Suitable stimuli, form and sequence of presentation are necessary steps in the process of writing a frame.

'A frame or items is a segment of material which the learner handles at one time.' A frame varies in size form a few words or a sentence or two (linear), to a para or two full page or more (branching). A frame requires at least one response which may be overt or covert response and provides for knowledge of results before the leaner proceeds to next frame. A frame structure consists of three parts:

(a) ***Stimulus***: the information is presented,
(b) ***Response****:* the learner construct or selects a response,
(c) ***Feedback or Reinforcement:*** The knowledge of result (checking his own response with the given correct response).

A frame produces a learning situation which involves the following elements

i. A stimulus or stimuli (S) which serves to elicit or cue for the desired response.
ii. A stimulus content (S) to which the occurrence is to be learned.
iii. A response(R) which the student supplies and which adds to lead to the terminal behaviours of the programmes.
iv. (iv) Extra material which makes the frame more readable, understandable or interesting.

Before the programmer can actually start writing the programme, he must decide what information it should contain. The broad concepts or topics will already decided prior to the statement of objectives. It is now important that every single item information should be listed, in the smallest possible form so that nothing is omitted when writing the instructional sequence. Rules should be written:

(1) In simple sentence without punctuation.

(2) Without conjunction such as and but although (the use of a conjunction indicates that there are two rules present).

(3). As statements.

(4). Without qualification (qualifications are usually exceptions to the general rule and must be treated separately. Most of them will eventually be handled in the programme as discrimination items).

Characteristics of a Good Frame:

A good frame has the following characteristics:

(1) A good frame employs clear words which have the specific meaning.

(2) A good frame satisfies the needs of the learners.

(3) The response of good frame is meaningful.

(4) The correct response of good frame is the integral part of terminal behaviours.

(5) A good frame is stimulating as well as challenging, but the response is under the reach of the learners.

(6) A good frame employs the language and words which are easily understandable to the learner.

(7) The structure of good frame is such that it has only one correct response for the blank.

(8) A good frame increases the probability of learning.

(9) The appropriate and adequate prompts are used in good frame.

(10) The stimulus of a good frame is related to the response of proceeding frame.

(11) A good frame produces a chain learning.

(12) A good frame is written in simple sentence without punctuation and conjunctions.

Stages of Programme Frames:

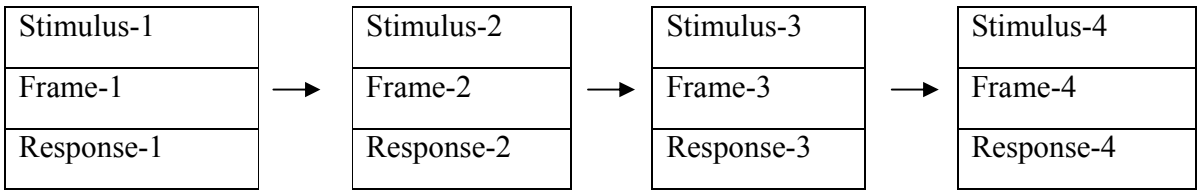
There are four stages in an unit of a programme: Introductory, Practice and Testing Stage:

(a) ***Introductory Stage***-The introductory frames are full of demonstration St and priming 10 to 15 percent frames. The purpose of these frames is introduce the new content by linking the previous one.
(b) ***Teaching Stage-***The purpose of teaching frame is to impart new knowledge. Thus, these frames present the content structure in terms of behavior specified for terminal objectives. The frames are heavily prompted by both formal and thematic prompts 60 to 70 percent frames.
(c) ***Practice Stage***-These frames produce the frames for practising the teaching content. These frames are half-prompted frames 15 to 20 percent frames.
(d) ***Testing Stage***-These frames are designed to ascertain the establishment of the behaviours. The frames are unprompted 15 to 20 percent frames.

These frames produce the gradual withdrawing learning situations.

There are three very common approaches in designing of frame sequencing
:Matrix, Ruleg and Egrule approach.

All these facts to be taken into consideration in writing the frames of programme. The content sequence is so designed that response of earlier frame may function as stimulus for next frame for developing chain learning. It has been shown with the help of following diagram:



The logical sequence of programme frames is developed for presenting the subject-matter. This sequence is perceived by the designer and it is subjected to modification. The modification is made on the basis of students responses. The logical sequence is validated empirical through the students responses on criterion test.

The first draft is prepared by considering about facts. It may be prepared on may cards. Each frame is written on a single card. The first draft involve the following types of errors:

(1) Copying frames or echo-type frames.

(2) Irrelevant responses is asked for.

(3) Irrelevant frame.

(4) Over loaded frames or lecture.

(5) Too many prompts or over prompting frames.

(6) Incomplete discrimination sequence.

(7) In multiple-choice frame poor alternatives may be used.

The first draft is improved and modified by individual try out. After individual try out revision can be done and it may be discussed with experts to seek their opinions for improving and modifying the frames. The purpose of individual try out to improve the language ambiguity and difficulty of the frames. The structure of the content can be evaluated by the experts. The subject-matter can be presented correctly.

III. Revising, Editing and Preparation of Final Draft with the help of Group Try Out:

The first draft of the programme is revised after empirical try out. The sample of subjects who take the programme at this stage are carefully selected from the target population on the basis of entering behaviours to confirm to the eventual uses. From 15 to 40 or more students are selected from the target population for the empirical try out of the programme. In contrast to the try out of short sequence students should be tested on a carefully prepared detailed diagnostic performance test after completing the programme units. Testing students before and after taking the programme provides a baseline against which student performance can be assessed.

After this try out, the frames are again analysed and the success with which g terminal behaviours have been attained as indicated on the criterion test, is determined. The student responses are analysed to improve frames. A list of common errors are made. A high error rate on a particular frame often points to a need for revision. At this stage the programme may undergo several try out and revision cycles. After revision of the programme editing work is done for preparing the final draft of the programme.

Editing of a Programme-The main objectives of editing of the programme are:

- To eliminate the ambiguities, complexities and other inadequacies before any student sees the programme.
- To improve the logical sequence of the frames.
- To sharpen and smoothen the programme.
- To improve the technical accuracy aspects of the programme.
- To modify the frames of high error rate.
- To examine the proper use of promotes, cues and primes.

Types of Editing-There are three types of editing through which the fir draft of the programme is processed. The three types of editing are:

(1) Technical Accuracy,
(2) Programme technique, and
(3) Composition editing

All three types of editing can not be done simultaneously therefore, he has to perform editing in hierachical order so that no time is wasted in repetition. It has been suggested by the experts that 'technical accuracy edit should be done first because it is most important in all the three types of edits. The second type of edit in hierarcy is programming techniques edit. The final edit is the composition so as to give a concrete shape of the programme.

(1) ***Technical Accuracy Edit:***

In this type of edit, the subject-matter checks the programme to ascertain whether or not the material presented is technically accurate. Even a programmer who considers himself an expert in the subject-matter areas his programming, should have his material checked by some one else who is an expert in the field. Too often, a programmer fails to find out his own errors. Probably while programming he may omit certain items. It is so doing he may cause the student to develop an inaccurate concept. This commission may not apparent to another expert.

For instance, if a definition is being taught, the programmer must be sure that it is not one he has modified or simplified to the points of inaccuracy simply for case of teaching. This is a common tendency-over simplification resulting is not technically accurate material.

Vocabulary should also be carefully scrutinised. Programmer should see that vocabulary of the programme is neither too difficult nor too easy for the leaner and that it is technically sound. (2)

(2). Programming Techniques Edit:

There are two sub-types of programming technique edit. One is to edit the programme as a whole and the other is the edit the frames of the programme.

(a) ***The Programme: Technique Edit of the Programme***-There are several aspects of programming technique edit which apply to the programme as a whole. The continuity of the programme is one of them. The programme must flow from item to item. There should be inter-relationship between the different parts of the programme. The programmer should ask himself certain questions about the programme and development of the ideas within his programme for e.g.

(1) Is there an inter-relationship between the parts of the programme? Is the programme composed of individual unrelated sequences ? If so, the continuity could stand improvement.

(2) Are the ideas logically and methodologically developed, with and adequate amount of supporting material?

(3) Have examples and illustrations been used aptly to develop ideas.

(4) Are the students familiar with examples and illustrations given in the Programme ?

(5). Can the students follow the line of reasoning through the programme as the material is developed?

(6). Does the programme work steadily towards a conclusion?

These items should be considered very thoroughly and sincerely by the programmer and should modify his programme in the light of his answers, for they make the difference between a programme that apeals to the student and one that frustates him.

Another consideration to the be made during a general programme technique edit is the size of steps within the programme. It has been suggested that too large a step-size will lose the student, and too small a step-size may drive him to distruction. The optimum step-size for a particular student population can only be guessed at, but the programmer must try to tailor his steps to fit his group. Though the question of step-size is under constant debate.

There are two types of frame, size which need proper consideration, the intra frame and the Inter-frame. Inter-frame step-size is the size of the step from one frame to the next; how big a jump is being taken frames are teaching point to another teaching point? The intra-frame step-size is the size of the concept presented within a single frame. How much is the student expected to grasp in each frame? How difficult is it for him to apply the knowledge presented as he response to the frame? Another important consideration during the programming technique are followed throughout the programme. In the course of writing or rewriting, it is possible that a frame or two may have been left out inadvertently. Therefore, programme would check for various types of frames and their placement in the programme. Item to check for include: practice frame with no set frames, practice frames these have been placed a head of their respective set frames, terminal frames out of sequence, a frame incomplete etc.

The final aspect of programming technique edit in general, is the quality and aptness of the illustration used. The placement of illustrations in relation to printed material may also be a factor to be checked.

(b) Programming Technique Edit of the Frames-The purpose of the individual frame edit is to each obvious faults before they affect the performance of the programme. The programmer should frames individually, with no regard to the material that procedure each frame or is to follow it, may not be valid. In considering a frame individually inadequacies are suspected that exists only when that frame is taken out of the context. Earlier frames may have preclude the inadequacies. However, much benefit can be gained from examining each frame and deliberately looking for inadequacies.

Examples should be used when ever applicable in a programme, but the frame in which an illustration is used, must be so designed that the student is forced to make use of the illustration in one manner or the another before forming his response. He must ensure that the student will make the use of the pictures, diagrams and charts used in the frames. Before using a picture or illustration in a frame, the programmer must ask himself about the illustration in any frame:

(1) Is the illustration meaningful?
(2) Is the student required to use illustration to make his response?

If the answer to either of their questions is negative, the need for particular illustration is meaningless.

The programmer should also check the art work of the programme. The picture and diagrams should convey idea which the programmer wants to convey He should show in illustration to illustration that conveys something other than what the programmer intends can do more harms than a thousand words.

The next step in a frame edit is to take a close look at the response required of the student. The response which a student makes should be relevant. For maximum programme efficiency and effectiveness, each response the student makes should be part of the terminal behaviour toward which he is being led.

In addition to the relevance of the response, careful consideration should be made of the response made that is used. Following check list given by Susan Mayer Markle (1969) may be applied for the purpose of frames editing

(3) ***Composition Edit***: Editing a programmes for composition is the same as editing any other written material for composition. The programme is checked for grammatial for composition. The programme is checked for grammatial mistakes, languages of the frames, spelling, the ability to communicate, aptness and punctuation etc. Also examined are such mechanical aspects of the material as the length of the blanks, uniformity of numbering systems placement of illustrations, and adherence to same basic construction rules. The entire programme will present a more favourable appearance to the student if it is compositionally correct. Errors will probably influence some students to think poorly of the programme and to questions an ability of the programmers.

A second factor that requires emphasis is the importance of maintaining a consistency through the programme from the stand point of what the student is expected to do.

If necessary, the student should be instructed within each frame as to what his action should be. The method of answering should be uniform in one type of frame. If one discrimination frames tells him to put an 'X' in the space to the left of each correct response, then all discrimination frames in the programme should ask him to do this. Needless to mention that it is confusing for a student to make a check in one frame, to make a 'X' in the second and circle the correct answer in third.

Some basic construction rules given below may be observed as guide lines for the programmer:

(1) Single blank should not be continued on the next line.

(2) Frame should be contained entirely on one page.

(3) Blanks should be placed at or near the end of frame.

(4) A programme may develop his own style to suit his own particular type of programmes, but he must be consistent through the programme that he developes.

IV. Evaluation of Programme or Master Validation

This is the final step of programme development. The characteristics of programme material are evaluated in this step to ascertain its effectiveness or workability. The evaluation is done on the basis of empirical evidences obtained form students response. It requires selection of a representative sample of the target population. The sample consists of 50 subjects or more. The

entering behaviour is the basis of their selection. The entire programme is administered to a larger group more than 50 students. The same criterion test is used as pre-test (before the programme) and post-test (after the programme) to ascertain the net gain through the programme material. It is also known as field testing. The ultimate object of field testing is to ascertain the level of its effectiveness in terms of some criteria. These criterion measures can be broadly classified into two categories.

(a) Internal Criteria-These are related to the characteristics of the programme. They are of four types:
(i) Error rate,
(ii) Programme Density or Type Token Ratio (TTR)
(iii) Sequence Progression, and
(iv) Frame Inventory.

(b) External Criteria-These are related to the performance gain and attitude of the learners. They are of three types:
(i) Performance level,
(ii) 90/90 Standard criterion, and
(iii) Attitude coefficient.

If a programme meet these types of criteria in field testing, then it is considered valid and it is ready for use. The detail description and analysis of these criterion have provided in the following chapter of the book.

The field testing is done to change or modify and aspect of the programme but its subject is to validate the existing programme to determine its optimal use in an instructional settings. This try out may be used to indicate the best role for the instructor and organization of the curriculum material in terms of the sequence of programme material i.e., validation stage of the programme. The evaluation of the programme provides the feedback to the designer.

V. **Manual of a Programme**:

When a programme is published for classroom use, it should be accompanied by a manual which provides the user with adequate informations. Without a good manual programme can not be used effectively. A good manual provides the following informations:

(1) Specification of objectives (Terminal behaviours),
(2) Programme pre-requisits (Entering behaviours),
(3) Description of the criterion test,
(4) Detail description about the programme,
(5) Evaluation of the programme,
(6) Testing conditions and student sample,
(7) Effectiveness of programme, and
(8) Instructions for using the programme.

4.4. MERITS OF PROGRAMME DEVELOPMENT

The steps of programme development should have the following characteristics:

(1) There should be a flow in the steps of programme development.
(2) The steps should be more practical.
(3) The steps provide a guide line for programmer to develop a programmed material.
(4) The steps provide a scientific basis for the programme development.
(5) The logical sequence of content structure is validated empirically on the basis of students responses.

4.5. DEMERITS OF PROGRAMME DEVELOPMENT

The following are the demerits of programme development:
(1) It is a challenging rather difficult task to prepare good programme.
(2) It requires training and practice for developing programme frames.
(3) It is very time consuming and costly exercise.
(4) It is difficult job to incorporate all the suitable programme techniques and devices in writing good programme frames.

(5) Generally over prompting frames are used to avoid the errors or reduce the error rate of the programme.

(6) In writing frames, main emphasis is given to complete the blank rather than to produce learning conditions.

(7) Usually relevant response are asked these are not related to the new knowledge or terminal behaviours.

(8) In developing linear programme completion type of items are written rather than construct response frames.

CHECK YOUR PROGRESS-1

Q.1. Programme instructional material is used for _____.(Fill up the blank)

Q.2. Topic is to be selected in Conceptual. True/False

Q.3. Who gave the steps for developing programme?

Q.4. The content analysis is done in preparing a programme. Write true/False

4.6. Summing Up

- The important stages in programming are as follows: i. Preparation, ii.Constructing or writing the plan, iii. Try-out and revision, iv. Evaluation and v. Preparation of a manual of the programme.
- Empirical approach is used in preparing programming.
- Robert Mager approach wrote the objectives in behavioural term.
- The frame structure consists of contextual stimulus, response and reinforcement.

4.7. ANSWER TO CHECK YOUR PROGRESS:

Answer to Q.1.: Cognitive Objectives

Answer to Q.2.: True

Answer to Q.3.: Patricia Calendar, Petter Pipe, Joh P. Dececco

4.8. ESSAY TYPE QUESTIONS:

Q.1. Write the various stages of a programme development. What are the specific skills that are needed at various stages?

Q.2. What are the principles of making of programme? Show their application in a school subject in which you have specialized.

Q.3. Enumerate the criteria for evaluating the programme instruction.

Write the merits and demerits of programme development.

4.9. Refernces/Suggested Readings:

- Sampath.K and others *"Introduction to Educational Technology"*
- Chauhan, S.S. "*Advanced educational Psychology"*
- Mangal, S.K. *"Foundations of Educational Technology"*

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BLOCK III:
THE FUNDAMENTAL BASES OF TEACHING AND LEARNING

Unit 1 : Meaning, Nature and Characteristics of Teaching

Unit 2 : Phases of Teaching

Unit 3 : Nature of Learning

Unit 4 : Levels of Teaching Learning-Memory

Unit 5 : Models of Teaching

UNIT 1: MEANING, NATURE AND CHARACTERISTICS OF TEACHING

Structure

1.1 Introduction

The teaching and learning process is as old as human civilization. So, like human civilization, the teaching and learning process also has its history. Teaching means to train the children to adjust to any situation. In modern times, teaching is regarded as a skilled job and complex task as it should provide maximum benefit to the students to develop themselves as human resources. The success of the teaching-learning process largely depends on good planning and proper execution.

1.2 Unit Objectives

After going through this unit you will be able to

- Know the meaning and general characteristics of teaching.
- Know the meaning, aims, and characteristics of learning.
- Develop an understanding of the concept of the teaching-learning process.
- Examine the marks of good teaching.
- Understand the general and psychological principles of teaching.

1.3 Meaningof Teaching

To know the meaning of teaching, it is necessary to know what teaching is not. Teaching is not merely imparting knowledge to students, not merely it is a giving device. The meaning of teaching can be explained by narrow meaning and broad meaning.

In the narrow sense, teaching is a process that is given by a teacher or by any other person in society to a student at a particular place or school. From this sense, teaching may be according to a prior prescribed curriculum or the teaching may be based on one's own experience. This type of teaching is given to make a student able to stand on his legs and establish his individuality.

In the broad sense, it is a process by which different stakeholders like the family, the neighbours, friends, social and religious institutions, the educational institutions, etc. teach a person throughout his life how to achieve his necessities and make an environment. Hence, according to wider meaning, all the persons or things that come into the environment teach him something or give him some experience.

The meaning of teaching can also be described with the help of different definitions provided by different educationists. Some of them are:

- According to W. M. Ryburn, “Teaching is a relationship which helps the child to develop all his powers.”
- According to Burton, "Teaching is the stimulation, guidance, direction, and encouragement of learning."
- In the words of John Brubacher, “Teaching is an arrangement and manipulation of a situation in which there are gaps and obstructions which an individual seeks to overcome from which he will learn in the course of doing so.”
- According to Thomas F. Green, “Teaching is the task of the teacher which is performed for the development of child.”
- Clarke defined teaching as “the activities that are designed and performed to produce changes in students’ behaviour.”

- In the words of Yoakan Simpson, "Teaching is the means whereby society trains the young in a selected environment as quickly as possible to adjust themselves to the world in which they live."
- To quote Silverman “Teaching is considered as an art as well as a science” because teaching can be studied objectively and scientifically.
- G. A. Yoakham and R. G. Simpson think, that "Teaching is the means whereby the experienced members of the group guide the immature and infant members in their adjustment in life."
- In the words of Henry C. Morrison, "Teaching is an intimate contact between a more mature personality and less mature one which is designed to further the education of the latter."

Teaching is the specialized application of knowledge, skills, and attributes designed to provide unique service to meet the educational needs of the individual and society. It is a partnership between schools, the community, and parents to help children succeed in their academic careers.

1.4 General Characteristics and Nature of Teaching

Teaching is a very unique activity. So, its characteristics are also unique. Some of the general characteristics of teaching are discussed below:

1) **Interactive Activity:** Teaching activities mainly happen through the interaction of teachers and students. Through proper interaction, the teacher provided different valuable knowledge to students and students received it.
2) **Well-Planned Process:** Teaching is a well-planned activity. Well-planning is needed to reach the goal of teaching. The presentation of teaching is done effectively with the help of proper planning.
3) **Gives Information:** To live a happy life, knowledge of adjustment is required for every student. Teaching provides different information through which students can adjust in every situation properly.
4) **Both Formal and Informal Type:** Teaching is both formal and informal type. The formal type of teaching is delivered in educational institutions with the help of proper rules and regulations. Informal teaching is related to different types of real-life experiences acquired by students in their day-to-day lives from different stakeholders.

5) **Skilled Job:** Teaching is a difficult activity. Only the knowledge of the subject matter never helped a teacher to be effective in his/her teaching. It required skills. Teaching is a skilled job. With the help of skills, teachers can modify the behaviour of the students.
6) **Communication Process:** Proper communication between teacher and taught is developed with the help of teaching activity. This communication may be verbal or non-verbal through which a good bond is established between teachers and taught.
7) **Diagnostic and Remedial:** Teachers can identify the strengths and weaknesses of the students during the time of teaching. After identifying the weakness, the teacher can apply diagnostic and remedial measures to remove the weaknesses.
8) **Measurable:** Teaching can change the behaviour of the students. The instinctive nature of students can be changed with the help of teaching. Measurement of teaching will be done by the amount of changing behaviour of the students. So, it is said that teaching is measurable.
9) **Tri-polar Process:** Teaching is a tri-polar process. These three poles of teaching are objectives of education, content, and students.
10) **Stimulating Work:** Teaching is a stimulating work. Through teaching, the teacher can stimulate the students to acquire new knowledge actively.
11) **Cooperative Process:** Teachers can't make teaching effective without the participation of students. Teaching will be effective only when teachers and students are cooperatively involved in it.
12) **Both Art and Sciences:** Teaching is a combination of both art and sciences. As arts, teachers use his creativity and style in it. In sciences, different scientific principles, maxims, devices, and methods are applied in teaching.

CHECK YOUR PROGRESS

Q 1: Define teaching.

Q 2: What is informal teaching?

Q 3: Mention the three poles of teaching.

1.5 Marks of Good Teaching

Teaching is effective when teachers teach properly. There are different criteria or marks of good teaching. All the teachers must follow these criteria or marks to make his or her teaching effective. These are:

1) **Recognize Individual Differences among Pupils:**Each child is unique and different from others. Their interest, likings, hobbies, capacities, and needs are different from each other. The teacher must recognize the individual differences of pupils while teaching. Otherwise, the all-round development of pupils is not possible. Teachers should always remember that standardized procedures do not fit every student.
2) **Systematic and Well Planned:** The success of the teaching-learning process depends on proper planning. Students can learn easily if the planned subject matter is presented systematically. Thus, it is said that good teaching always should be systematic and planned properly. The teacher should always study the mental make-up of the students he teaches.
3) **Democratic:** Good teaching should be democratic. There should be equal importance to all children irrespective of any barrier. All children can learn something. A good teacher always respects the individuality of his students. For that democratic atmosphere should be provided at educational institutions.
4) **Helps to Adjust in the Environment:** The teaching-learning process helps students to adjust to a new situation. Good teaching helps students to learn the skills of adjustment. These skills help the students to cope with any new situation properly. To live a happy life, adjustment to a new situation is essential.
5) **Follows Laws of Learning:** Major and minor laws of learning introduced by Thorndike help to make teaching successful and permanent. Teachers should follow the law of readiness, the law of effect, and the law of exercise while he/she teaching in the class.
6) **Sympathetic:** Good teaching is kind and sympathetic. The teacher should have a sympathetic understanding of those whom he or she teaches. When the learner fails to understand the teaching of the teacher, the teacher first checks himself or herself and those of the learner afterward. Good teaching creates an atmosphere of acceptance, understanding, and sympathy.
7) **Easily Motivate the Students:** Without motivation, the students can't learn something. Good teaching should easily motivate the students to acquire new knowledge and experiences. If students are motivated to learn, half of the teacher's work is minimized.
8) **Co-operative:** Good teaching is always cooperative. Teachers should look after the complaints and problems of students and try to solve all these. As teaching and learning is an interactive process without cooperation, teaching is not effective at all.

9) **Skilled Job:** It is a famous saying that 'teaching is not everybody's cup of tea'. Because the teaching of a teacher requires knowledge of the subject matter, capacity of classroom management, techniques to use methods, use of technology, etc. All these make teaching effective. Thus it is said that good teaching is a skilled job.
10) **Selective:** Good teaching is selective. The subject matter to be taught is selected based on the interests and needs of the students as well as the development of skills.
11) **Helps in Learning by Doing:** Learning activity is effective if students acquire real-life experiences. The knowledge acquired through doing something is permanent and not forgettable. That is why great educationists and philosophers like Rousseau, Mahatma Gandhi, Rabindra Nath Tagore, and John Dewey emphasized learning by doing.
12) **Helps in Emotional Stability:** While teaching, the teacher should control his emotions as well and more emphasis should be given to controlling the emotions of his or her students. If it is not controlled, then different emotions like anger, sorrow, and fear can hamper the learning of the students. So, good teaching always helps to train and sublimate the urges and emotions.
13) **Means of Learning:** Good teaching prepares the children physically and mentally to learn. The effectiveness of learning depends on the attraction of teaching. So, teaching is termed as a means of good learning.
14) **Not Tied to Any Method:** A good teacher considers methods and devices as his or her servants, not as masters. Good teaching is not tied to any method as a teacher should select the teaching method and device according to the needs of the learner as well as the needs of the local situation. For example, the project method is not applied for all subjects, the discussion method is not recommended for all problems, and so on.
15) **Reduces the Distance between Teacher and Students:** For the effectiveness of teaching and learning, interaction between teacher and students is essential. Teachers should come out of their ivory towers and come as close to the students as possible. Good teaching increases intimacy between teacher and students and makes the process of teaching and learning effective.
16) **Helps in Self-Learning:** Good teaching inspires the students to self-learning. Teaching plays an important role in developing independent thinking capacity, self-confidence, and work ethics. All of these help the students to learn at their own pace.

1.6 Principles of Teaching

Teachers can develop the innate power of children through their teaching. So, teaching is called a noble profession. Educationist Thomas P. Green viewed that "Teaching is a task of a teacher which is performed for the development of a child". Teachers should follow some principles while teaching. Principles of teaching are divided into two parts. These are:

- General principles of teaching and
- Psychological principles of teaching.

Both these types of principles are explained below:

- **General Principles of Teaching:**

1) Principle of Goal Setting: Teaching is an activity directed through specific aims and objectives. The teacher should fix the aims and objectives while he or she should teach a particular course of study. Teaching is not effective without an objective or goal. Without a goal, it is not possible to change the behaviour of the students.

2) Principle of Planning: Proper planning helps to make teaching-learning successful. The teacher should always plan his or her lesson before entering into class. Planning of a lesson includes the planning of teaching methods, teaching strategy, and teaching aids. Without proper planning, it is very difficult for teachers to teach a lesson.

3) Principle of Child-Centeredness: The child is the main center of the education system. To teach the children, teaching methods and teaching aids are selected according to the needs, interests, aptitudes, and attitudes of the children. Thus, the education system of the present time is known as child-centered education.

4) Principle of Activity: One important principle of teaching is to facilitate learning activity. The child is active by nature. Educationist Froebel also emphasizes providing education through activity. Mahatma Gandhi also emphasized activity in learning. Children can learn by 3Hs i.e. head, hand, and heart.

5) Principle of Individual Differences: We all know that no two individuals in this world are the same. The thinking, attitude, and reasoning of every individual differ from each other. Again, the learning capacity of the children is also different. So, teachers should design, perform, and evaluate his or her teaching keeping given the principle of individual differences.

6) **Principle of Linking with Life:** One important aim of education is to prepare children for life. So, teaching should be essentially linked with the necessities and happenings in the actual life of the child. Pragmatic philosopher John Dewey said that the knowledge provided to students must be related to real-life situations.

7) **Principle of Flexibility:** Both time and society are very dynamic. So, the subject matter of education should be related to the changing times and society. Flexible subject matter also changes teaching methods. The teacher must be imaginative, resourceful, and creative to adapt himself and his teaching according to the changing teaching-learning process.

8) **Principle of Material Selection:** Proper teaching learning materials should be selected based on the age of the students, teaching objectives, and teaching content. Proper teaching materials make the teaching-learning process easy and real.

9) **Principle of Co-operation:** Teaching-learning is a cooperative task. Both teachers and students cooperate in the classroom to make teaching and learning successful. From a wider perspective, the cooperation of teachers, guardians, and educational authority is needed for the all-round development of the personality of the child.

10) **Principle of Creating a Conducive Environment:** A conducive learning environment plays an important role in effective learning. To create a conducive environment in the classroom, teachers should treat all students equally. Apart from that environmental factors like proper seating arrangement, light, and ventilation, classroom instruction, and discipline also influence the teaching-learning process.

- ## Psychological Principles of Teaching:

1) **Principle of Motivation:** Motivation plays an important role in the teaching-learning process. To arouse interest among the students, the teacher should try the create motivation. In this regard, Kelly opined that "Motivation is the central factor in the effective management of the process of learning". The teacher will try to do his best to motivate students in the lesson.

2) **Principle of Stimulation:** In the words of Burton, "Teaching is the stimulation, guidance, direction, and encouragement of learning". One major task of the teacher is to stimulate students with the help of a proper presentation of the subject matter. Ryburn also emphasizes in this regard that "the guidance of the teacher is mainly a matter of giving the right kind of stimulus to help him to learn right things in the right way".

3) Principle of Repetition and Exercise: There is a proverb that 'practice makes a man perfect'. In the same way, exercise and repetition of activity make the learning permanent. This principle of teaching is based on Thorndike's law of exercise. Repetition is essential for strengthening the connection between stimulus and response.

4) Principle of Readiness: Psycho-physical readiness of students plays a pivotal role in the teaching-learning process. According to this principle of teaching, the teacher should try to prepare the students to learn. Students can acquire knowledge effectively if he or she is ready to learn. The teacher must arouse the readiness of his students to learn a new topic.

5) Principle of Individual Difference: One important concept of psychology is individual difference. Intellectual capacity, learning capacity, problem-solving ability, motor ability, hopes and aspiration, interest, attitude, and reasoning capacity of an individual is different from others. Teachers always consider the individual differences of the students while teaching.

6) Principle of Creativity: Every child comes into this world with creative powers which is varied. To explore and develop this creative power of children is another principle of teaching. Teachers should provide opportunities for the students to explore things and events and find cause-effect relationships.

7) Principle of Rest and Recreation: Psycho-physical activeness is required in teaching the teaching-learning process. To become active in this process, rest and recreation are required. Fatigue, lack of attention, and monotony can be overcome by making appropriate provision for rest and recreation. Rest and recreation provide learners with refreshments and re-energize them.

8) Principle of Self-learning: The present education system places more importance on self-learning or self-education. Apart from providing knowledge and experiences in the classroom, teachers also prepare their students for self-learning. Self-learning provides independent thinking and it also develops the self-confidence of students. In this regard Galileo Galileo opined that "You cannot teach a man anything, you can only help him to find it himself".

9) Principle of Feedback and Reinforcement: One important principle of teaching is to provide feedback (knowledge of the results) and reinforcement (praise, grade, certificate, token money, and other incentives). Teachers can know their strengths and weaknesses through this process and also inspire the unsuccessful students for better learning.

10) Principle of Association: Psychologist Thorndike viewed that things we want to go together should be put together. It is generally observed that many things or ideas which we

want to go together should be associated with each other. They should form a part of a process. This way, students can easily understand the relationship of the process.

CHECK YOUR PROGRESS

Q 4: Why teaching is called a skilled job?

Q 5: Mention one psychological principle of teaching.

1.7 Summary

- Teaching is the specialized application of knowledge, skills, and attributes designed to provide unique service to meet the educational needs of the individual and society.
- Teaching is a skilled job. With the help of skills, teachers can modify the behaviour of the students.
- Different marks of good teaching are: recognizing individual differences among pupils, being systematic and well-planned, democratic, helping to adjust to the environment, following laws of learning, sympathetic, easily motivating the students, cooperative, skilled job, selective, helping in learning by doing, helps in emotional stability, means of learning, not tied to any method, reduces the distance between teacher and students and helps in self-learning.
- General principles of teaching are the principle of goal setting, the principle of planning, the principle of child-centeredness, the principle of activity, the principle of individual differences, the principle of linking with life, the principle of flexibility, the principle of material selection, the principle of co-operation and principle of creating a conducive environment.
- Psychological principles of teaching are the principle of motivation, the principle of stimulation, the principle of repetition and exercise, the principle of readiness, the principle of individual difference, the principle of creativity, the principle of rest and recreation, the principle of self-learning, the principle of feedback and reinforcement, and, the principle of association.

1.8 Answers to Check Your Progress

Answer to Q. No. 1: According to Henry C. Morrison, "Teaching is an intimate contact between a more mature personality and less mature one which is designed to further the education of the latter."

Answer to Q. No. 2: Informal teaching is related to different types of real-life experiences acquired by students in their day-to-day lives from different stakeholders.

Answer to Q. No. 3: The three poles of teaching are: objectives of education, content, and students.

Answer to Q. No. 4: Teaching of teacher requires knowledge of the subject matter, capacity of classroom management, techniques to use methods, use of technology, etc. All these make teaching effective. Thus it is said that good teaching is a skilled job.

Answer to Q. No. 5: One important principle of teaching is to provide feedback (knowledge of the results) and reinforcement (praise, grade, certificate, token money, and other incentives). Teachers can know his strengths and weaknesses through this process and also inspire the unsuccessful students for better learning.

1.9 Questions and Exercises

Short-Answer Questions

1. What is meant by teaching?
2. Write two important characteristics of teaching.
3. Why good teaching is democratic?

Long-Answer Questions

1. Explain the characteristics of teaching.
2. Elucidate the marks or criteria of good teaching.
3. Discuss the general and psychological principles of teaching.

1.10 Further Reading

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UNIT 2: PHASES OF TEACHING

Structure

2.1 Introduction

Teaching denotes actions undertaken to bring about learning in another. It is an effective interaction between the teacher and the pupils. It is a professional activity and helps to bring about the harmonious development of students. The three phases of teaching, the pre-active, the inter-active, and the post-active phases help to make teaching-learning more productive and effective and bring about a positive attitude towards learning. The teacher has to translate the subject matter using devices, skills, methods, and techniques thereby generating motivation and morale and assessing the teaching through evaluations, supervision, and feedback.

2.2 Unit Objectives

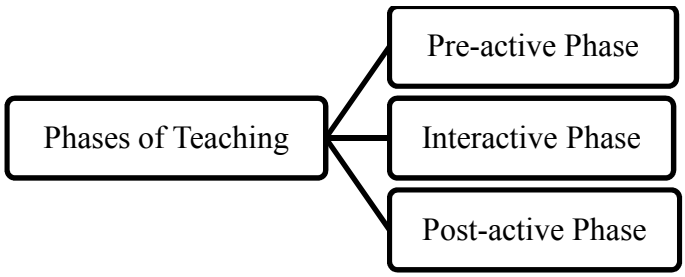
After going through this unit you will be able to

- Know the different phases of teaching.
- Develop an understanding of different strategies of teaching.

- Understand the different methods and devices of teaching.

2.3 Phases of Teaching

Teaching is defined as dynamic as well as interactive, and several activities proceed to actual teaching the process involves numerous actions as well as many actions that follow up actual classroom teaching. To fulfill his teaching responsibility, a teacher has to carry out various types of teaching activities with his students, and for this, he has to go through the proper procedures related to systematic planning and implementation. To do all this, he has to proceed by arranging his teaching work in certain steps or stages.These steps or stages are called the teaching stages or phases of teaching.In 1966, Philip Jackson distinguished between the pre-active and inter-active phases of teaching. And thus Phases of Teaching is also called Philip Jackson's analysis of teaching. The three phases of teaching are the pre-active phase, Interactive phase, and Post-active phase.



Let us discuss each phase in detail.

2.3.1 Pre-Active Phase

There are many activities related to teaching that teacher has to do before classroom teaching. In these activities, the teacher sets the objectives of classroom teaching according to his ability and experience. This phase is exclusively related to the analysis of the teaching task at the time of planning. In the pre-active phase of teaching, the planning of teaching is carried out. This phase includes all those activities, which a teacher performs before classroom teaching or before entering the classroom. Pre-teaching consists essentially of the planning of a lesson. The planning of lessons needs to be seen in broader terms, not merely the designing of a lesson plan. Planning includes identifying the objectives to be achieved in terms of students learning, the strategies and methods to be adopted, the use of teaching aids, and so on. All the activities that the teacher does before entering the class are included here. For example, preparing lesson plans for the teacher is a pre-active phase of teaching. The

success of the interactive phase entirely depends on it. It includes all the activities the teacher does before he has a face-to-face meeting with the students. There are four operations in the Pre-active phase. They are as follows:

1) Formulation of Instructional Objectives

The initial task of this phase is concerned with why a teacher is to teach in the class. What type of knowledge students will receive in a 45 to 60-minute class period is termed the objective of the teacher.

The objectives are formulated by considering the following points.

- Socio-economic background and mental level of students
- The standard of the lesson and the class
- Resources available in the class
- Environment and its aspirations
- Socio-political philosophy of the nation

2) Making Decisions about the SubjectMatter

The teacher will select the course materialafter determining the objectives of teaching. The teacher will see why this text is necessary for this course what level of motivation will be effective for the students and what methods should be used for their evaluation.

3) Arrangements of Ideas and Style of Teaching

After selecting the objectives and the subject matter by the teacher, it is very important to keep the different parts of the subject matter in order. This sequencing of the text should be kept psychologically so that the child can learn well.

4) Development of the Teaching Strategy

This includes an overall teaching strategy, to give a final look and revise what to perform in the class. Different strategies and techniques are selected for different elements of the subject matter and sometimes a combination of strategies is applied for the purpose. Selection of the strategies and techniques also depends on the age and psychology of the students.

2.3.2 Inter-Active Phase

All those activities of teaching come under this phase step, which the teacher does after entering the class. All the activities related to the presentation of the text are included in it. A teacher has to use a variety of skills in the classroom. Out of these, classroom management skills and communication skills are very important. The skill of classroom arrangement is very important in the teacher's teaching work. When going to the classroom in school, the first thing to do is to use the skill of classroom management. Good teaching depends a lot on the skill of classroom organization. It is through this skill that an environment conducive to learning is created. For proper seating arrangement of the students in the class, the necessary equipment and arrangements (furniture, carpet, blackboard, chalk, duster), etc. have to be kept in mind. Arrangements should be made for the students to sit in the classroom keeping in mind their height, visual impairment, hearing impairment, etc. Arrangements should be made according to the educational activities, and physical and social activities of the class. After the preparation stage, the second stage is to move to the actual stage of teaching in this way.

The most important difference between the pre-active and interactive phases of teaching is that the pre-active teaching activities are done by the teacher himself after a lot of thought, but on the contrary, in the interactive phase, the teacher's behaviour is mostly related to the classroom conditions and the needs of the students. Directly being guided is going to happen spontaneously because the students are in front of the teacher. Teachers do what they think is appropriate in that situation at that time. There is also a difference between the pre-active and interactive phases of teaching the events in the class happen very fast and the teacher has to run the activities at the same pace. While teaching a class, a teacher has to change the focus of his attention hundreds of times. During this stage, there is an interaction between the teacher and the learner. In this, the responsibility of the teacher is important; he takes care of the behaviour of the students and moves towards the desired behavior change. In this way, all the activities of textual presentation are included in it.

According to Jackson, in the inter-active phase, "the teacher provides pupils verbal stimulations of various kinds, makes explanations, asks questions, listens to students' responses and provides guidance."

The operations involved in this phase may be identified as follows:

1) Sizing up The Class

As soon as the teacher enters the class he throws a bird's eye view of the class and he comes to know in a moment the following things.

- What is the size of the class?
- Who are the students who will cooperate with him during teaching?
- Who are those who will be creating problems for him?

On the other hand, students also try to weigh the teacher visually, i.e., what is the worth of their teacher. This operation refers to the activity of perceiving the size of the class, and getting the feel of the moods of the learners. It is being made aware of how, many in the group are looking attentive, how many are negligent and disinterested, who are the sharper ones, and who are the troublemakers or slow at learning.

2) Diagnosis of the Learners

The second main step in the underlying process of teaching is to get knowledge of the level of the students. The teacher needs to know how much knowledge a student has of the subject and what the level of general knowledge is. For this, he takes the help of various questions. The knowledge and level of the students can be easily known through the questions on the content.

3) Treatment Given to the Learners

When a teacher does some activities by asking questions or by showing some material aids in the class, students react to these stimuli leading to some responses from the teacher, i.e., reinforcing the students' proper response. It includes both verbal and non-verbal actions and reactions. Learners respond to what the teacher says or does, and the teacher responds to what the learner says or does. This action-reaction has special importance in teaching. The following functions are done under these heads:

(i) Selection of stimuli:

Motivation is very important in the action-reaction between teacher and student. Therefore, the teacher has to decide which motivator is effective during teaching work and

which is not. It is through this motivation that the expected conditions of teaching can be created. While presenting the motivators, the teacher must keep in mind the order of teaching.

(ii) Presentation of stimuli:

The teacher also has to see in which context and in what form these motivators are to be presented. They will be more useful if presented in the same context and format.

(iii) Reinforcement:

It is also very important to do feedback and reinforcement in teaching for the increase of response. They help in teaching. It is of two types, positive and negative. In 'positive' reinforcement the teacher motivates the students by praising, praising, awarding, etc. Due to this, the possibility of taking expected and desirable actions increases a lot. Negative reinforcement includes scolding, punishment, humiliation, etc. Due to this, there is no possibility of unwanted actions happening again. The purpose of both positive and negative reinforcement is to improve the behavior of the students.

(iv) Use of devices:

Generally, with the help of questions, the teacher informs about the following aspects:

- Abilities of the students
- Attitude and interests of the students.
- Educational background of the students.

The teacher receives information regarding the abilities and interests of the students through his indirect communication and starts his teaching responses keeping that in mind. The activities that take place under teaching can be mainly divided into two parts- Initiation, andResponse,Both these activities are performed between the student and the teacher, which is called verbal interaction. The teacher initiates some activities, the student responds to them or the teacher responds to the student's initiation. In this way, the interactive process of teaching goes on. All the activities of teaching can be analyzed in the form of verbal and non-verbal interaction. The main objective of the activities of teaching is to change and improve the behaviour of the students. Therefore, the expected changes and improvements can be brought in the students only by using proper techniques of Feedback and Reinforcement.

2.3.3 Post-Active Phase

The last step in the teaching process is related to the teaching or evaluation of students. Teaching remains incomplete without evaluation. Under this stage, the teacher evaluates the knowledge given by various formal and informal methods and checks that in which direction and to what extent the desired behaviour change of the students has taken place. Teaching is conducted to achieve an educational objective. Through evaluation, the teacher finds out how successful the teaching was about the objectives, that is, to what extent the student could achieve the educational objectives. Measurement and evaluation of the desired behaviour change in the students, in this stage of teaching, the teacher does it with the help of oral or written, or practical tests. It is a phase of evaluation and follow-up of the operation at the pre-active and inter-active phases. Only after the evaluation, the teacher comes to know whether the objectives are achieved or not. The operatives involved in this phase are discussed below:

1) Determining the Exact Dimensions of the Behaviour

The teacher defines or determines the different dimensions of behavioural change based on the criteria of desirable behaviour. The teacher compares the real behaviour change of the students with their expected behaviour. If there is a greater similarity between the two, it is assumed that objectives are achieved e.g., after teaching the lesson on 'Parliament' to the students, the teacher expects that the students must have learned about the functions, houses, and officials of parliament.

2) Using Appropriate Testing Devices and Techniques

From the list of available testing tools, those, which are suitable for testing the attainment of the terminal behaviour are administered. These tools may include different types of paper-pencil tests, standard criterion reference tests, teacher-made informal tests, aptitude tests, aptitude test scales, etc.

3) Changing the Strategies of Teaching

The results of the tests, thus obtained enable the identification of those terminal goals that were not attained or those that were partly attained. By these tests, the teacher comes to know about the achievement of students on one hand, and on the other hand, he can also

know the effectiveness of his teaching strategies. These instruments can also help the teacher to know his shortcomings. When a teacher is unable to identify the terminal goal (behaviour) he may again identify his teaching strategy, review his method and teach again review his class and change his teaching styles, and judge the entry behavior of the students again to reach the terminal behaviour.

CHECK YOUR PROGRESS

Q 1: Who developed the concept of phases of teaching?

Q 2: What is meant by the pre-active phase of teaching?

2.3 Strategies of Teaching

Teaching strategies are made up of two words, teaching + strategy. Teaching is an interactive process carried out by teachers and students in classroom situations to achieve desired objectives. Strategies indicate planning, policy, and skills. According to The Collin English Gem Dictionary, strategy means war art and war skills. It is mostly used in war in the context of proper placement of the army and the art of fighting. The word 'strategy' of war science has been taken in educational technology, are those which are carried out by the teacher in the classroom situations to achieve his/her objectives and to bring about desired changes in the behaviour of the students.

In the words of Davies, “Strategies are broad methods of teaching”.

According to Stones and Morris, “Teaching strategy is a generalized plan for a lesson which includes desired learner behaviour in terms of goals, instructions, and an outline of planned tactics necessary to implement strategy”.

According to Mangal and Mangal, "Teaching Strategies may stand for the plans means, and specific ways especially devised and employed by the teachers for guiding, directing, and showing the path to the learners for the realization of the set instructional or teaching-learning objectives."

In the words of Medley, “Teaching strategy refers to sets of decision rules developed by teachers to attain an instructional goal.”

The nature of teaching strategies can be understood through the following characteristics.

(1) Teaching strategies help in the general planning for the teaching of a particular subject.
(2) Teaching strategies are the methods of work and they help the students to understand the objectives of the prescribed teaching and learning.
(3) A teaching strategy is a type of plan, program, or structure of teaching. Following this strategy will help to achieve the intended objectives of teaching more effectively.
(4) Well-planned teaching strategies are required for the successful implementation of teaching strategies.
(5) Teaching strategies are based on psychological principles and methods.
(6) Teaching strategies are used to make teaching enjoyable, playful, and encouraging.

Types of Teaching Strategy:

Teaching strategies are applied to achieve the goals and objectives of education. The purpose of education is to bring about the desired change in the behaviour of students. Various measures are taken in teaching to bring about this change. Teaching strategies are one such system. Teaching strategies can be divided into two categories based on the classroom environment and teacher attitudes. Such as-

(1) Autocratic strategy and
(2) Democratic Strategy.

Both these strategies are discussed below:

(1) Autocratic strategy:

Traditional teaching strategies are autocratic strategies and are also called convergent approaches. These teaching strategies are content and teacher-centered. When applying these strategies, the teacher plays a primary role and the students play a secondary role. Teachers try to impart knowledge externally without focusing on the interests, attitudes, skills, and needs of the students. In such circumstances, students do not have the opportunity to express their feelings. Autocratic strategies focus only on the mental development of students, not on cognitive objectives and team development.These strategies are discussed below:

a) Lecture:

One of the main autocratic strategies of teaching is lecture. This strategy can also be referred to as a teacher-centric or divergent approach. There are various ways in which teachers can deliver lectures to students. In this method, the teacher plays an active role and the students play a passive role.

b) Demonstration:

Demonstration is a more effective strategy when students are involved in a problem or topic and want solutions. Teachers play a major role in providing demonstrations.

c) Tutorials:

The tutorial is a sub-section of the class where the teacher can solve the problems of a small group of students through individual teaching. There are three types of tutorials- group tutorials, inspection tutorials, and practical tutorials. Tutorial develops positive attitudes and values of the students.It helps students to solve problems, make connections, etc.

d) Programmed Instruction:

This strategy is a self-directed technique in which students are given individual instruction or learning experiences. In this learning, the learning content is divided into a series of logically small groups. This learning is directly related to Thorndike's outcome policy. The five basic principles of this learning are the Principle of Small Steps, the Principle of Active Responding, the Principle of Immediate Reinforcement, the Principle of Self-Pacing, and the Principle of Student Testing.This learning helps students to move forward at their own pace.

(2) Democratic Strategy:

Democratic teaching strategies have been developed based on modern approaches to education. These teaching strategies are student and situation-focused. Instead of the one-sided traditional teaching provided by teachers, it provides opportunities for students to express themselves. The student plays a major role in the teaching of this strategy and the teacher plays a secondary role. Democratic teaching strategies facilitate the self-expression and development of latent and underlying strengths and abilities of the individual. Below are some important democratic strategies—

a) Project Method:

William H. Kilpatrick, a disciple of the American educational philosopher John Dewey and a professor at Columbia University, developed the project method. This method was developed as a result of the philosophy of pragmatism. According to William Kilpatrick, "A project is a wholehearted purposeful activity proceeding in a social environment". In this approach, students democratically prepare and implement educational plans to solve the problems of society. The project method is suitable for secondary-level students.The different steps of the project method are as follows—

- Teachers should provide the appropriate situation for the students to understand the problem.
- Both the teacher and the students should discuss together and prepare the objectives of the project in this context so that the work can be carried out properly.
- All the actions should be planned to achieve success in the project.
- Students should perform at this level according to their respective roles. When performing activities at this level, the teacher should pay attention to the progress of the students.
- This stage is where the work done by the students is judged or evaluated.
- All information should be recorded from project planning to judgment.
- Finally, the project should be evaluated. This stage assesses how the students perform.

b) Heuristic Method:

The heuristic method is one of the democratic strategies of teaching. Prof. Armstrong invented this method. The word ‘Heuristic’ comes from the ancient Greek ‘Heurisco’ which means ‘I find out’ or ‘I discover’. Armstrong's method of teaching science was later applied to other subjects. According to this method, students will find or discover the learning content in their efforts. Here, students develop self-learning through self-action. This method can instill in students the desire to seek knowledge through scientific approaches and experimental efforts.

c) Questioning-Answering Strategy:

Questioning-Answering strategy is used in all types of teaching. Questions and answers cannot be separated. The two move together. In teaching, both teachers and students ask questions and both answer. Therefore, teachers should know the techniques of asking students questions, encourage students to ask questions and answer them satisfactorily. The great philosopher Socrates invented this technique. No subject can be successfully taught to students without questions and answers. Questions and answers can make a person's thinking more orderly and organized.

d) Review:

Review means to check again. This democratic teaching strategy allows students to re-analyze the complex aspects of the learning content. It allows students to be involved in learning individually or in groups in intellectual activities. Teaching a subject does not end at the presentation level. Re-examination is a way to re-examine the weaknesses of students after refeeding or testing. This strategy is essential for students pursuing higher education.

e) Discussion:

Discussion is a form of democratic strategy in which teachers and students or a group of students analyze their views on a topic. Both teachers and students play an active role in this strategy. Before starting the discussion, all the teachers and students participating in the discussion should have at least a small understanding of the topic to be discussed. Discussions can be of various types — (i) formal discussions and (ii) informal discussions.

f) Role Playing:

Another strategy of democratic teaching is role-playing. Role play is more useful when students expect to interact effectively with others with the help of technological information. In role-play, two or more students are assigned situations and roles. Selected students put themselves in roles and attempt to solve problems. Role-plays are performed by small or large groups of students. This technique is used to present the problem dramatically. Students participate in this strategy in group discussions of the topic.

g) Seminars:

Seminars are a high-quality function of democratic education strategy. Here, students, teachers, and individuals sit together and exchange their views and ideas formally and

systematically. It allows individuals to read research papers on teaching (learning) stages and strategies prepared on specific topics one by one and the topics are discussed and conclusions are drawn from the discussions. This has the potential to benefit all participants. Such seminars are usually conducted jointly by students, teachers, and education authorities or other organizations may also conduct seminars on appropriate topics at any time.

h) Brain Storming:

It is a form of group teaching that develops creativity. This approach to teaching believes that students can learn more in groups than in individual teaching. This method is called brainstorming because the students create a storm-like situation in their brains by asking questions and answering them. In this method, students are divided into small groups. Students are presented with questions on a problem and are required to provide solutions within a given time frame. The underlying idea of this approach is that students can learn more freely and successfully in a question-and-answer environment in groups rather than studying any problem or topic individually. They can correct and improve their own misconceptions and limited knowledge and experience. Such activities help students to develop creative thinking collectively.

2.5 Methods of Teaching

Teaching methods are those methods with the help of which a teacher starts and completes the work of teaching and learning in the class. According to the teaching method, there is interaction between teachers and students in the classroom. The more efficiently the teacher uses the teaching method, the better the environment is generated in the classroom and the more effective the teaching-learning process is.

The teaching method is the correct answer to the question of "How to Teach" the curriculum and syllabus in the classroom. It creates a good and effective policy and rules to convey any subject or topic to the students. The teaching method is considered a part of educational technology and educational equipment. Education is a social process, due to which teaching methods are created or used keeping in mind the social needs.

Some of the salient features of the teaching method are:

- Teaching methods are used to conduct the course to the students correctly and clearly.

- In teaching methods, more importance is given to the objectives of the curriculum than the objectives of teaching.
- In teaching methods, proper help of sub-methods of teaching is also taken.
- Teaching methods are used during the interaction between the students and the teaching.
- The teacher gets the answer to how a subject has been taught, how to teach it, or how to convey it to the students only through these methods.
- More importance is given to experimental work and presentation in teaching methods.

Importance of using Teaching Methods

- With the use of teaching methods, a sense of stability can be brought into the knowledge of the students.
- Using this, students can recall the acquired knowledge when the time comes.
- It works to reduce the complexities of the topic and subject.
- The class remains disciplined by using the teaching method.
- By its use, a cordial relationship is created between the student and the teacher.
- By using the methods properly and efficiently, the interest of the students towards the subject or course can be increased.
- For its use, the mental, intellectual, and spiritual development of the student can be done simultaneously.

Types of teaching methods

Where, how, and in what manner which teaching method is to be used depends on the skill of the teacher. There are many types of teaching methods lecture method, demonstration method, lecture-demonstration method, question-answer method, etc. Some of the important teaching methods are stated below:

• Lecture method:

This is the method that every teacher uses to clarify the topic. This method can be used by the teacher outside the classroom as well. This method is an ancient method. In ancient times, in Gurukuls, Gurus used to use this method to teach their disciples by sitting in

a natural environment. This method is considered to be the simplest. The biggest advantage of this method is that it keeps the class disciplined.

- ***Demonstration method:***

The demonstration method helps the teacher to explain clearly to the students. In the demonstration method, the teacher reveals the scenes related to the topic among the students and also keeps explaining it to the students by showing those scenes so that the students take an interest in the topic and their knowledge becomes permanent. This is a psychological method.

- ***Question Answer method:***

This method was propounded by Plato's guru Socrates. Through the questioning method, the thinking level of the students is expanded and it also develops the memory power of the students. With its use, the class remains disciplined and it also works to increase students' interest in the subject. By using this, individual differences between students can be identified and students can be differentiated (high, average, low). This teaching method is one of the most widely used teaching methods.

- ***Inductive method:***

This method was propounded by Aristotle, the guru and father of politics. In the induction method, before starting the teaching work or starting the topic, examples related to prior knowledge are presented to the students so that the topic to be taught is reached, that is, this method moves from known to unknown.

- ***Deductive method:***

The deductive method was propounded by Aristotle's guru Plato. This method is opposite to the induction method. This method moves from the unknown to the known. In this, first of all, some formula or some principle is presented among the students and then the students are taken to that level with which the student is familiar, that is, in this method, the students are told about the principles and then their meanings are explained. This method is also seen as the basis of philosophy. In this method, students are taken from general to specific, from knowledge to unknown, and from micro to macro.

- ***Montessori Method:***

Dr. Maria Montessori developed this method of teaching which is primarily concerned with young children. In this method, emphasis is given to inner development, complete freedom, auto or self-education, sense training, individual development, formation of good habits of the students, use of didactic apparatus, etc.

- ***Kinder Garten Method:***

The inventor of this method was the German educational philosopher F. W. Froebel. According to Froebel, this method is characterized by the fact that the child learns through his nature. In this kindergarten system, special emphasis is placed on the creativity of the child. Froebel considered a school as a small society. Therefore, he argued that children should be allowed to acquire social knowledge by participating in various social activities.

- ***Project Method:***

This method was developed by the American educational philosopher John Dewey. This method primarily focussed on two aspects. These are: (i) learning by doing or learning by problem-solving and (ii) recognition of experiences. Dewey emphasized that students should acquire experiential knowledge by planning various problems related to their real lives rather than the teacher giving instructions to the students.

- ***Game method:***

In modern times, to provide primary education, children and infants are provided education through games. Henry Foldwell Cook is seen as the exponent of this method. This is an interesting method in which the child expresses his full interest due to which the knowledge gained becomes permanent and the student can store that knowledge in his mind for a long time.

Teaching methods are how proper use of the quality of education can be increased and the objectives and goals of education can be fully achieved. The teaching method is a new need of modern education. In the present circumstances, it is very important to change the methods of teaching from time to time, but all the teaching methods are beneficial only when the teachers use them efficiently.Otherwise, the level of education will continue to decrease instead of increasing.

2.6 Devices of Teaching

Teaching is a dynamic and planned process. The aim of teaching is that the student should get maximum learning experience. The teacher can make teaching effective and easy by using various teaching devices as per the subject and situation. Different techniques of teaching e.g. question-answer technique, example technique, interpretation technique, and explanation technique, etc. are all helpful in some teaching methods, similarly, various devices of teaching are also helpful in some way or the other in teaching techniques. In other words, teaching devices are fundamentally the cornerstone of learning structure.

In the words of Raymond, "Devices are certain external forms or modes which teacher's instructions may from time by time assume".

Various Teaching Devices

Some of the important devices of teaching are as follows:-

1. ***Exposition***

The purpose of exposition is to present the new knowledge to the students in such a beautiful and comprehensible manner that they can take it to heart. The teacher uses this device when he comes to know that his students have little knowledge about the subject he is going to teach. Thus exposition means to uncover, reveal, show, bring to light, and provide new information to the students.

2. ***Explanation***

Explanation means to clarify, to propound, to remove ambiguity, and to develop wisdom. Explanation is commonly used in the teaching of literature, history, geography, sociology, political science, economics, and science.

3. ***Narration***

The teacher needs to learn the device of narration to give a clear understanding of ideas, concepts, rules, events, etc. to the students. A teacher who can give effective narration can certainly make his teaching effective. The purpose of narration is to mark a clear picture of a phenomenon in the minds of the students so that they can successfully assimilate its

knowledge. This device has special significance in the teaching of history because the teacher can make the students aware of various historical events only by giving details about them.

4. Description

To describe means to define or depict. Depicting the basis or elements of an object by words is called description. A description is a form of explanation. By describing a war in teaching history, an instrument in teaching science, and a region in teaching geography, the teacher imprints their picture in the minds of the students. Description device is used in the teaching of all subjects to a greater or lesser extent.

5. Illustration

To illustrate means to explain, explain, illustrate, or quote. In teaching, illustration is used in a technical sense. This not only includes the use of pictures, maps, models, charts, examples, and comparisons but it also includes the use of various types of instruments, such as blackboard, scientific and geographical instruments, and psychological instruments and diagrams. In short, illustrations include everything that influences the student's emotions and imagination, stimulates his interest and curiosity, and thus provides clarity to the part described.

6. Questioning device

Asking questions is an important device of teaching. The success of teaching largely depends on the skill or art of asking questions. Questions are asked to test the students' prior knowledge, that is, questions are asked to find out what the students already know.Asking questions is an art that the teacher should not only learn himself but should also teach to the students. Teachers' behaviour towards questions and the answers are given have a significant impact on teaching.

7. Answering

The teacher's behaviour towards students' answers is as important as his asking questions. One should be careful in front of students' answers in the same way as while asking questions.

8. Assignment

Assignment is work that is given to a student or class. Mainly it is used as a supplement to the teacher instead of teaching. It provides expert guidance to the students in their curricular activities.

9. Home work

Home study or homework is work that is done outside normal school hours. This is often done by students at home too. Homework develops the habit of hard work and regular work. This is a habit which is very useful In gaining knowledge.

10. Blackboard

The blackboard is a very important tool in the hands of the teacher. It is an important asset of the teacher in classroom teaching which has a direct impact on the students and strengthens their attention and concentration.

11. Textbook

The textbook device is used as a tool, support material, and source of information. The teacher should use textbook devices to make his teaching interesting, effective, and successful.

12. Reference books

Reference books are called storehouses of information. It is used to make up for the deficiency of the textbook material.

Apart from these devices of teaching, there are certain fixing devices of teaching too. The fixed devices of teaching are as follows:

- ***Drill***

An important device among the fixing devices used in teaching is the drill device. It is widely used in education. The drill is a teaching device for symbolic learning such as algebra, English grammar, and foreign language learning.

- ***Review***

Review is also an important device to make learning permanent. It is used to master facts and skills that are essential for both school and life.

- ***Recapitulation***

Recapitulation is another fixing device that has a special place in the teaching-learning process. It is required in all lessons. Recapitulation means revisiting or repeating the acquired knowledge. In this, previously learned knowledge is reviewed and reproduced.

- ***Repetitive practice***

A repetitive practice device as a fixing device has an important place in the teaching-learning process and its stabilization. As the name suggests, this device is concerned with the repetition of the learned material. This is a useful device for the learner because repetition is essential for permanent learning.

CHECK YOUR PROGRESS

Q 3: What is the project method?

Q 4: What is meant by the Heuristic method?

Q 5: Seminar is a democratic strategy. (Write true or false)

Q 6: Democratic teaching strategies are teacher-oriented. (Write true or false)

2.7 Summary

- In 1966, Philip Jackson distinguished between the pre-active and inter-active phases of teaching. And thus Phases of Teaching is also called Philip Jackson's analysis of teaching. The three phases of teaching are the pre-active phase, Interactive phase, and Post-active phase.
- In the pre-active phase of teaching, the planning of teaching is carried out. This phase includes all those activities, which a teacher performs before classroom teaching or before entering the classroom.
- All those activities of teaching come under the interactive phase, which the teacher does after entering the class. All the activities related to the presentation of the text are included in it.
- The post-active step in the teaching process is related to the teaching or evaluation of students. Under this stage, the teacher evaluates the knowledge given by various

formal and informal methods and checks that in which direction and to what extent the desired behaviour change of the students has taken place.

- According to Stones and Morris, “Teaching strategy is a generalized plan for a lesson which includes desired learner behaviour in terms of goals, instructions, and an outline of planned tactics necessary to implement strategy”.
- Teaching strategies can be divided into two categories based on the classroom environment and teacher attitudes. Such as Autocratic strategy and Democratic Strategy.
- The teaching method is the correct answer to the question of "How to Teach" the curriculum and syllabus in the classroom. It creates a good and effective policy and rules to convey any subject or topic to the students.
- The teacher can make teaching effective and easy by using various teaching devices as per the subject and situation. In the words of Raymond, “Devices are certain external forms or modes which teacher’s instructions may from time by time assume”.

2.8 Answer to ‘Check Your Progress’

Answer to Q. No. 1: Philip Jacksondeveloped the concept of phases of teaching

Answer to Q. No. 2: In the pre-active phase of teaching, the planning of teaching is carried out. This phase includes all those activities, which a teacher performs before classroom teaching or before entering the classroom. Pre-teaching consists essentially of the planning of a lesson. The planning of lessons needs to be seen in broader terms, not merely the designing of a lesson plan.

Answer to Q. No. 3: The projectmethod was developed by the American educational philosopher John Dewey. This method primarily focussed on two aspects. These are: (i) learning by doing or learning by problem-solving and (ii) recognition of experiences. Dewey emphasized that students should acquire experiential knowledge by planning various problems related to their real lives rather than the teacher giving instructions to the students.

Answer to Q. No. 4: The heuristic method is one of the democratic strategies of teaching. Prof. Armstrong invented this method. The word ‘Heuristic’ comes from the ancient Greek ‘Heurisco’ which means ‘I find out’ or ‘I discover’. Armstrong’s method of teaching science was later applied to other subjects. According to this method, students will

find or discover the learning content in their efforts. Here, students develop self-learning through self-action. This method can instill in students the desire to seek knowledge through scientific approaches and experimental efforts.

Answer to Q. No. 5: True.

Answer to Q. No. 6: False.

2.9 Questions and Exercises

Short-Answer Questions

1. What are the phases of teaching?
2. Write the opinion of Jackson on the interactive phase of teaching.
3. Write the characteristics of the teaching strategy.
4. Why teaching methods are important for a teacher?

Long-Answer Questions

1. Explain the different phases of teaching with appropriate ,examples.
2. Write elaborately about teaching devices.
3. Discuss the democratic teaching strategies important for a primary school.
4. Describe five important teaching methods with appropriate examples.

2.10 Further Reading

- Aggarwal, J. C. (2014). *Principles, Methods & Techniques of Teaching.* New Delhi: Vikas Publishing House Pvt. Ltd.
- Chauhan, S. S. (1979). *Innovations in Teaching-Learning Process*. New Delhi: Vikas Publishing House Pvt. Ltd.
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UNIT 3: NATURE OF LEARNING

Structure

3.1 Introduction

Learning is another name for development. Through learning ability, humans have achieved superiority in the animal kingdom. The scientific study of the learning process has naturally made human development more accurate, faster, and better. Therefore, there is no end to the extensive study, testing, and development work of learning experts. In educational psychology, learning is the focus of study. Educational psychology can therefore be generally described as the science of learning. This learning can elevate man from animality to humanity and finally to divinity. The life structure and progress of life from birth to death take place through this learning. It is learning that has made man from the stage of savagery to better-functioning skills in the present complex situation. Nowadays, as human efficiency and skills become more complex, the need for learning and its improvement has naturally increased. This unit attempts to simplify the nature and steps of learning.

3.2 Unit Objectives

After going through this unit you will be able to

- Know the meaning of learning.

- Develop an understanding of the nature of the learning process.
- Understand the concept of the teaching-learning process.
- Examine the different steps in the learning process.

3.3 Meaning of Learning

Learning is a lifelong continuous process that starts from the birth of an individual and continues till the time of death. Simply learning means the modification of human behaviour. Human behaviour is modified with different experiences and training. These experiences may be direct or indirect.

The instinctive behaviour of human beings is not learned. Through experience and training, this behaviour is modified which enables us to adjust properly and effectively to the new environment. Everyone wants to acquire new behaviour, skills, activities, and new experiences to adjust properly and effectively to the new situation. Throughout life, human beings change, modify, and improve their crude instinctive behaviour. This change, medication, and improvement are called learning.

A complete understanding of the meaning of 'learning' needs the views of psychologists in this regard. Some of the definitions provided by psychologists regarding the meaning of learning are mentioned below:

- In the words of Gates and others, “Learning is the modification of behaviour through experience”.
- According to Henry, P.Smith, “Learning is the acquisition of new behaviour or strengthening or weakening of old behaviour as a result of experience”.
- According to Crow and Crow, "Learning is the acquisition of habits, knowledge, and attitudes. It involves new ways of doing things, and it operates in an individual's attempt to overcome obstacles or to adjust to new situations."
- To quote Skinner, “Learning is the process of progressive behaviour adaptation.”
- In the words of Munn, “To learn is to modify behaviour and experience.”
- According to M. L. Bigge, “Learning may be considered as change in insights, behaviour, perception, motivation or a combination of these.”

- In the words of Pressey, Robinson & Horrocks, “Learning is an episode in which a motivated individual attempts to adopt his behaviour so as to succeed in a situation which he perceives as requiring action to attain a goal.”
- In the words of Hilgard, “Learning is the process by which an activity originates or is changed through reacting to an encountered situation, provided that the characteristics of the changes in activity cannot be explained on the basis of native response, tendencies, maturation or temporary states of the organism (e.g. fatigue or drugs, etc.).”

3.4 Aims of Learning

The main aim of learning is to modify the instinctive behaviour of human beings. There are some other aims of learning also. These are mentioned below:

- One important aim of learning is to help the individual to adjust to the new situation. With the help of learning, an individual can adjust himself to new situations very easily.
- Another aim of learning is to develop a balanced personality of the individual. The process of learning brings all round development of the personality through experiences and training.
- To attain teaching-learning objectives is another aim of learning. This objective can be effectively reached through the help of learning and consequently, children can be made to acquire essential knowledge, skills, applications, attitudes, interests, etc.
- Another aim of learning is to proper growth and development of an individual. Learning helps in reaching one's maximum growth and development in different aspects such as physical, mental, intellectual, emotional, social, moral aesthetic, language, etc.
- Solving different real-life problems is another aim of learning. Learning helps individuals to solve different problems in real life. It makes one's life happy.

3.5 Nature of Learning

The comprehensive nature of learning may be understood with the help of the following characteristics of learning.

1) **Active Process:** Learning is termed an active process because, without the activeness of the learner, it is not possible to learn something.
2) **Adjustment:** Learning is a process of adjustment of an individual in his environment. With the help of learning, one can adjust to a new situation very easily.
3) **Problem Solving:** Every individual faces different problems in their day-to-day life. Learning helps the individual to find out the problem properly and with the help of experience and proper education one can solve his/her problem.
4) **Goal-Oriented:** Learning is always a purposive and goal-oriented process. Men used to learn with a clear goal or purpose in mind to achieve. Learning helps to achieve its goal.
5) **Continuous Process:** Learning is a lifelong continuous process. It starts from the birth of an individual and continues till the time of death. People learn new experiences every day of his/her whole life.
6) **Modification of Behaviour:** Learning is a process through which the behaviour of a human being is modified by experiences and training. When people learn something, it helps them to modify his/her behaviour.
7) **Based on Maturation:** The learning of an individual is always based on psycho-physical maturation. More maturity may result in more capability to learn. Immaturity indicates unfit to learn.
8) **Depend upon Motivation:** Learning is always depending upon motivation. It gives readiness to the learner to learn something. Learning effectiveness is the result of the motivation of the learner.
9) **Habit Formation:** Sometimes learning is based on habits also. Habitual activity makes learning permanent.
10) **Individualized Activity:** All people in this world do not have equal ability to learn as every individual in this world is not the same. That is why learning is termed an individualized activity.
11) **Intellectual Activity:** Learning is also termed an intellectual activity. Learning helps individuals to solve different problems, adjust to new situations, and create something new or innovative.
12) **The bond between Stimulus and Response:**Learning is the establishment of the bond between stimulus and response. Without the bond between stimulus and response, it is not possible to learn something.

CHECK YOUR PROGRESS

Q 1: What is learning?

Q 2: Mention one objective of learning.

Q 3: 'Learning depends on motivation'- explain briefly.

3.6 Concept of Teaching-Learning Process

The teaching-learning process is as old as human civilization in this world. Teaching-learning is a very complex as well as interesting process. Teachers and students are related to this process. This process is the process of exchanging knowledge and experiences. When learning is effective, teaching is also effective. Teaching teaching-learning process is a mutual activity between teachers and students, the purpose of which is learning-oriented.

In the words of J.C. Aggarwala, "Teaching learning process is a means through which the teacher, the learner, the curriculum and other variables are organized in a systematic manner to attain pre-determined goals and objectives".

According to Bernard, "In the teaching-learning process, teachers and students encourage learning".

Teaching-learning provides a means for society to train the young generations in a selected environment (for example school, college, and university) as quickly as possible to adjust themselves to the environment where they live. Teaching-learning has four aspects. These are teacher, student, learning process, and learning situation. The effectiveness of all these aspects makes the teaching-learning process successful.

Nowadays, classroom transactions between teachers and students have drastically changed. Teachers use different strategies and methods to develop the inherent capabilities of children. At present apart from classroom transactions, students can learn at different other places of educational institutions like libraries, and laboratories, and also through different activities like discussion, seminars, extempore speech, debate competitions, group discussions, etc. The teaching-learning process is influenced by the totality of the situation. Teaching learning will be effective and fruitful when the total teaching-learning situation is related to the life situation.

The teaching-learning process has a three-way communication cycle. These are:

Communication Cycle	Steps Involved in the Cycle
Communication from the teacher to the learner	Educational Objectives and Contents
	Information Presenting
Communication from the learner to the teacher	Information receiving
	Information processing
	Responding
Communication again from the teacher to the learner	Diagnosing
	Evaluating
	KR* information Presenting

*KR is a kind of feedback information provided to students by the teacher for their behaviour; such as ‘good’, ‘wrong’, ‘no’, ‘well done’ etc.

Characteristics of Teaching Learning Process

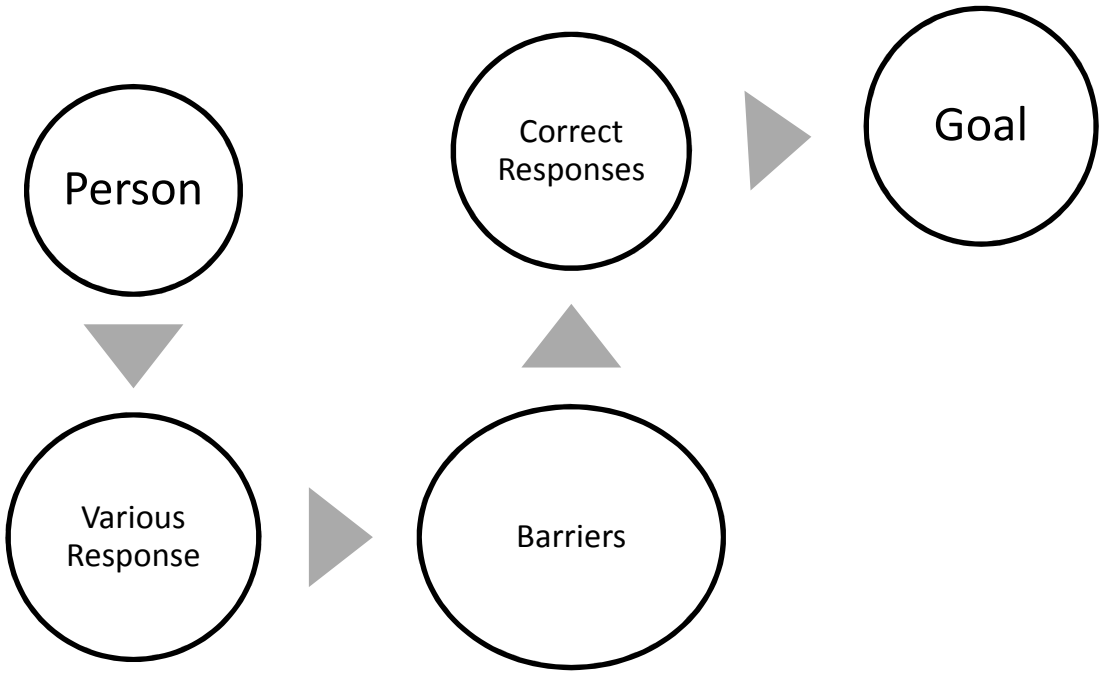
Some characteristics of the teaching-learning process are mentioned below:

- Teaching learning is a complex social and psychological process. It is complex because if the students in not want or are ready to learn, then the teacher can't teach. To learn something, psycho-physical readiness is needed.
- The teaching-learning process has pre-determined aims and objectives. To achieve these aims and objectives, interaction between teachers and students is mandatory.
- The teaching-learning process is formal as well as informal. Formally from educational institutions and informally from real-life situations people learn and acquire knowledge.
- The teaching-learning process is a tri-polar communication process. These three poles are teacher, students, and teaching environment. All these three poles make the teaching-learning process effective.
- Teaching learning is an interconnected process. One is always dependent on others. Teaching is incomplete without learning and learning is incomplete without the discussion of teaching.
- The teaching-learning process helps the learners to adjust to the social environment. With the help of new knowledge and experiences, one can adjust to new situations.

- Teaching learning activities improve the interaction between teachers and students. This interaction motivates the teachers to teach effectively and students to make the acquired knowledge permanent.

3.6 Steps in the Learning Process

Learning is a continuous, comprehensive, and lifelong process due to which there is a change in the behaviour of the person. Learning is not accidental; rather it requires the accumulation of various experiences. Learning is a conscious mental process that is initiated by some need or motivation. When a person learns a new thing, the object that attracts him is the goal. Some obstacles are also experienced in achieving it. Thus the process of learning shows several stages of analysis. For example- when the child feels the need for food due to hunger impulses, he reaches to the almirah while searching for food, where the box of sweets is kept at a height. The goal of the child is to get the box of sweets, but due to the high height, he feels an obstacle in getting that box and tries to get it by standing on a stool, chair, or post. In this way, after being successful in his objective, he learns how to reach the object kept at a higher height, and in the future, he uses this learning to solve other similar problems.



The relationship of these stages has been described by Miller and Donald in this way- to learn, a person should need something, he should see something, understand something, he should do something and finally, he should achieve something.

The different steps of the learning process are described below:

1) ***Motivation:***

There is some motivation behind every work of a person. Innumerable human needs are not easily satisfied, and to fulfill them he/she has to be active. Therefore, motivation is that dynamic source of power, which provides strength to behaviour and inspires the child to do something and this motivation takes the person towards his/her objective.

2) ***Goal Oriented:***

Learning is always goal-oriented. No action of a person is without purpose. Therefore, he/she has to set some clear goals and objectives, and to achieve these goals; he/she has to go through some learning process. The clearer the goals and objectives are, the stronger the learning process.

3) ***Obstacles/Barriers:***

Under this, some kind of obstruction, barriers, difficulty, and obstacles come to the fore. If there is no obstacle or difficulty, then the person will not have any desire to change his behaviour and acquire new knowledge and skills. Therefore, obstruction or hindrance is also a necessary step in the process of learning.

4) ***Various Possible Responses:***

A person tries again and again to do any work or activity that he knows how to do and in these attempts, he corrects his earlier mistakes. For this, he takes the help of logic, reasoning, trial and error, etc., and ultimately succeeds in doing the work correctly. Thus, to carry out a process or task correctly, several possible responses are usually required.

5) ***Reinforcement:***

To overcome the obstacles in the process of learning, a person makes different types of efforts and becomes successful in removing the obstacle by any one effort. So he/she experiences it and wants to repeat it again and again. This repetition is a very important step in the process of reinforcement.

6) ***Organization/Generalization:***

Learning is organizing to select appropriate and successful responses. The last step of learning not only fulfills the need and goal of the individual but also connects the new successful response with the previously learned responses. In this way, he/she goes on coordinating his/her new or previous knowledge which is called integration or equalization.

CHECK YOUR PROGRESS

Q 4: What is the teaching-learning process?

Q 5: Mention two steps of the learning process.

3.8 Summary

- Throughout life, human beings change, modify and improve their crude instinctive behaviour. This change, medication, and improvement are called learning.
- The main aim of learning is to modify the instinctive behaviour of human beings.
- Learning helps the individual to find out the problem properly and with the help of experience and proper education one can solve his/her problem.
- The teaching-learning process is a means through which the teacher, the learner, the curriculum, and other variables are organized in a systematic manner to attain pre-determined goals and objectives.
- Teaching-learning has four aspects. These are teacher, student, learning process, and learning situation. The effectiveness of all these aspects makes the teaching-learning process successful.
- The teaching-learning process is a tri-polar communication process. These three poles are teacher, students, and teaching environment. All these three poles make teaching teaching-learning process effective.

3.9 Answer to 'Check Your Progress'

Answer to Q. No. 1: Learning is the modification of behaviour through experienceand training.

Answer to Q. No. 2: One important aim of learning is to help individuals to adjust the new situation. With the help of learning, an individual can adjust himself to new situations very easily.

Answer to Q. No. 3: Learning is always depending upon motivation. It gives readiness to the learner to learn something. Learning effectiveness is the result of the motivation of the learner.

Answer to Q. No. 4: In the words of J. C.Aggarwala, "Teaching learning process is a means through which the teacher, the learner, the curriculum, and other variables are organized in a systematic manner to attain pre-determined goals and objectives".

Answer to Q. No. 5: Two steps of the learning process are motivation and reinforcement.

3.10 Questions and Exercises

Short-Answer Questions

1. Define learning.
2. Write two characteristics of learning.
3. Mention any two characteristics of the teaching-learning process

Long-Answer Questions

1. What is learning? Discuss the aims of learning.
2. Describe the different steps of the learning process.

3.11 Further Reading

- Aggarwal, J. C. (2014). *Principles, Methods & Techniques of Teaching.* New Delhi: Vikas Publishing HousePvt. Ltd.
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UNIT 4: LEVELS OF TEACHING

Structure

4.1 Introduction

Teaching is a systematic, scientific, and complex process through which teachers can make the learning of students possible. In teaching, teachers systematically present teaching content to students in the classroom. Teaching is not just about presenting the teaching-learning content in the classroom. Teaching is not just presenting the teaching-learning content in the classroom as teaching also focuses on how successfully the students have absorbed the teaching-learning content presented. Teachers' teaching is deeply involved in the mental skills, intellectual abilities, efficiency, sense of life, social awareness, etc. of students. Teachers use different levels to teach students. From ancient times to the present, various levels have been used to make teaching successful. As a result of various scientific studies and analyses of teaching, the levels of teaching have gained a stable form. In this unit, we will discuss the different levels of teaching in detail.

4.2 Unit Objectives

After going through this unit you will be able to

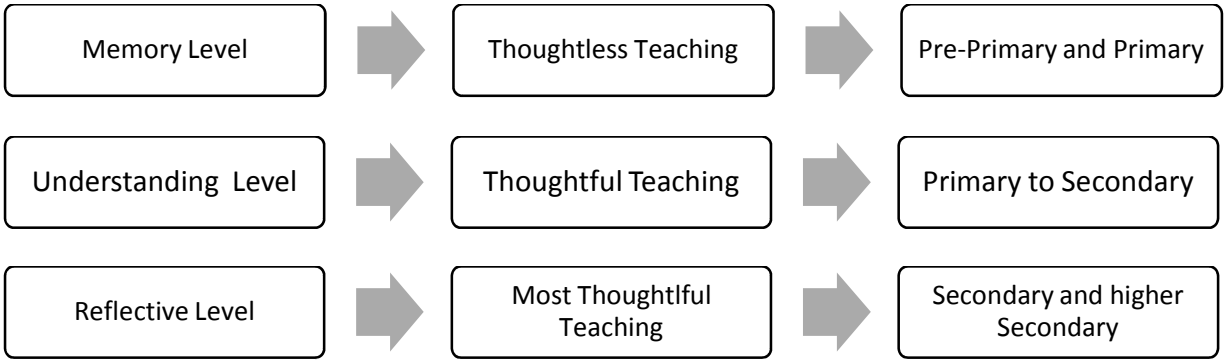
- Know the basic concept of levels of teaching-learning.
- Understand the different levels of teaching-learning.

4.3 Levels of Teaching Learning

The main objective of teaching is to bring about desired changes in the behaviour of the learner and to help him to make suitable adjustments in his personal and social life. To achieve those objectives of education, keeping in mind the level of physical and mental development of the child, teaching-learning has been divided into three major levels.

The three levels of teaching-learning are:

1. Memory Level
2. Understanding Level
3. Reflective Level



4.3.1 Memory Level

The main objective of teaching-learning at this level is to develop the child's memory power. The child is unaware of school and educational activities. He is immature in terms of physical and cognitive development.Memory is a mental process, which is found in some or the other quantity in every living being. When a person sees an object, substance, or place, the reflection or symbol of that object, substance, or place becomes in his mind, remembering these accumulated symbols or things learned in the past is called memory.

The different stages of memory are stated below:

1) **Learning:**This is the initial stage of memory where the individual acquires new information or experience through various means such as reading, seeing, hearing, or doing.Learning can be intentional or unintentional.For example, when a person learns to ride a bicycle, he is consciously trying to acquire a new skill.
2) **Retention:**This is the stage of memory where the learned information or experience is stored in the brain for a longer period.Retention can be affected by a variety of factors such as repetition, relevance, and sentiment.For example, a person may remember the lyrics of a song that he or she has heard over and over, or he or she may remember an event that had a strong emotional impact on him.
3) **Recall:**It is the stage of memory where a person retrieves or brings back the stored information or experience into conscious awareness. Recall may be spontaneous or may be prompted by external cues. For example, a person may recall a childhood memory after seeing a picture or hearing a familiar sound.
4) **Recognition**:This is the stage of memory where a person recognizes or accepts that they have seen or experienced something before. Recognition can be based on different cues such as visual, auditory, or contextual.For example, a person may recognize a former classmate after seeing him in a different setting or he can recognize a song that he had previously heard on the radio.

Model of Memory Level of Teaching

The memory level model of teaching-learning is a framework that describes how information is processed and stored in memory during the teaching-learning process. It consists of the following components:

Aim: Teaching aims to provide new information and knowledge to the students that they can use in their lives. This includes setting clear learning objectives and providing relevant and meaningful content.

Syntax: The structure or syntax of teaching refers to how information is organized and presented to the students. It involves breaking down complex information into smaller, more manageable pieces and presenting it logically and coherently.

Social System: The social system of teaching refers to the interactions and relationships among teachers, students, and peers. This includes creating a positive and supportive learning environment where students feel safe asking questions and sharing their ideas.

Support System: The support system of instruction refers to the resources and equipment available to help students learn and retain information. This involves providing feedback, guidance, and reinforcement to help students develop their memory skills and improve their learning outcomes.

Elements of Memory Level of Teaching-Learning

Memory level of teaching-learning is the first level of education, where the aim is to develop the memory power of the child. Here are the key elements of this level:

1. **Objectives:** The main objective of teaching at this stage is to provide factual information and knowledge to the learner. The learner needs to memorize these facts and identify them as and when required.
2. **Nature of subject matter:** At this stage, the subject matter is simple. The learner learns by rote method, where the teacher presents factual material for memorization.
3. **Teaching methods:** The teacher is active at this stage and uses methods such as drill exercises, repetition, recall, and questions to help the learner remember the subject matter.
4. **Role of the teacher:** The teacher plays an effective, active, and dominant role at this stage. They have direct contact with the learner, and the relationship between them is important.
5. **Role of the learner:** In this stage the role of the learner is passive. They need to follow the teacher's orders and remember the facts, words, and concepts presented to them.
6. **Teaching equipment:** The use of audio-visual aids like charts, models, radio, television, tape recorder, etc. can help in making teaching interesting and sustainable.
7. **Nature of motivation:** In this stage, the motivation of the learner is completely extrinsic. The teacher motivates the children to studyand stresses the importance of memorizing the subject matter.
8. **Evaluation system:** The evaluation system is an essential part of teaching, as it helps in measuring the achievement of educational objectives.

Example: In a primary school, students are taught multiplication tables at the memory level of teaching. The teacher presents the tables to be memorized, and the students are required to memorize them and refer to them when needed. The teacher uses repetition and questioning to help students memorize the tables. The motivation for students is extrinsic, as teachers stress the importance of memorizing tables to do well in mathematics class. The evaluation system measures the extent to which the students memorized the tables.

Merits of Memory Level of Teaching

1. **Developmentally Appropriate:** The memory level of teaching is appropriate for young children because it aligns with their cognitive development level. Example: A teacher is teaching a nursery rhyme to preschoolers using repeating phrases and songs.
2. **Learning simple concepts:** This learning level helps children to learn about simple objects, substances, situations, and elements of their environment, which form the basis of future learning. Example: A teacher uses pictures of fruits and vegetables to teach a preschooler about healthy eating habits.
3. **Development of memory:** Memory power is important at all stages of life, and this learning level helps in the development of memory power of the child. Example: A teacher is asking students in elementary school to memorize the multiplication table.
4. **Useful for special needs students:** The memory level of teaching is helpful for students with special needs, such as those with learning disabilities or mental retardation. Example: A teacher uses flashcards to teach basic vocabulary to a student with autism.
5. **Foundation for higher learning:** This level of learning lays the foundation for the next level of learning, which includes the levels of understanding and thinking. Example: A teacher teaches a child to write the alphabet using repetitive exercises as the basis for later spelling and reading skills.

Limitations of Memory Level of Teaching

1. **Rote learning:** This teaching method relies on memorization without practical application, which leads to a lack of deep understanding of the subject matter. Example: A teacher asks students to memorize a list of historical dates without explaining the context.

2. **Passive learning:** The teacher plays a major role in this level of learning, with little autonomy or active participation of the children in the learning process. Example: A teacher lecturing to a class of students without conversation or discussion.
3. **Lack of socialization:** Children engage only in physical activities related to memory and do not get opportunities for socialization. Example: A teacher is asking students to memorize vocabulary words individually without group discussion or collaborative activities.
4. **Limited opportunities for self-learning:** This teaching level does not encourage self-teaching or initiative in learning. Example: A teacher provides a list of questions and answers for students to memorize without encouraging critical thinking or problem-solving.
5. **Lack of intrinsic motivation:** The material presented may not intrinsically motivate the children to learn, which may lead to disinterest and alienation. Example: A teacher is teaching a subject that has no interest or relevance to a student's life.

CHECK YOUR PROGRESS

Q 1: What are the levels of teaching?

Q 2: Write the name of the second level of teaching.

Q 3: The teacher plays a pivotal role in the memory level of teaching. (Write true or false)

Q. 4: Importance should be given to memorization in the memory level of teaching. (Write true or false)

4.3.2 Understanding Level

The literal meaning of understandingis perception, receiving, knowing, and explaining.Understanding means knowing the meaning of an object, the subject matter the determination of a concept, and the evaluation of other concepts. Understanding level of teaching is the middle level of teaching, it includes those students whose intelligence is developing. Teaching at the understanding level requires that the teaching has already taken place at the memory level. At the understanding level, the emphasis is on generalizing and making students aware of principles and facts. If the teacher is successful in his endeavor, the students develop the ability to identify, understand, and apply the rules. In understanding-level teaching, the

teacher presents the subject matter to the students in such a way that the students get maximum opportunities to understand and the necessary understanding is generated in the students.

In education, the understanding level of teaching refers to the level where learners not only receive information but understand it and apply it in real-life situations.

Here are some key points that explain the level of understanding of the teaching-learning:

1) ***Objectives:*** Learning objectives at this level include translation, interpretation, and extrapolation.Learners should be able to use the acquired knowledge or information in other similar and different situations.
2) ***Nature of Subject Matter:*** At this stage, learners acquire information about new concepts, factors, topics, and facts and they understand, learn and retain them.Students also learn to apply the acquired knowledge to real-life situations.
3) ***Methods Used:*** At this level, teachers use different methods of teaching such as lecture method, lecture-demonstration method, debate method, inductive-deductive method, and descriptive method.
4) ***Role of Teacher:***The role of the teacher is prominent at this level as well, but the role of the children in the teaching-teaching activities increases. In this stage, children ask questions, argue, and present their arguments to the teacher to increase their knowledge.
5) ***Role of Learner:***At this stage of education children participate more actively in the teaching-learning process. They demonstrate the active participation and understanding of the presented subject material, the integration of reading materials, and the creation and application of principles and rules.
6) ***Teaching Equipment:*** Teaching equipment is an important aid for the teacher. Their use makes learning simple, interesting, and easy for children. In modern times, apart from charts, pictures, and models, electronic devices like TV and radio are also available.
7) ***Nature of Motivation:*** Due to the involvement and participation of the children in the teaching-learning process, their motivation level for learning remains high. The motivation level can be made even higher if the teacher uses proper teaching skills and understanding.
8) ***Classroom Climate:*** The level of teaching at this level is more vibrant and encouraging. Children are more active here and take an interest in the subject. There is student

participation in the teaching-learning process, so the problem of the disciplinary system is also relatively less.

9) ***Evaluation:*** The testing methods and tools used for evaluation should test children's abilities to apply the understanding gained from generalized rules to other situations. It should be able to determine how capable the child is of doing this.

Example: In the physics class, the teacher is explaining the concept of electricity to the students. At the understanding level of teaching, the teacher not only defines electricity but also explains its properties, types, and uses. The teacher uses various teaching methods, such as demonstrations and illustrations, to make it easier for the students to understand. Students are actively participating by asking questions and presenting their examples of electricity in real-life situations like the use of electric bulbs in homes. The teacher uses assessment methods that test the understanding of students' concepts and their ability to apply them in other situations, such as solving problems related to electricity in daily life.

Model of Understanding Level of Teaching

Focus:The aim of teaching-learning at this level is to ensure that learners acquire the knowledge and skills necessary for their personal and professional development. Teachers need to have a clear understanding of what they want their students to accomplish and how they can help them reach their goals. For example, a high school English teacher's objective may be to help students improve their reading and writing skills by the end of the academic year.

Syntax:The structure of teaching refers to how information is presented to the learners. Teachers should organize their lessons clearly and logically so that learners can easily understand the material. For example, a mathematics teacher might begin by reviewing the basic concepts of addition and subtraction, then move on to multiplication and division, and finally teach more advanced topics such as algebra and geometry. Morrison divides the teaching structure of this level into five parts. These are mentioned below:

(i) **Exploration:** Morison includes the following activities in this stage-

- Testing prior knowledge for content analysis.
- Arranging the elements in a psychological perspective for content analysis.

(ii) **Presentation:** At this stage, the teacher should be more active and perform the following tasks.

- The teacher should present the content elements in small parts and finally relate all the parts as a group.
- When presenting the content, the teacher should also pay attention to whether the students understand the content or not.
- Teachers should re-teach the content until most of the students understand it.

(iii) **Assimilation:** During the presentation of the content, the teacher concludes that most of the students have acquired new knowledge. The teacher then provides opportunities for students to assimilate. Its main features are-

- Students should be allowed to generalize the subject matter through assimilation to gain proficiency.
- Students should be provided with assimilation opportunities for understanding the depth of the subject matter.
- All students should be allowed to study according to their needs during assimilation. This means providing the best opportunities for personal performance.
- In assimilation, students study in laboratories and libraries. So let them do their homework.
- Supervision is essential during assimilation. Teachers and students are all active during this activity. Teachers supervise and assist students as they perform individual tasks as needed.
- During assimilation, the teacher checks whether the students have acquired proficiency in the subject matter. If proficiency has not been achieved, the teacher should restore the opportunity to assimilate to the students.

(iv) **Organization:**Organization refers to how the classroom is structured and managed. Teachers must create a positive learning environment that fosters collaboration, respect, and active participation. For example, a teacher might create group projects that encourage students to work together and learn from each other.

(v) **Description (Recitation):**Description refers to the process of teachers explaining concepts and ideas to their learners. Teachers should use clear and concise language to help learners understand the material. For example, an art teacher might describe

techniques used by famous painters to help students understand how to create different styles of art.

Social System:Social system refers to the relationships that exist between teachers, learners, and other members of the learning community. Teachers should create a supportive and inclusive learning environment that encourages learners to feel comfortable sharing their ideas and asking questions.For example, a history teacher might create a discussion forum where students can share their opinions on various historical events and debates.

Support System:Support systems refer to the resources that are available to help learners achieve their goals. Teachers should provide learners with access to additional learning materials, such as books, videos, and online resources. For example, a language teacher may provide their students with access to language learning software or online language courses to help them improve their language skills.

Merits of Understanding Level of Teaching

- **Active Participation:** In this level of learning, students actively participate in the learning process which helps them to understand the subject material more effectively. Example: During a science class, students actively participate in practical experiments, group discussions, and critical thinking exercises.
- **Skill Development:** The understanding level of teaching helps students to develop important skills that can be useful in the future. Example: Students can learn problem-solving, critical thinking, and decision-making skills by understanding the levels of learning.
- **Flexibility:** There is flexibility in the teaching process at this level, which allows teachers to use a variety of teaching methods and materials to enhance student learning. Example: A teacher can use different teaching methods like group discussion, debate, lecture, case study, and role-play to cater to the different learning styles of the students.
- **Increased Participation:** At this level of teaching, the participation of children in the teaching-learning process is more than the memory level. They ask questions, present arguments, and engage in debate, thereby improving their understanding of the subject. Example: During a social studies class, students can engage in a debate on a controversial

topic related to the subject matter, which helps them understand different points of view better.

- **Co-curricular Activities:** The understanding level of learning encourages students to participate in co-curricular activities, which helps in their overall development. Example: Students can participate in extra-curricular activities like sports, music, and drama, which can help in their physical, emotional, and social development.

Demerits of Understanding Level of Teaching

- **Low Motivation:** At this stage of learning, the motivation of the students is usually low and controlled by external factors. Example: Students may not be motivated to learn a subject if they do not see its relevance in their daily lives.
- **The dominance of teachers:** Children's participation in teaching-learning is less and teacher's dominance is relatively high. Example: A teacher may use the lecture method and not allow students to ask questions or participate in the learning process.
- **Teacher-centered approach:** All educational work at this level is based on a teacher-centered approach, which cannot meet the individual needs of all students. Example: A teacher may teach in the middle of the class and not differentiate instruction for students who are struggling or need enrichment.

4.3.3 Reflective Level of Teaching

At this level of teaching-learning, the teacher increases the thinking, reasoning, and imagination power in his students, so that the student can solve his problems through both the memory and the understanding level. Learning at the level of teaching is problematic. At this stage, the teacher puts a problem in front of the children and gives the children time to think about it independently. In this stage, critical and original thinking develops in children. At this level, students can test the facts themselves through teaching. They independently create hypotheses. Let's examine them and gather their supporting facts and evidence against them. They create new hypotheses according to the need and also try to test them. Children can apply the knowledge gained in real-life situations.

Model of Reflective Level of Teaching

Focus:Reflective teaching-learning aims to help learners develop critical thinking and self-awareness skills. Teachers should encourage learners to reflect on their own learning experiences and to evaluate their progress toward achieving their goals. For example, a college professor may encourage students to reflect on their writing process and identify areas where they can improve their writing skills.

Syntax:The structuring of reflective teaching-learning refers to the way through which learning activities are organized and presented to the learners. Teachers should create a structured learning environment that encourages learners to think deeply about their own learning experiences. For example, a science teacher might use inquiry-based learning activities that encourage students to ask questions, explore different hypotheses, and evaluate evidence so that they can develop their conclusions.

Social System:The social system in reflective teaching-learning refers to the relationships that exist between the teacher, the learners, and other members of the learning community. Teachers should create a supportive and collaborative learning environment that encourages learners to share their thoughts and experiences with others. For example, a language teacher might create a peer-editing group where students can review each other's writing and provide feedback to help each other improve their writing skills.

Support System:Support systems in reflective teaching-learning refer to the resources and tools that are available to help learners reflect on their own learning experiences. Teachers should provide learners with access to a range of resources, such as journals, self-reflection prompts, and reflective writing exercises. For example, a history teacher might provide students with a self-reflection prompt that asks them to think about how their own experiences have influenced their understanding of a particular historical event. Teachers can also provide resources to help students learn how to write effective reflective essays.

Elements of Reflective Teaching-Learning

Reflective teaching-learning is a process where a teacher evaluates their teaching practices and reflects on their teaching strategies to improve student learning outcomes. There are several key elements of reflective learning, which are described below:

1) ***Objectives:***

- **Generating prompts for problem-solving:** The teacher should create opportunities for students to identify problems and find solutions. For example, a science teacher may ask students to design an experiment to test a hypothesis.
- **Developing logical and critical thinking:**The teacher should encourage the students to think critically and logically. For example, an English teacher might ask students to analyze a piece of literature and make connections to real-world issues.
- **Developing the ability of self-thinking and decision-making:** The teacher should help the students to develop their thoughts and ideas and encourage them to make informed decisions. For example, a social studies teacher might ask students to research and present a controversial topic.

2) Nature of subject matter:

The main objective of teaching and learning is to find and identify problems and then find appropriate solutions. For example, a math teacher may ask students to solve real-world problems using mathematical concepts.

3) The method used:

The teacher should use teaching methods that encourage student participation and engagement. For example, a history teacher might use role-playing activities to help students understand historical events from different perspectives.

4) Role of the teacher:

The teacher should act as a facilitator of learning, helping students discover and learn on their own. For example, a music teacher might encourage students to explore different instruments and styles of music.

5) Role of the learner:

The student should be actively involved in the learning process and motivated to learn. For example, a language teacher might encourage students to practice speaking and writing in the target language outside of the classroom.

6) Teaching-learning Process:

The teaching-learning process should be dynamic and flexible, allowing for student input and creativity. For example, an art teacher may allow students to choose their own medium and subject matter for a project.

7) ***Guided problem-solving:***

The teacher should guide students through the problem-solving process, helping them develop their solutions. For example, a physics teacher might guide students through an experiment to help them discover the laws of motion.

8) ***Evaluation***

- **Testing Analysis and Synthesis:** The teacher should evaluate the student's ability to analyze and synthesize information. For example, a social studies teacher may ask students to write a research paper on a historical event.
- **Testing Reasoning and Critical Aptitude:** The teacher should evaluate student reasoning and critical thinking skills. For example, a philosophy teacher may ask students to analyze and evaluate arguments.
- **Testing Independent Judgment:** The teacher should evaluate the student's ability to make independent decisions and make informed decisions. For example, a health teacher may ask students to research and present a health-related issue.

The Merits and Demerits of Reflective Level of Teaching-Learning

The reflective level of teaching-learning is an approach that emphasizes the development of higher cognitive abilities in learners. Here are some of the merits and demerits of the reflective level of teaching-learning:

Merits:

- **Development of Higher Cognitive Abilities:** The reflective level of teaching-learning helps in the development of higher cognitive abilities in learners. By engaging in reflective thinking, learners can analyze, synthesize, and evaluate information, which are the skills necessary for problem-solving.

- **Child-Centered Approach:** This approach is focused on the learner, making the role of the student paramount. It allows learners to actively participate in their learning process, and promote self-discovery and independent thinking.
- **Opportunities for Problem Solving:** The reflective level of teaching-learning provides opportunities for the learners to develop the ability to solve problems inside and outside the school. These skills are essential for success in both academic and professional situations.

Example: A science teacher using a reflective approach to teaching might ask students to reflect on a recent scientific discovery and analyze its implications. The teacher can then ask the students to use this information to solve a problem or design an experiment.

Demerits:

(i) Not Suitable for All Students: Not all students are capable of learning at the reflective level of teaching. This method may not be suitable for very young and mentally retarded children.

(ii) Slow Pace of Learning: With this approach, the pace of learning becomes extremely slow. It takes a lot of time to impart education by that method.

(iii) Lack of Physical Facilities: In the modern prevalent education system, our educational institutions lack physical facilities for problem-solving studies.

Example: An art teacher using a reflective level of teaching may find it challenging to engage young students who may have limited attention spans and may not have developed the cognitive abilities necessary for reflective thinking.

Reflective layering of teaching-learning can be an effective approach to promote higher cognitive abilities and problem-solving skills. However, it may not be suitable for all students and may require more time for effective teaching and learning. Ultimately, the choice of teaching method should be based on the individual needs of the learners and the availability of appropriate resources.

CHECK YOUR PROGRESS

Q 5: What is meant by the understanding level of teaching?

Q 6: Write two merits of the reflective level of teaching.

4.4 Summary

- To achieve those objectives of education, keeping in mind the level of physical and mental development of the child, teaching-learning has been divided into three major levels. The three levels of teaching-learning are memory level, understanding level, and reflective level.
- The main objective of teaching-learning at the memory level is to develop the child's memory power.
- The memory level model of teaching-learning is a framework that describes how information is processed and stored in memory during the teaching-learning process.
- Understanding level of teaching is the middle level of teaching, it includes those students whose intelligence is developing. Teaching at the understanding level requires that the teaching has already taken place at the memory level. At the understanding level, the emphasis is on generalizing and making students aware of principles and facts.
- Understanding the level of teaching helps students to develop important skills that can be useful in the future. Example: Students can learn problem-solving, critical thinking, and decision-making skills by understanding the levels of learning.
- At the reflective level of teaching-learning, the teacher increases the thinking, reasoning, and imagination power in his students, so that the student can solve his problems through both the memory and the understanding level.
- Reflective teaching-learning aims to help learners develop critical thinking and self-awareness skills.

4.5 Answer to 'Check Your Progress'

Answer to Q. No. 1:There are three levels of teaching.

Answer to Q. No. 2:The name of the second level of teaching is the understanding level.

Answer to Q. No. 3:True.

Answer to Q. No. 4:True

Answer to Q. No. 5:Understanding level of teaching is the middle level of teaching, it includes those students whose intelligence is developing. Teaching at the understanding level requires that the teaching has already taken place at the memory level. At the understanding level, the emphasis is on generalizing and making students aware of principles and facts.

Answer to Q. No. 6: Two merits of a reflective level of teaching are as follows:

- **Development of Higher Cognitive Abilities:** The reflective level of teaching-learning helps in the development of higher cognitive abilities in learners. By engaging in reflective thinking, learners can analyze, synthesize, and evaluate information, which are the skills necessary for problem-solving.
- **Child-Centered Approach:** This approach is focused on the learner, making the role of the student paramount. It allows learners to actively participate in their learning process, and promote self-discovery and independent thinking.

4.6 Questions and Exercises

Short-Answer Questions

1. What is meant by the memory level of teaching?
2. Write the meaning of understanding.
3. Write two merits of understanding level of teaching.
4. Write two demerits of the reflective level of teaching.

Long-Answer Questions

1. Explain the models and elements of the memory level of teaching.
2. Critically evaluate the memory level of teaching.
3. Describe the model of understanding level of teaching.
4. Discuss in detail the elements of the reflective level of teaching.

4.7 Further Reading

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UNIT 5: MODELS OF TEACHING

Structure

5.1 Introduction

The Report of Secondary Education Commission, 1952-53 suggested that even the best courses and the most appropriate curriculum would be considered dead unless there were good methods of teaching and the life of good types of teachers. There was a time when too much emphasis was placed on methods of learning. Later on, experience and research have shown that learning methods are not adequate to solve teaching problems. Therefore, educators and psychologists are now starting to use technological theory to understand the nature of teaching. This has led to the development of teaching theories. To date, there are no theories of teaching that can be recognized as good or universal. A teaching model is an attempt to shape itself like the theories of teaching. Some people like to call teaching models incomplete teaching theories. Models of teaching provide basic material and scientific basis in the theory of teaching. Teaching models occupy a special place in the entire teaching process.

5.2 Unit Objectives

After going through this unit you will be able to

- Know the basic concept and nature of the teaching model.
- Understand the different types of teaching models.

5.3 Meaning of Teaching Model

Teaching models play an important role in developing teaching principles. Teaching is purposeful action. Its main objective is to correct the initial behaviour of the students and develop a personality full of the desired development of latent talents. Teaching is a combination of art and science, therefore it requires techniques, skills, and practical methods to deliver this task successfully. For this purpose, teachers should prepare a model related to the classroom and teaching programme. The word 'Model' means a pre-planned design or scheme or sample, which helps to carry out a task properly. There is an urgent need to develop implementation mechanisms to create a suitable environment for teaching. The teacher should develop an attractive and interesting model using his/her personality, behaviour, actions, language, etc., considering what, where, and how to present the content of the lesson. Through such models, teachers can carry out meaningful and effective teaching.

Teaching models have been used in the teaching and learning process since ancient times to make teaching more realistic, lively, and effective. A look at the history of the use of teaching models shows that the Greek philosopher and educator Socrates was the first to teach students using the 'Question-answer or Dialect' model. Similarly, the ancient teachers taught their disciples by applying various models based on their wisdom. Western countries can be considered the pioneers of modern teaching models based on the widespread use of teaching models developed in Western countries today. The rapid development and application of recent science and technology have brought about changes in the learning environment, content of study, curriculum, teaching methods and techniques, teaching tools, etc. Consequently, various teaching models have been developed as a result of psychological theories of learning and the successful application of such models has paved the way for innovation in the world of education.

A teaching model is a plan prepared in advance that includes the teaching strategies, structures, and instructions required to achieve the educational goals and objectives set to make teaching easier, more interesting, and more lively. Modern education is child-centered education and therefore efforts should be made to correct the behaviour of students in the learning environment to develop their personalities. It is worth mentioning that if the teacher does not make the whole teaching period lively and interesting in the classroom, the students will become bored and the whole teaching period will be wasted. Therefore, teachers should develop teaching models strategically to create a vibrant environment. In short, the teaching model is the model of teachers' creative activities.

Different educators have given different definitions of teaching models at different times. Some of the most notable definitions are mentioned below:

- In the words of Allen and Ryan, "Modeling is an individual demonstrating a particular pattern which the trainee learns through imitation."
- According to Bruce Joyce and Marsha Weil, "A model of teaching consists of guidelines for designing educational activities and environments. It specific ways of teaching and learning that are intended to achieve certain kinds of goal."
- According to Paul D. Eggen and others, "Models are perspective teaching strategies designed to accomplish particular instructional goal."
- In the words of N. K. Jangira and Ajit Singh (1983), "A model of teaching is a set of interrelated components arranged in a sequence which provided guidelines to realize a specific goal. It helps in designing instructional activities and environmental facilities, carrying out of these activities, and realization of a stipulated objective."
- B.K. Passi, L.C. Singh, and D. N. Sansanwal opined that"A model of teaching consists of guidelines for designing educational activities and environment. Models of teaching isa plan that can also be utilized to shape the course of studies to design instructional material and guide instruction."

Based on the above definitions, it can be clearly stated that a teaching model is a pre-planned design or scheme that is prepared before teaching and through which an interrelationship between teacher and student is established.It can make the teaching and learning process

effective by configuring the curriculum, specializing teacher-student tasks, and controlling student behaviour. In short, ***a teaching model is a scheme that contains the educational structure and guidelines necessary to achieve predetermined learning objectives to improve student behaviour.***

5.3.2 Characteristics of Teaching Model

Some characteristics of teaching models can be determined based on the opinions given by different educators at different times. These characteristics are discussed below:

(1) Scientific Procedure: The ideal teaching model is based on systematic procedure and sequential methodology. Teaching models are based on systematic approaches to correct student behaviour.

(2) Specification of Learning environment:The outcome of the learning process depends on the desired classroom or educational institution environment. Emphasis should be placed on developing teaching models in an environment in which the behavioural correction of learners is considered.

(3) Specification of Teaching Operation: The teaching model specifies the protection provided for the learner's reaction and interaction with the environment. This means that the teaching model emphasizes the interaction between teachers, students, and the environment.

(4) Specification of Criterion of Performance: Judging the quality of the learner's performance is a considerable aspect of the teaching model. Such models specify criteria for editing what learners have acquired after teaching.

(5) Specification of learning outcome: The teaching model ensures the outcome of the learning instruction of the given subject at the end of the teaching. The teaching model specifically specifies the behaviour to be exhibited after teaching.

(6) Guideline to Teaching: The teaching model guides the teacher in carrying out the teaching duties. The teaching model guides how to proceed with the lesson to keep the whole learning environment alive.

(7) New Innovation in Teaching: Teaching models help in making the desired changes in students' behaviour and moving them in the right direction. These teaching models, and innovative creations of modern technology, have sparked innovative thinking in the world of education.

(8) Unification of analytical and synthetical attitude: Both analytical and synthetical aspects of the learning process are reflected in the teaching model. Therefore, such models are useful for both teachers and students.

(9) Consideration of the Principle of Individual Differences: Teaching models are prepared from a psychological perspective by considering the tastes, interests, tendencies, abilities, etc. of the students.

In short, a teaching model is a comprehensive analysis of the learning environment or a reflection of scientific thinking.

5.4 Significance of Teaching Model

Teaching models help in solving various problems of the learning environment rationally by making the teaching and learning process more realistic and effective. Teaching models are closely related to the effectiveness of the educational process. Such depth determines the significance of teaching models in education. They are—

(1) It helps in achieving the objectives of the teaching and learning programme.
(2) Teaching models help in creating systematic teaching.
(3) It helps to make the teaching and learning process more effective and easier to understand.
(4) The teaching model assesses learner behaviour.
(5) It helps in specifying the teaching and learning programme.
(6) The teaching model helps in selecting appropriate teaching tools.
(7) It helps in the qualitative development and social competence of teachers.
(8) The teaching model assists in the adoption of necessary measures and strategies based on the behavioural aspects of the learner.

(9) The use of teaching models helps to introduce innovation in education.
(10) It helps in making the teaching and learning process scientific and accurate.
(11) It helps to make the education process research-oriented.
(12) Teachers enhance student relationships and help them learn about their strengths and abilities.
(13) It helps to determine the content of the curriculum in line with the teaching objectives.
(14) It helps in the development of teacher and student skills in any aspect of education.

Based on the above discussion, it is clear that the main objective of the teaching model is to improve the quality of the teaching system. Therefore, these teaching models are important in creating an appropriate environment for teaching and developing students' cognitive, emotional, and practical behaviour.

5.5 Elements of Teaching Model:

Based on the analysis of the teaching model, some of its basic elements can be discussed. They are:

1) ***Focus:*** This is the context of the subject to be learned.
2) ***Syntax:*** Syntax is the description of the teaching model. Layout is the description of what, where, and how the subject matter will be presented in the teaching process.
3) ***Principles of Reactions:***Firmness and relaxation of the teaching model is the principle of reaction. This component explains how teachers will consider students' reactions, how they will behave towards them, etc.
4) ***Social System:*** The relationship between teacher and student is the social system. Social systems are the descriptions of how teachers and students will play roles and establish relationships in the learning environment.
5) ***Support System:*** A support system is a method or technique applied in the learning environment to provide useful facilities. These facilities can be used to assess the success of education. It has been identified as a component of the teaching model, although not a major part.
6) ***Application Context:*** This component covers making each model easily usable in all three aspects of the individual's mind: cognitive, affective, and psychomotor.

CHECK YOUR PROGRESS

Q 1: Define teaching model.

Q 2: Mention any two elements of teaching model.

5.6 Classification of Teaching Model

Studying the history of education shows that since ancient times, various philosophers and educationists have applied different teaching models based on their philosophy of life. Many teaching models have been implemented since the 'Question-Answer Model' of the Greek philosopher Socrates or Gurukul education in India. Thus, many teaching models have been developed as a result of the thoughts and careful observations of eminent experts. There are five types of teaching models. These are mentioned below:

(I) Historical Teaching Model
(II) Philosophical Teaching Model
(III) Psychological Teaching Model
(IV) Teaching Model for Teacher Education
(V) Modern Teaching Model

The names of the co-models under the above models and their inventors and a brief discussion of those models are given below:

(I) Historical Teaching Model:

Historical teaching models are those teaching models that have been used in historical form. This model is also applied in the current education system. Other models and inventors included in this category are as follows—

Models of Teaching	**Name of the Inventor**
The Socratic Teaching Model	Socratic
Classical Humanistic Model	Brody

Personal Development Model	Carl Rogers

The above models are explained below—

(a) The Socratic Teaching Model: This model was invented by the Greek philosopher Socrates and is named after him. This model focuses on establishing teacher-student relationships through the provision of 'questions and answers'

(b) Classical Humanistic Model: The thinker Brody is the inventor of this model. The essence of this model is to determine the teaching and learning programme according to the happiness and sorrow of the individual mind and humanistic feelings and experiences.

(c) Personal Development Model: This model was invented by the American educator Carl Rogers. This model of teaching relies on the development of learners' competencies and abilities such as self-awareness, cognitive ability, self-discipline, self-concept, etc.

(II) Philosophical Teaching Model:

Philosophical aspects are the main foundation of education. The influence of philosophical approaches on teaching objectives, curriculum, teaching methods, assessment, etc. can be seen. This teaching model is based on a philosophical approach. Other teaching models in this category are listed below with the names of the inventors:

Models of Teaching	**Name of the Inventor**
The Impression Model	John Locke
The Insight Model	Plato
The Role Model	Kant

The above models are explained below—

(a) The Impression Model: The famous philosopher John Locke was the inventor of this model. According to this model, the teaching experience provides verbal, numerical, and visual templates of sensations in the minds of the students.

(b) Insight Model: According to the Greek philosopher Plato, the inventor of this model, teaching is the result of observation and observation of the learning material as a whole. It is not mechanical. According to this teaching model, teaching and learning are based on the whole which is always more effective than parts.

(c) Role Model: Kant, the pioneer philosopher of logic, was the inventor of this model. According to this model, teaching experiences should develop students' reasoning tendencies and abilities. This model applies the conventional formulas of logic.

(III) Psychological Teaching Model:

The formulas, principles, and analysis of education provided by psychologists are the main themes of this model. Other teaching models in this category are listed below with the names of the inventors:

Models of Teaching	**Name of the Inventor**
Basic Teaching Model	Robert Glaser
Computer-Based Teaching Model	LowrenceStolyraw& Davis
Interaction Teaching Model	N. A. Flander
Teaching Model of School Learning	John Carroll

These models are described below—

(a) Basic Teaching Model: According to this model developed by Robert Glaser, teaching can be socially developed by raising the teaching and learning process to the stage of self-discovery and self-evaluation of teacher-student behaviour.

(b) Computer-Based Teaching Model: This model involves teaching with the help of computers. The main objective of this model is to enable students to make problem-solving decisions by promoting personal development. LowrenceStolyrawand Davis were the inventors of this model.

(c) **Interaction Teaching Model:** This model was invented by Flaender. The main feature of this teaching model is the establishment of interactive relationships between teachers and learners.

(d) **Teaching Model of School Learning:** According to this model, invented by John Carroll, schools should try to teach students according to their own skills, interests, abilities, and abilities. This model demonstrates the importance of developing individual self-talent. According to this model, students can learn according to their inclinations within the time given to them.

(IV) Teaching Model For Teacher Education:

The teaching model for teacher education is based on teacher education or training. The main objective of this model is to transform the behaviour of teachers. Other models under this model are discussed below:

(a) **Taba's Teaching Model:** This model is known as the Inductive Thinking Model. According to this model, how teachers apply thinking and design lesson plans is a reflection of their skills. The development of the three aspects of concept formation, interpretation of data, and application of principles can be seen in this model. This model explains why teachers review the whole learning environment rather than the information received as a whole.

(b) **Turner's Model of Teaching:** According to Jonathan Balduin Turner, teaching is problem-solving behaviour. Problem-solving strategies can be measured according to teacher competence. Such qualifications give effectiveness to teachers.

(c) **Model of Variation in Teacher Orientation:** Teachers can acquire teaching qualifications according to their judgment. Therefore, there is variation in the rearrangement.

(d) **Lifelong Teacher Education Programme Model:** In the present society, teachers should prepare themselves in such a way that they can face all the challenges faced by the students and acquire the ability to lead a working and capable life. This model of teaching therefore involves preparing students for lifelong learning according to the curriculum through lifelong efforts rather than periodic efforts.

(V) Modern Teaching Model:

Modern teaching models are the teaching models proposed by education experts that are suitable for the current science and technology juncture and the teaching process. Other models and inventors belonging to this model are as follows:

Models of Teaching	**Name of the Inventor**
Behaviour Modification Model	Skinner
Information Processing Model	Jean Piaget
Personal Model	William Glasser, Carl Rogers, etc.
Social Interaction Model	John Dewey & Associates

The above models are discussed below—

(a) Behaviour Modification Model: The main objective of this model is to develop and improve the social behaviour and skills of learners. The inventor of this model is B.F. Skinner. These teaching models are based on behavioural development through more organized learning activities and appropriate motivation. Some of the models under this model are:

(i) Programmed Instruction Model: The main objective of this model is to acquire, store, and develop concepts and functionality of learners.

(ii) Set Control Model: The main objective of this model is to increase the self-control of the students by increasing their social behaviour skills.

(iii) Anxiety Reduction Model: The anxiety reduction model is the correction of behaviour by reducing the anxiety of a learner or individual in social situations.

(iv) Assertive Training: This model increases the ability of individuals to express their feelings directly or spontaneously in social environments.

(v) Direct training: The purpose of this model is to master the method of behavioural techniques.

(b) Information Processing Model: Information processing models are the intellectual techniques required by the teaching model to process or generalize information. This model organizes, classifies, and processes information received from various stimuli in the environment in the mind of the individual. This model helps in developing students' creativity, problem-solving ability, intellectual development, application of facts, idea formation, application of memory, and decision-making ability. Other models invented by Jean Piaget are as follows:

(i) Cognitive Development Model: The main purpose of this model is to apply the general intellectual development and rational thinking of the individual to social and moral development.

(ii) Scientific Inquiry Model: The purpose of this model is to develop scientific inquiry and provide training in research on a particular subject.

(iii) Memory Model: This model emphasizes improving the memory aspects of the students.

(iv) Inquiry Training Model: The main theme of this model is the development of inductive thinking and decision-making.

(v) Concept Attainment Model: The main objective of this model is to provide the power of concept attainment through the application of synthetic and analytical approaches.

Apart from these, the Information processing model is again subdivided into three types. These are:

(i) Inductive Model: According to this model, education is carried out from the specific to the general.

(ii) Deductive Model: Deductive model is the process of moving the learning of students from general to special.

(iii) Inductive-Deductive Model: This model proceeds in two ways: from special to general and from general to special. It attempts to put educational theory into practice through a structure of a sequence of actions, interactive roles, organizational support, and application.

(c) **Personal Model:**Educators like William Glasser and Carl Rogers are the inventors of this model. This model coordinates and realizes the emotional and cognitive needs of the individual. This model, which is essentially individual-centered and self-developmental, paves the way for personality development by building healthy and interactive relationships with one's environment according to one's personality. Some of the most important examples of this model are as follows:

(i) **Social Problem Solving Model:** According to this model, the main objective is to instill a sense of responsibility towards oneself and society. The social problem-solving model is also known as the classroom meeting model

(ii) **Awareness Training Model:** The main objective of this model is to increase the self-expression ability and self-awareness of the individual.

(iii) **Non-directive Teaching Model:** The main objective of this model is to acquire personal development skills by emphasizing self-concept, independence, and self-awareness.

(iv) **SyneticModel:** The main purpose of this model is to achieve the personal development of individuals through the development of creative and problem-solving abilities of individuals.

(v) **Conceptual System Model:** The purpose of this model is to form correct concepts through planning to increase flexibility by removing individual complexity.

(d) **Social Interaction Model:** This model was developed by John Dewey and his colleagues. The primary purpose of this model is to establish the relationship between the individual and society and the socialization process of the individual becomes possible as a result of the relationship thus established. This model socializes individual attitudes and behaviour, makes behaviours socially acceptable, awakens democratic values, and aims at the conscious economic development of solidarity.This model believes in social relationships as the main vehicle of learning. Some of the other major models under this model are as follows:

(i) **Group Investigation Model:** The purpose of this model is to establish interpersonal relationships and acquire investigative skills through enhancing participation skills in democratic social processes.

(ii) **Jurisprudential Model:** The main purpose of this model is to acquire the skills to analyze social problems in a planned manner.

(iii) **Social Inquiry Model:** The purpose of this model is to enhance the ability to solve social problems based on rationality.

(iv) **Role Playing Model:** The main objective of this model is to develop inquisitiveness by taking the students' own and social values as the focus of inquiry.

(v) **Social Stimulation Model:** The purpose of this model is to help the learner acquire various experiences, understand social processes, and observe reactions.

The above models consider the educational process of an educational institution from their own perspective. The teaching and learning process also varies from environment to environment. Therefore, teachers need to focus on improving work efficiency, identifying the objectives of each teaching model, and trying to master the techniques of using the models. Only then will the entire teaching and learning process become lively, effective, and entertaining.

5.7 Role of Teacher in Application of Teaching Model

Successful and appropriate application of teaching models developed for different purposes requires a well-thought-out approach. Without proper application of these models, teaching cannot be made effective, and interesting. Therefore, teachers have to pay attention to certain aspects when applying these teaching models. The role of teachers in this regard is discussed below.

(1) Teachers should choose the model based on the nature and purpose of the teaching model and try to combine different models accordingly as necessary.

(2) Teachers should choose teaching models based on the individual differences and nature of students in the classroom.

(3) The relationship between the theoretical aspects of teaching and the teaching models should be considered.

(4) Teaching models should be selected based on the needs of the subject and try to apply multiple models as required.

(5) When applying teaching models, teachers should try to apply them with the image of their classroom in mind and a well-studied inquisitive mind is required.

(6) Teaching models should try to create an appropriate environment to improve student behaviour.

It is not easy to choose a universally accepted teaching model and apply it in the classroom, taking into account individual differences. The teacher must therefore be skilled and technical. Teachers must be very careful and always aware of the organizational changes and application of teaching models given classroom teaching as needed only then teaching and learning will be successful.

CHECK YOUR PROGRESS

Q 3: How many models are included under the modern teaching model?

Q.4: What is the objective of concept attainment model?

Q 5: What is meant by Insight model?

5.8 Summary

- Teaching models play an important role in developing teaching principles. Teaching is purposeful action. Its main objective is to correct the initial behaviour of the students and develop a personality full of the desired development of latent talents.
- The word 'Model' means a pre-planned design or scheme or sample, which helps to carry out a task properly.
- A teaching model is a scheme that contains the educational structure and guidelines necessary to achieve predetermined learning objectives to improve student behaviour.
- Teaching models help in solving various problems of the learning environment rationally by making the teaching and learning process more realistic and effective. Teaching models are closely related to the effectiveness of the educational process.
- Studying the history of education shows that since ancient times, various philosophers and educationists have applied different teaching models based on their philosophy of life. Many teaching models have been implemented since the 'Question-Answer Model' of the Greek philosopher Socrates or Gurukul education in India.
- Historical teaching models are those teaching models that have been used in historical form. This model is also applied in the current education system.

- Philosophical aspects are the main foundation of education. The influence of philosophical approaches on teaching objectives, curriculum, teaching methods, assessment, etc. can be seen. This teaching model is based on a philosophical approach.
- The formulas, principles, and analysis of education provided by psychologists are the main themes of this model.
- The teaching model for teacher education is based on teacher education or training. The main objective of this model is to transform the behaviour of teachers.
- Modern teaching models are the teaching models proposed by education experts that are suitable for the current science and technology juncture and the teaching process.
- Teachers should choose the model based on the nature and purpose of the teaching model and try to combine different models accordingly as necessary.

5.9 Answer to 'Check Your Progress'

Answer to Q. No. 1: In the words of N. K. Jangira and Ajit Singh (1983), "A model of teaching is a set of interrelated components arranged in a sequence which provided guidelines to realize a specific goal. It helps in designing instructional activities and environmental facilities, carrying out of these activities and realization of a stipulated objectives."

Answer to Q. No. 2: Two elements of the teaching model are- focus and syntax.

Answer to Q. No. 3: There are five models included under the modern teaching model.

Answer to Q. No. 4: The main objective of this model is to provide the power of concept attainment through the application of synthetic and analytical approaches.

Answer to Q. No. 5: According to the Greek philosopher Plato, the inventor of the Insight model, teaching is the result of observation and observation of the learning material as a whole. It is not mechanical. According to this teaching model, teaching and learning are based on the whole which is always more effective than parts.

5.10 Questions and Exercises

Short-Answer Questions

1. What is meant by teaching model?
2. Who developed the Inquiry training model?
3. Write two characteristics of teaching model.
4. Why teaching models are important for a teacher?

Long-Answer Questions

1. Explain the meaning and nature of teaching model.
2. Describe the modern teaching models with examples.

5.11 Further Reading

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BLOCK IV:
MICRO TEACHING AND CLASSROOM INTERACTION

Unit 1 : Meaning, Definition and Importance of Micro-Teaching

Unit 2 : Micro-Teaching Cycle

Unit 3 : Practice and Evaluation of Micro Teaching

Unit 4 : FIACS

Unit 5 : Practice of FIACS in the Classroom

Unit-1

Meaning, Definition and Importance of Micro Teaching

Unit Structure:

1.1 Introduction

Before going into detail regarding skills of micro teaching we need to understand the meaning of micro-teaching. Micro teaching represents an appropriate technique for helping the pupil teachers being trained in the colleges of education in their acquisition of the desired teaching skill. In this technique, the teacher trainees will develop different skills of teaching like skill of questioning, skill of introduction, skill of probing questions etc. This technique reduces the class size, time duration and content to be covered.

1.2 Objectives

- *understand* the meaning of micro teaching,
- *understand* the definitions of micro teaching,
- *know* characteristics of micro teaching,
- *understand* the objectives of micro teaching,
- *know* the importance of micro teaching.

1. MICRO-TEACHING

Training is a systematic and continuous process that enables the teacher to develop knowledge, skills, attitudes and behaviour through effective teaching, which includes effective instruction, demonstration, practice, planned experience and better evaluation procedure and techniques. According to Crow and Crow, "Learning is the acquisition of habits, knowledge, and attitudes." It is very much clear from various definitions of learning that the modification of behaviour and formation of habits is called learning. Training of teaching creates different types of learning situations to motivate the pupils to learn the required matter and it assists in the growth of the child's mind and matter.

2. MEANING OF MICRO TEACHING

Micro teaching is an important technique which imparts intensive training in the component skills of teaching to the teacher trainees. It is a learning process of teaching and a tool to help not only the teacher trainee nut also the personnel involved in activities such as counseling, military management, leadership, vocational training, training of medical personnel etc., to develop skills under controlled conditions. The term was originally used by Dwight. W. Allen and Robert Bush of Stanford University, California in 1963. It is comparatively a recent innovative method of teaching meant for the secondary school teachers.

Micro teaching goes to mean small form of teaching practice meant for teacher-trainees or the pupils' teacher undergoing training. It is a scaled down, clinically controlled teaching programme in a simplified environment to develop specific teaching skills. Micro teaching aimed at bringing about desired changes in behaviour by acquiring new skills in teaching such as- use of blackboard, asking questions, illustration and presentation of the lesson, use of reinforcement, development of students participation in class room communication, etc. Micro teaching is not a substitute but a supplement to the teacher education programme.

To serve the purpose, the micro teaching classes are scaled down by reducing the class size to 5 – 10 students and economizing time to 5 – 10 minutes. The content of teaching is reduced to

small unit in relation to the time factor. Observation is done by expert teacher-educator and sophisticated electronic equipments are used to record the teaching presentation to make necessary correction if needed.

The training institutions can train the teacher trainees to acquire effective teaching through various techniques. The pre requisite skills are used to teach common teaching, but the practice of the required skills through micro teaching is used to teach effective teaching. The pupils' teachers acquire necessary teaching skills through micro teaching. Paintal says about micro teaching, "we examine each teaching skill as though it were being put under a microscope or being seen through magnifying glass." According to him the teaching behaviour can be observed by teaching skills under microscope. A single skill cannot independently instill the required behaviour among the teachers. At the same time, one cannot attain perfection in all the skills at a time without practice one after the other.

3. DEFINITIONS OF MICRO TEACHING

The following definitions are very useful to know the significance of micro teaching.

- D.W. Allen (1966): "Micro teaching is a scaled down teaching encounter in class size and time."
- D.W. Allen and A.W. Eve (1968): Micro teaching is defined as a system of controlled practice that makes it possible to concentrate on specific teaching behaviour and to practice teaching under controlled conditions."
- Robert Bush (1968): "A teacher education technique which allows to apply well defined teaching skills to a carefully prepared lesson in a planned series of 5 – 10 minutes encounter with a small group of real class-room students."
- B.K. Passi (1976): "Micro teaching is a training technique which requires pupil-teachers to teach a single concept using specific teaching skills to a small number of pupils in a short duration of time."
- Cliff and other (1976): "Micro teaching is a teacher-training procedure which reduces the teaching situation to simpler and more controlled encounter achieved by limiting the practice to specific skill and reducing teaching time and class size."

- Miltza(1978): Micro teaching is an opportunity to present some things and then analyze the outcome; the two crucial elements are the ability to see oneself in action and analyze what was done.
- Jangira(1980): Micro teaching is a training setting for the students teachers where complexities of normal classroom teaching is reduced by practicing a particular teaching skill, for five to ten minutes on five to ten pupils using single concept.
- N.K Singh and Ajith Singh (1982): "Micro teaching is a 'scaled down teaching encounter' in which a teacher teaches a small unit to a group of 5 pupils for a small period of 5 to 20 minutes. Such a situation offers a helpful setting for an experienced or inexperienced teacher to acquire new teaching skills and refine old ones."
- Kumar (1996): Micro teaching is a design for teacher training, which provides trainees with information about their performance immediately after completion of their class.

4. CHARACTERISTICS OF MICRO TEACHING

Micro teaching is a significant effort to make teacher education/training programme by making it more scientific. The main characteristics of Micro teaching are as follows:

i. Micro teaching is relatively a new experience or innovation in the field of teacher education. It is a training technique, not a teaching technique.

ii. It is a scaled down teaching encounter by-

   a. Practicing one skill at a time

   b. Reducing the class size to 5 – 10 students

   c. Reducing the duration of the lesson to 5 – 10 minutes

   d. Limiting the content to a single concept.

iii. It is a highly individualized training device with a high degree of control in practicing a particular skill.

iv. It is a new device of training the specific skills to the teacher trainees.

v. Expert and trained teacher-educator is appointed to make clear observation of the teacher trainee while acquiring required skill in teaching.

vi. In micro teaching there is the provision of providing adequate feedback.

Stop to consider

The term was originally used by Dwight. W. Allen and Robert Bush of Stanford University, California in 1963. It is comparatively a recent innovative method of teaching meant for the secondary school teachers.

5. OBJECTIVES OF MICRO TEACHING

Micro teaching basically aims at training the teacher trainees with certain skills for efficient and effective teaching. The main objectives of micro teaching are as follows:

- To enable the teacher- trainees to learn and assimilate new teaching skills under controlled conditions.
- To enable the teacher-trainees to gain confidence in teaching by mastering a number of teaching skills on a small group of students.
- To make use of the academic potential of teacher-trainees for providing much needed feedback.
- To derive maximum advantage with the available material, money and time.

6. MAIN PROPOSITIONS OF MICRO OF TEACHING

Allen and Ryan in their book on the subject give the following main propositions of micro teaching.

- Micro teaching is real teaching, although a teaching situation is constructed in which the students-teacher and pupils work together in a practice situation.
- Micro teaching lessens the complexities of normal classroom teaching. Class size, scope of content and time are all reduced.

- Micro teaching focuses on training for the accomplishment of specific tasks. These tasks may be the practice of instructional skills, the practice of techniques of teaching, the mastery of certain curricular materials or the demonstration of teaching method.
- Micro-teaching allows for the increased control of practice. In a micro teaching setting, the time, number of pupils, methods of feedback and supervision, etc., may be manipulated.
- Micro teaching greatly expands the normal knowledge of results or feedback dimensions in teaching. Immediately, after teaching a brief micro-lesson, the trainee is engaged in a critique of his performance. All hiss feedback can be immediately translated into is practice when the trainee re-teaches shortly after the critique conference.

7. IMPORTANCE OF MICRO TEACHING

1. Micro teaching helps a training institution in overcoming the hardship faced in the task of organising students' teaching in respect of availability of pupils, classrooms and cooperation from the staff of the practicing school.
2. The complex task of teaching is treated as a set of simpler skills comprising specific classroom behaviours that helps in proper understanding of the meaning and concept of the term 'teaching'.
3. In micro teaching the student teacher concentrates on practicing a specific and well defined teaching skill consisting of a set of teacher behaviours that are observable, controllable and practicable.
4. It helps in reducing the complexities of the normal classroom teaching as it is a scaled down classroom teaching.
5. Micro teaching works as a laboratory exercise to focus training on the acquisition of teaching skill and instructional technique.
6. It saves time and energy of the student teacher and provides economy in mastering the teaching skills.

7. Provision of immediate and systematic feedback in behavioural terms to the student teacher is of utmost importance.
8. A student teacher may work for the development of teaching skills at his or her own pace depending on one's teaching abilities that stresses importance on the concept of individual differences.

Check your progress

Q1. Define Micro teaching.

Q2. What is meant by the term micro-teaching? Discuss its nature and characteristics.

Answer to the questions of 'check your progress'.

Answer 1: Refer to point no. 3 of the study material.

Answer 2: Refer to point no. 1 and 5 of the study material.

Questions for self assessment:

1. "Micro teaching is a scaled down teaching encounter." Discuss the statement and enumerate the nature and characteristics of micro-teaching?
2. What are the main propositions of micro teaching?
3. Mention the importance of micro teaching.

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Unit-2

MICRO TEACHING CYCLE AND USE OF DIFFERENT SKILLS IN MICRO-TEACHING

Unit Structure:

2.1 Introduction

Micro teaching goes to mean small form of teaching practice meant for teacher-trainees or the pupils' teacher undergoing training. It is a scaled down, clinically controlled teaching programme in a simplified environment to develop specific teaching skills. Micro teaching aimed at bringing about desired changes in behaviour by acquiring new skills in teaching such as- use of blackboard, asking questions, illustration and presentation of the lesson, use of reinforcement, development of students participation in class room communication, etc. micro teaching is not a substitute but a supplement to the teacher education programme. The main aim of micro teaching basically aims at training the teacher trainees with certain skills for efficient and effective teaching.

2.2 Objectives

After going through this unit you will be able to understand the—

- organizational procedure in micro teaching,
- micro teaching cycle,
- phases/activities/components of micro teaching,
- development of teaching skills,
- comparison between micro teaching and traditional teaching.

2.3 Organizational Procedure in Micro Teaching

Micro teaching involves a series of teaching procedures for acquisition of required teaching skills.

They are-

i) Explaining the skill: Prior to the actual teaching encounter in the class-room, the teacher trainees receive a clear concept of the nature of the skill.

ii) Demonstration: Relating to the concept of requisite teaching skill, necessary physical demonstration is presented to the trainees by showing the video recording collected for the purpose.

iii) Preparation of the lesson-plan: Prior facing the class-room, the teacher-trainee prepares the lesson plan that serves as guide to his/her teaching considering the scheduled time limit of 5 – 10 minutes.

iv) Teaching encounter: After the preparation of the planned lesson, the teacher-trainee encounters the classroom to present the content as per the lesson plan.

v) Feedback: After completion of the classroom teaching, the feedback session begins. The teacher-trainee receives necessary suggestions regarding improvement or to make the presentation more effective. Feedback is considered as an important step in micro teaching.

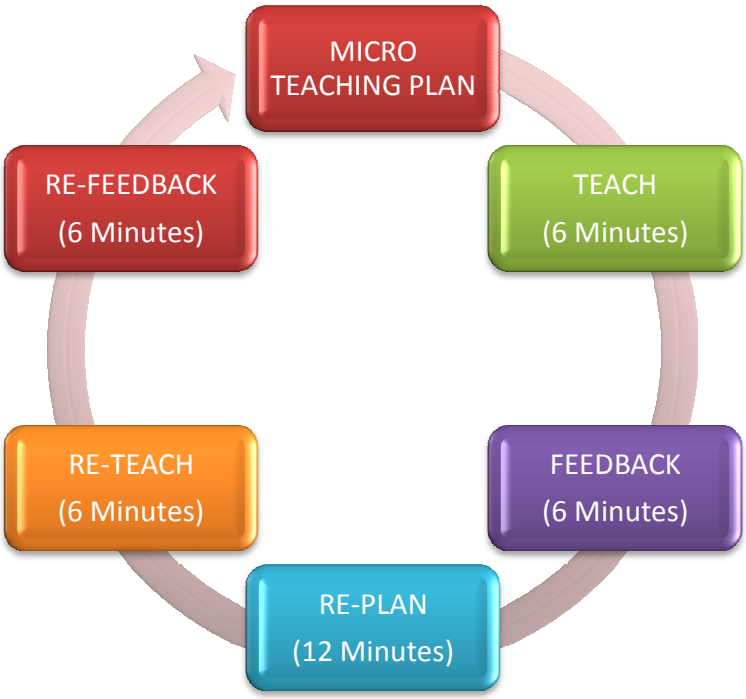
vi) Re-planning: Feedback may reveal necessary modifications or corrections to the lesson plan presented. Accordingly, the teacher-trainee re-plan or re-arrange the lesson plan in the light of the expert suggestions.

vii) Re-teaching: The re-planned lesson is re-presented to the students for the same duration of time. Re-teaching may claim to have more improved presentation over the earlier presentation.

viii) Re-feedback: Re-teaching is again followed by re-feedback. It is believed that repetition helps in elimination of the error that leads to more perfection in learning the skill.

1. MICRO TEACHING CYCLE

Based on the organizational procedure, micro teaching can be concluded that micro teaching should follow a cycle as mentioned below:



Schematic diagram of cycle of micro teaching

The duration of the micro teaching cycle is as follows:

I. Teach 6 minutes

II.	Feedback	6 minutes
III.	Re-plan	12 minutes
IV.	Re-teach	6 minutes
V.	Re-feedback	6 minutes
	Total	**36 minutes**

Stop to consider

Micro teaching cycle is based on the organizational procedure of micro teaching

2. PHASES/ACTIVITIES/COMPONENTS OF MICRO TEACHING

According to J.C Clift and others, micro teaching procedure has three phases. N.K Jangira and Ajit Singh also present these phases as under three heading- (i) Knowledge Acquisition Phase; (ii)Skill Acquisition Phase; and (iii)Transfer Phase. They are discussed in detail below:

(i) **Knowledge Acquisition Phase:** in this phase, the student- teacher attempts to acquire knowledge about the skill-its rational, its role in classroom and its component behaviour. For this he reads relevant literature. He also observes demonstration lesson-mode of presentation of the skill (modeling). The students-teacher gets theoretical as well as practical knowledge of the skill.

It involves two major activities-to observe demonstration skill and to analyze and discuss demonstration.

(ii) **Skill acquisition phase:** On the basis of the model presented to the student- teacher, he prepares a micro teaching cycle. There are two components of this phase: feedback and micro-teaching. Micro teaching setting includes conditions like size of the micro-class, duration of the micro lesson, supervisor, types of students etc.

Three activities are performed under these phases in the following sequence- to prepare lesson plan; to practice teaching skills; and to evaluate the performance.

(iii) **Transfer phase:** here he student-teacher integrates the different skills. In place of artificial situation, he teaches in the real classroom and tries to integrate all the skills.

Check your progress
1. Write on the organisational procedure and the micro teaching cycle. 2. What are the different phases of micro teaching? Answer 1: *Refer to point no. 1 and 2 of study material.* Answer 2: *Refer to point no. 3 of the study material.*

3. DEVELOPMENT OF TEACHING SKILLS

Primarily, micro teaching aims at the development of teaching skills involved in the task of teaching. The different skills involved in the task of teaching involve specific component behaviours and thus need special dealing for its practice and development. Below, we shall discuss the processes of developing different teaching skills-

A. Skill of introducing the lesson:

This skill may be defined as, "proficiency in the use of verbal and non-verbal behaviour, teaching aids and appropriate device for making the pupils realise the need of studying the lesson by establishing cognition and affective rapport with them". The following component behaviours are involved in this skill-

i) Teacher-trainee is able to utilize the previous knowledge and experience of the students.

ii) To maintain continuity of information and ideas in the introduction of the lesson.

Let us discuss the above two components in detail-

i) Utilization of previous knowledge: Knowledge or experience acquired through formal or informal education, direct or indirect experiences or the previous knowledge is the basis of the new learning. One cannot teach in vacuum. Thus, a teacher has to acquire the art of utilising the previous knowledge of the students.

ii) Use of appropriate devices or techniques: A teacher must acquire the ability to use appropriate devices or techniques while introducing a lesson. Questioning, narration, storytelling, audio-visual aids, demonstration or experimentation, dramatization or role playing, excursions, etc. can be used by the teacher while introducing a new lesson.

iii) Maintenance of continuity: The continuity of ideas or information is essential for a proper introduction of a new idea or information. The main parts of the introduction should be logically sequenced.

iv) Relevance of verbal or non-verbal behaviour: A teacher should try to observe relevancy in his/her verbal or non-verbal behaviour. What is to be stated, asked, demonstrated, dramatized or illustrated should contribute maximum towards the introduction of lesson in some of the following ways-

- Testing of the previous knowledge
- Utilization of the past experiences
- Establishing cognitive and affective rapport with the pupils
- Making the pupil feel the need of studying the lesson
- Highlighting the aims of the lesson

B. Skill of probing question:

The success of questioning lies in evoking desired response from the students. However, questioning is considered to be a major device in teaching-learning. The skill of probing questions may be defined as, "an art of response management comprising a set of behaviours or techniques for going deep into pupils' responses with a view to elicit the desired responses".

The skill of probing question consists of the following component behaviours or techniques**:**

a) Prompting

b) Seeking further information

c) Refocusing

d) Redirection

e) Increasing critical awareness

Below we shall discuss the above mentioned components in detail-

a) Prompting: In teaching-learning situation prompting refers to the cues or hints provided by the teacher through well framed question to a pupil for arriving at the desired response from the undesired situations like no response, incorrect, partially correct or incomplete responses. Here, the teacher himself does not provide the answer to the question asked in the class-room but tries to manage the situation by giving prompts.

b) Seeking further information: In case of incomplete responses, this technique is applied. This is a technique of getting additional information from the responding pupil to reach the level of desired responses from the incomplete or partially correct responses.

c) Refocusing: To strengthen the correct response given by the pupil, this technique is used. Here, the teacher asks the responding pupils to relate their responses to something already studied by them or to consider implications of their responses in a more complex and noble situations.

d) Redirection: In case of 'incomplete' or 'no response' situations, the technique of redirection is used. This technique helps the teacher in the task of probing by prompting or seeking further information with the help of several pupils.

e) Increasing critical awareness: This technique is used in case of 'correct response' to increase the critical awareness in the pupil. The teacher asks the pupil to make proper assumptions or justifications of the correct responses to increase the critical awareness in the pupil.

C. Skill of illustrating with examples:

Many a times the teacher faces difficulty in making the students understand some abstract ideas, concept, principles, theories, etc. In such situations the teacher may resort to some other processes in addition or despite to lecture or description. Some of the processes are-

1. The teacher tries to illustrate the abstract ideas, concept, principle, theories, etc. by citing suitable example at the beginning.

2. The teacher repeats the process of illustration by put forwarding various other related examples.

3. The teacher asks the students to give examples related to the concept to verify whether the students have understood the concept or not.

The technique of illustrating with examples may be done through giving analogy, telling story or incidents, showing objects, models, pictures, diagrams, maps, charts, demonstrating experiments based on the pupils' experiences, etc.

Thus, the skill of illustrating with examples is the art of judicious selection and proper presentation of the suitable examples in order to generalise a concept, idea, principle or theory with a view to its understanding and proper application. The main components of these skills may be outlined below-

1. Formulating relevant examples

2. Formulating simple examples

3. Formulating interesting examples

4. Using appropriate media for examples, and

5. Making use of inductive-deductive approach

D. The skill of narration:

Narration is an artistic skill that needs to be cultivated by a teacher for professional efficiency. It goes to mean story telling or giving accounts of events to others verbally. Its purpose is to present a clear, vivid and lively visual picture in mind of the listener about an event that needs to be retained. Narration should help to re-construct the happenings of an event through use of auditory image in mind. To serve this purpose the teacher should have the skill of using the art of spoken language in a naturally lively and spontaneous way. It is easier than explanation but the

specific art of speaking is very much needed here. It involves the use of visual image transformed into spoken language in the form of pictorial word image with the artistic skill of delivery.

The skill of narration requires the following specific abilities-

1. Ability of forming and keeping better mental image in mind.

2. Ability of reviving the image without any distortion.

3. Ability of using appropriate language in giving expression to visual image in mind.

4. Simplicity and spontaneity of verbal expression.

5. Artistic and somewhat dramatic style of expression.

E. Skill of using the blackboard:

Although the modern education system is influenced by technological advancements, the use of the blackboard and chalks could not be underestimated. Teaching skill even today essentially includes the skill of the teacher in using the blackboard. A school must have blackboards even if other sophisticated teaching aids are not available. The blackboard can yield maximum output of teaching. The use of blackboard makes the teacher and the students equally alive and active in their respective roles.

In order to make effective educative use of the blackboard, the teacher should take into consideration of the following points-

1. It should be used by the teacher to arouse attention of the pupil towards the lesson.

2. The teacher should pinpoint the major points and summary in the blackboard.

3. Training in good handwriting and correction of spelling mistakes should be attempted through the use of blackboard.

4. To serve the purpose of stimulus variation in teaching, the teacher may make use of blackboard.

5. Students with hearing impairment may partially be helped by using the blackboard.

6. Teacher may remove the monotony of verbal instruction and make teaching more flexible through its use.

7. While using the blackboard it should be taken into consideration that it should be placed in a place which is easily visible from different corner of the room.

8. The teacher should not turn his back after writing on the blackboard but should stand on the side and use a pointer.

9. There should not be any reflection of light coming from outside on the blackboard.

10. Students should be allowed to use the blackboard for their learning and recapitulation in the appropriate situation.

F. Skill of class-room management:

Environmental condition plays a major role in increasing efficiency in teaching-learning activities. The class-room situation is under the complete control and management of the teacher. He may select, organize, manage and control the class-room environment as per necessity. Thus, the organization and utilization of the class-room condition or situation is an important skill that needs to be cultivated by the teacher. The skill of class-room management includes the techniques of effective and improved management of the psychophysical situation that may yield favourable outcome in teaching-learning. The success and failure of the modern teaching-learning activity is largely dependent on the acquisition of this skill by the teacher. This skill of class-room management is characterized by the following points-

1. Proper management of time and resources by the teacher.

2. To make teaching and learning purposeful.

3. Impartiality of attitude and behaviour on the part of the teacher towards his students.

4. Use of reinforcement to the attentive students by the teacher.

5. Importance should be given on creating democratic environment in the class-room.

6. The teacher should remain alert at all the time.

7. The teacher should have careful look even to the back-benchers.

8. The teacher must keep patience while dealing with the students.

9. The teacher should issue verbal reminders to the students as a whole in order to deal with the problem students.

10. As a final step, the teacher should tell the problem students in particular either to comply the teacher's suggestion or to suffer the consequences.

G. The skill of reinforcement

Learning depends on the art of reinforcement by using reward and punishment. Reward act as a positive reinforcement and punishment as a negative reinforcement in the learning situation. Therefore, the teacher should acquire the skill of using reinforcement both positively and negatively in respect of modification of students' behaviour.

Positive and negative reinforcement may again be sub-divided into verbal and non-verbal. Positive verbal reinforcement may be used by giving favourable comments as, 'good', 'excellent', 'correct', etc. again, positive non-verbal reactions may be made by 'nodding' or 'smiling' by the teacher.

Similarly, negative verbal reinforcement may be used by making comments as, *'no'; 'not good'; 'poor'*, etc. Again, negative non-verbal reaction may be made by '*frowning', 'expressing annoyance or dissatisfaction*' by the teacher.

H. Integration of the teaching skill:

Integration of teaching skills means bringing about a synthesis or harmony among various specific skills being dealt with by micro teaching. Teaching cannot be perceived in terms of separate skills taken into consideration in isolation. It is an organized and integrated activity of the variety of skills needed for their separate training.

In order to make integration of different teaching skills, the following steps may be taken-

1. The theory and practice of teaching should be combined.

2. The teacher-educator should give demonstration of the lesson as a whole in the class-room.

3. After the micro teaching session, the teacher-trainee should be asked to conduct the class as a whole.

4. The concept of integrated teaching skill should be clearly explained and its need should be emphasis.

5. COMPARISON BETWEEN MICRO TEACHING AND TRADITIONAL TEACHING

Micro teaching is an innovative teaching training programme which has been more effective and meaningful than the traditional teaching programme by making it more scientific. It has scaled down the teaching encounter as well as the complexities of teaching in terms of the size of the class, time and content. The differences between micro teaching and traditional teaching are as follows.

MICRO TEACHING	TRADITIONAL TEACHING
i. Micro teaching is a scaled down part of the teaching.	i. Traditional teaching is a comprehensive teaching.
ii. The main objective of micro teaching is to train specific behaviour skill.	ii. The main objective of traditional teaching is training in general and not training specific skill.
iii. The duration of time and number of students is scaled down. It reduced to 5-10 minutes and a small group of students	iii. While in traditional teaching no scaling down is done. The class consists of a large group of students and the time duration is of 40-45 minutes.
iv. There is immediate feedback system in micro teaching.	iv. In traditional teaching immediate feedback is not available.

v. In micro teaching due to scaling down of the complexities of the class the teaching has become relatively simple.	v. In tradition teaching on the other hand, teaching has the complexities in size of class, time and content.
vi. The role of supervisor is specific and well defined to improve teaching in micro teaching.	vi. While in traditional teaching, the role of the supervisor is vague.
vii. The training situation is strictly controlled and regulated in micro teaching.	vii. In traditional teaching, training situation is natural and remain uncontrolled.
viii. In micro teaching, observation of the teacher-educator is objective and clear.	viii. In traditional teaching, observations of the teacher educator remain vague and subjective.
ix. Immediate feedback in micro teaching lead to modification through discussion.	ix. On the other hand, in traditional teaching there is no provision for modification through discussion.
x. Micro teaching is a scaled down teaching so there is ample scope for take and re-take of the lesson for perfection.	x. In traditional teaching, the lesson plan is demonstrated once for all.

2.9 Questions for Self Assessment:

1. Write a note on the micro teaching cycle.
2. Write on the development of various teaching skills through micro teaching.
3. Distinguish between micro teaching and traditional teaching.

2.10 References/Suggested Readings:

- Aggarwal J.C : Essentials of educational technology; Teaching learning innovation in education; Vikas Publishing house Pvt ltd;2006(second edition)

- Aggarwal J.C: Principles, methods and techniques of teaching; Vikas Publishing house Pvt ltd;2013(second revised edition)
- Mangal, Dr. S. K: Foundation of Educational Technology, Tandon Publication, Ludhiana, 2001

Unit-3

PRACTICE AND EVALUATION OF MICRO TEACHING

Unit Structure:

3.1 Introduction

Micro teaching is a teacher training and faculty development technique whereby the teacher reviews a recording of a teaching session in order to get constructive feedback from peers about what has worked and what improvements can be made to their teaching technique.

3.2 Objectives

After going through this unit you will be able to understand the—

- micro teaching techniques,
- feedback in micro teaching,
- practicing teaching skills through micro teaching,
- merits or advantages of micro teaching,
- demerits or limitations of micro teaching.

3.3 Micro Teaching Techniques

Micro teaching technique is especially used in pre service teachers' training to train them systematically by allowing them to experiment main teacher behaviours. It has become an established teacher training procedure in many training institutions. This procedure simplifies the great complexities of the regular teaching learning process. Class size, time, skill and content are scaled down to provide optimal training environments. Here, the supervisor demonstrates the skill to be practiced either in live or video recorded form. After the demonstration the student teachers prepare the lesson for 5 to 10 minutes and practice the micro teaching session in which 5 to 10 pupils are involved.

3.4 Feedback in Micro Teaching

Feedback is very critical and important for student teacher to improve their skill in micro teaching. It is the information that a trainee receives concerning one's attempt to imitate certain patterns of teaching. The feedback mechanism in micro teaching acquaints the trainee with the success of their performance and enables them to evaluate and to improve teaching.

Stop to consider
Feedback mechanism is very important in micro teaching.

4 PRACTICING TEACHING SKILLS THROUGH MICRO TEACHING

Micro teaching primarily aims at the development of component teaching skills involved in the complex task of teaching. However, each skill involves its own component behaviours and thus needs a special dealing for its practice and development. Some prominent skills are-

i. Skill of introducing the lesson

Main components of this skill are-

a. Utilisation of previous experiences
b. Use of appropriate devices or technique
c. Maintenance of continuity
d. Relevancy of verbal or non-verbal behaviour

Model micro lesson for the skill of introducing lesson

Name of the student teacher: Date:

Subject: History
Class: IX

Topic: Auranzeb as the initiator of the downfall of the Mughal Empire

Teacher's Activity	Pupils' Activity
1. Who was the founder of the Mughal Empire?	Babar was the founder of the Mughal Empire.
2. Who succeeded Babar?	Humayun succeeded Babar.
3. Who was Akbar?	Akbar was the successor of Humayun and was the most successful and great ruler among the Mughal emperors.
4. Who was Jahangir?	Son of Akbar.
5. Who built the Taj Mahal?	Shahjahan, the successor of Jahangir.
6. Who was Auranzeb?	Succesor of Shahjahan.
7. Was Aurangzeb responsible for the downfall of the Mughal empire?	(No response) The teacher will judge that the students are curious to know why Aurangzeb is blamed for this downfall.

Announcement of the Topic: We'll today learn about the rule and policies of Auranzeb that are responsible for the downfall of the Mughal empire.

ii. Skill of Explaining

The skill of explaining a concept or phenomenon consists of two types of behaviuour- desirable and undesirable. In the practice of this skill, the occurrence of the desirable behaviour is to be increased whereas that of the undesirable behaviour is to be decreased and extinguished.

Components of the skill of explaining

Desirable behaviour	Undesirable behaviour
1. Using appropriate beginning and concluding statement. 2. Using explaining links. 3. Covering essential points. 4. Testing pupils' understanding.	1. Using irrelevant statements. 2. Lacking continuity in statements. 3. Lacking fluency. 4. Using inappropriate vocabulary, vague words and phrases.

iii. Skill of illustrating with example

Many times a teacher find it difficult to make the pupils understand an abstract idea, concept or principle despite the best explanation, lecturing or description on his/her part. Then the teacher may resort to the following main components of this skill-

a. Working out relevant examples.
b. Formulating simple examples.
c. Formulating interesting examples.
d. Using appropriate media for examples.
e. Making use of the inductive-deductive approach.

iv. Skill of Reinforcement

Reinforcement as a technique belongs to the area of psychology of learning and helps in influencing the responses of the learners.

Main components of the skill are-

Desirable behaviours	Undesirable behaviours
1. Use of positive verbal reinforcers. 2. Use of positive non-verbal reinforcers. 3. Use of extra verbal reinforcers.	1. Use of negative verbal reinforcers. 2. Use of negative non-verbal reinforcers. 3. Inappropriate or wrong use of reinforcement.

v. Skill of Questioning

This skill may be properly practiced by placing them into their two fold division- framing of question and presentation of the question to the students.

Framing of questions

a. Questions framed should be quite relevant to the topic being taught.
b. Questions should be framed in simple and clear language.
c. Questions should be precise and brief as possible.
d. To the point and specific questions should be framed related to the content.
e. Questions framed must be grammatically correct.

Presentation of the questions in the class

a. A teacher should try to present the questions in a quite clear and audible voice being properly heard by all the students.
b. Due care should be taken for the maintenance of proper speed in the asking of the questions on the part of a teacher.
c. Question should be addressed to the whole class rather than its being put to an individual student.
d. A teacher must demonstrate a quite spontaneous and natural behaviour while asking questions in the class.

5 MERITS OR ADVANTAGES OF MICRO TEACHING

Micro teaching may be described as an effective, well managed and controlled device of learning the art of teaching. The following are the main points highlighting the merits or utilities of micro teaching-

i) Minimizes complexity in teaching: A teacher trainee may find it difficult at the beginning to encounter a big classroom with 40-50 students for a period of 40-45 minutes. Micro teaching simplifies this complexity by reducing the class size and class time.

ii) Develop self confidence: The scaled down teaching encounter may help the introvert or newly appointed teachers to overcome the difficulty to make psychological adjustment in the classroom which in turn helps in developing self confidence.

iii) Understanding the skill in teaching: Micro teaching helps the teacher trainee in understanding the skills to be acquired through training such as verbal deliberation, use of the blackboard, asking questions, giving illustration, use of teaching aids, etc. in the classroom.

iv) Feedback mechanism: In this method feedback is very effectively used. The observer and the teacher educator provide necessary suggestion to serve the purpose.

v) Behaviour modification: Immediate feedback mechanism leads to correction or modification of behavior of the teacher-trainee. Re-planning, re-teaching and re-feedback may lead to more perfection in the trainees' behavior.

vi) Improving quality of teaching: Quality improvement in teaching is given high importance at present. In this regard, micro teaching is said to be the real teaching method leading to the modification of the teacher behavior.

vii) Research tool: To study the teacher behavior of the trainees this method may be used as a very effective research tool. Class-room demonstration may provide the objective data for perception of teacher's behavior to the research work.

6 DEMERITS OR LIMITATIONS OF MICRO TEACHING

Micro teaching has immense utility in the present teaching learning process for developing teaching skill and competency. In spite of its advantage it suffers from certain limitations. Following are the points highlighting the demerits or limitations of micro teaching-

i) In the absence of well-trained or experienced teacher educator micro teaching method can be a big problem.

ii) The method itself is very time consuming with the participation of a large number of teacher-trainee.

iii) Teacher's own creativity in teaching does not find scope for its revelation and application in this method.

iv) Teaching when broken into small parts may lose its meaning and significance.

v) Teaching ability cannot be viewed as the sum total of a number of skills to be trained one by one.

vi) Teaching only to 5 – 10 students for 5 – 10 minutes duration of time cannot be a true representative of the usual class-room.

vii) Students here do not get scope for their interaction and communication within the limited duration of time.

viii) The method itself is costly and time consuming. Use of video recording, re-teaching, re-feedback, etc. are making the method more complicated.

Check your progress

Question: Discuss the merits and demerits of micro teaching?

Answer: *Refer to point no. 4 and 5 of the study material.*

3.9 Question for Self Assessment:

1. How different skills are practiced in micro teaching?
2. Critically evaluate the process of micro teaching.

3.10 References/Suggested Readings

- Aggarwal J.C : Essentials of educational technology; Teaching learning innovation in education; Vikas Publishing house Pvt ltd;2006(second edition)
- Aggarwal J.C: Principles, methods and techniques of teaching; Vikas Publishing house Pvt ltd;2013(second revised edition)
- Mangal, S.K, Mangal, Uma : Essentials of Educational Technology, PHI Learning Private Limited, New Delhi, 2017
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UNIT 4:

FIACS

CONTENTS

4.1 Introduction

Flander's Interaction Analysis Category System (FIACS) was developed by Ned Flanders in 1959. Its aim is to analyse and study the classroom behaviour of teachers and students. In this system the teacher influences the students and students also interact with the teacher joyfully. This system determines whether or not the teacher is able to motivate and control the classroom. Rather than evaluating, this system focuses on describing the behaviour of the participants i.e. teachers and students in the classroom.

4.2 Objectives

- Discuss the meaning of Classroom Interaction and Flanders's Interaction Analysis Category System (FIACS)
- Describe the characteristics of Flanders's Interaction Analysis Category System (FIACS)

4.3 Classroom Interaction and Flanders's Interaction Analysis Category System (FIACS)

In general interaction is a reciprocal relationship occurring between individuals. However in the learning system, Classroom Interaction is a shared effect between pupil-pupil, teacher-pupil in classroom environment or between materials and pupils or groups. Classroom interaction is of

two types-verbal and non-verbal. Verbal interaction refers to the sent or received oral communication. It takes place through discussions, interviews, seminars, narratives, debates, etc. On the other hand non-verbal interaction is a process where communication takes place through self-sensory methods, symbolic, spontaneous expressions, eye contact, posture of the body, gestures, contact, silence, etc. Learning is a process of interaction between teacher and students. It can be said as both a bi-polar and tri-polar process. The bi-polar process includes teacher and students, whereas the tri-polar process includes teacher, students and the curriculum or environment. Learning in the classroom will be fruitful only if the Classroom Interaction is effective. Thus Ned Flanders established an analysis system of interaction that takes place between teachers and students in the classroom. This system is abbreviated as FIACS.

Flanders Interaction Analysis is a system of performance observation that throws light on what a teacher is doing while teaching and how the students are behaving while learning. It is an effective way of reflecting the classroom teaching-learning environment. FIACS is a method in which the research pattern of teaching and learning is coded and decoded. The classroom situation will only be useful when there is proper interaction between the teacher and students. This interaction can be assessed step by step to make the teaching-learning process a successful one with adequate feedback. The teaching effectiveness of a teacher can be judged or analyzed in a systematic way. The study analysis of the interaction between teacher and students during classroom situation is called Interaction Analysis. This system was developed by Ned Flanders and as such it is called Flanders Interaction Analysis. Flander thought of this method in 1959 and was formulated for teacher effectiveness and student welfare.This method is specially used for verbal behaviour and class communication. Flander's believed that the verbal behaviour of the class reflects upon the general class behaviour. According to Dr. S.K. Thakur, classroom interaction analysis may be defined as "an instrument which is designed to record categories of verbal interaction during, or from, recorded teaching learning sessions. It is a technique for capturing qualitative and quantitative dimensions of teacher's verbal behavior in the class-room."

Therefore Classroom Interaction and FIACS are two very significant concepts to be taken note of. The education system or the teaching-learning process will strive to achieve its goals with the successful implementation of its knowledge.

4.3.1 Characteristics of Flanders's Interaction Analysis Category System (FIACS)

Following are the characteristics of Flanders's Interaction Analysis Category System (FIACS)

- FIACS is a systematic technique with systematic recording.
- It observes and analyses the behaviour of classroom.
- In fact it is a representative of classroom behaviour.
- FIACS is a measuring instrument for classroom teaching.
- It is an evaluative device and provides effective feedback to the teachers and students.
- FIACS is a supplementary device and useful theory in teaching-learning process.
- It is an effective diagnostic tool to measure the social-emotional climate in the classroom.

STOP TO CONSIDER

Flanders Interaction Analysis is a method in which the research pattern of teaching and learning is coded and decoded.

SELF ASKING QUESTIONS

Q.1. What is Interaction?
Q.2. What is the full form of FIACS?

4.4 Summing Up

- Ned Flanders established an analysis system of interaction that takes place between teachers and students in the classroom.
- FIACS is a method in which the research pattern of teaching and learning is coded and decoded.
- It is a technique for capturing qualitative and quantitative dimensions of teacher's verbal behavior in the class-room.

4.5 References/Suggested Readings

1) Bailey, GeraldDouglas. 1972. A Studyof Classroom Interaction Patternsfrom Student Teaching to Independent ClassroomTeaching. Lincoln: University of Nebraska, unpublished doctoral dissertation.

2) Dunkin, Michael J. and Bruce. J. Biddle. 1974. The Study of Teaching. New York: Holt, Rinehart, and Winston, Inc.

3) Furst, Norma and Russell A. Hill. 1971. "Systematic Classroom Observation." In Vol.2, The Encyclopedia of Education, edited by Lee C. Deighton, pp. 168-183. New York: The MacMillan Company and The Free Press.

4.6 Model Questions

Q.1.What is Classroom Interaction?

Q.2.What is Flanders Interaction Analysis?

Q.3. Define Classroom Interaction.

Q.4.Mention two characteristics of Flanders's Interaction Analysis Category System (FIACS).

4.7 Answers to check your progress/Possible Answers to SAQ

Answer no.1 Classroom Interaction is a shared effect between pupil-pupil, teacher-pupil in classroom environment or between materials and pupils or groups. Classroom interaction is of two types-verbal and non-verbal.

Answer no.2 Flanders Interaction Analysis is a system of performance observation that throws light on what a teacher is doing while teaching and how the students are behaving while learning. It is an effective way of reflecting the classroom teaching-learning environment.

Answer no.3 According to Dr. S.K. Thakur, classroom interaction analysis may be defined as "an instrument which is designed to record categories of verbal interaction during, or from, recorded teaching learning sessions. It is a technique for capturing qualitative and quantitative dimensions of teacher's verbal behavior in the class-room."

Answer no.4 Two characteristics of Flanders's Interaction Analysis Category System (FIACS)are as follows:

- FIACS is a systematic technique with systematic recording.
- It observes and analyses the behaviour of classroom.

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UNIT: 5

PRACTICE OF FIACS

CONTENTS

5.1 Introduction

Flanders classified the classroom behaviour into three main sections: Teacher-talk, Student-talk, Silence or Confusion. These three sections are further divided into 10 categories which create interest and fun among the teachers and students. The Teacher-Talk section includes 7 categories viz; accepting feelings, praise or encouragement, accepting ideas, asking questions, lecturing, giving direction and criticism. The Student-Talk includes 2 categories viz: Pupil Talk Response Pupil Talk Initiation and the last one category is Silence or Confusion.

5.2 Objectives

- Understand the practice of FIACS in the Classroom.
- Know the ten categories of FIACS.

5.3 Practice of FIACS in the Classroom

Flanders's Interaction Analysis Category System (FIACS) is an essential perspective to enhance the verbal contact between classrooms and their needs. It will assist the teacher to improve student involvement and participation in the classroom learning. The interaction analysis works as an important tool to identify teacher behaviour patterns and analyze teacher-student communication in the classroom. As this interaction analysis is a process of encoding and

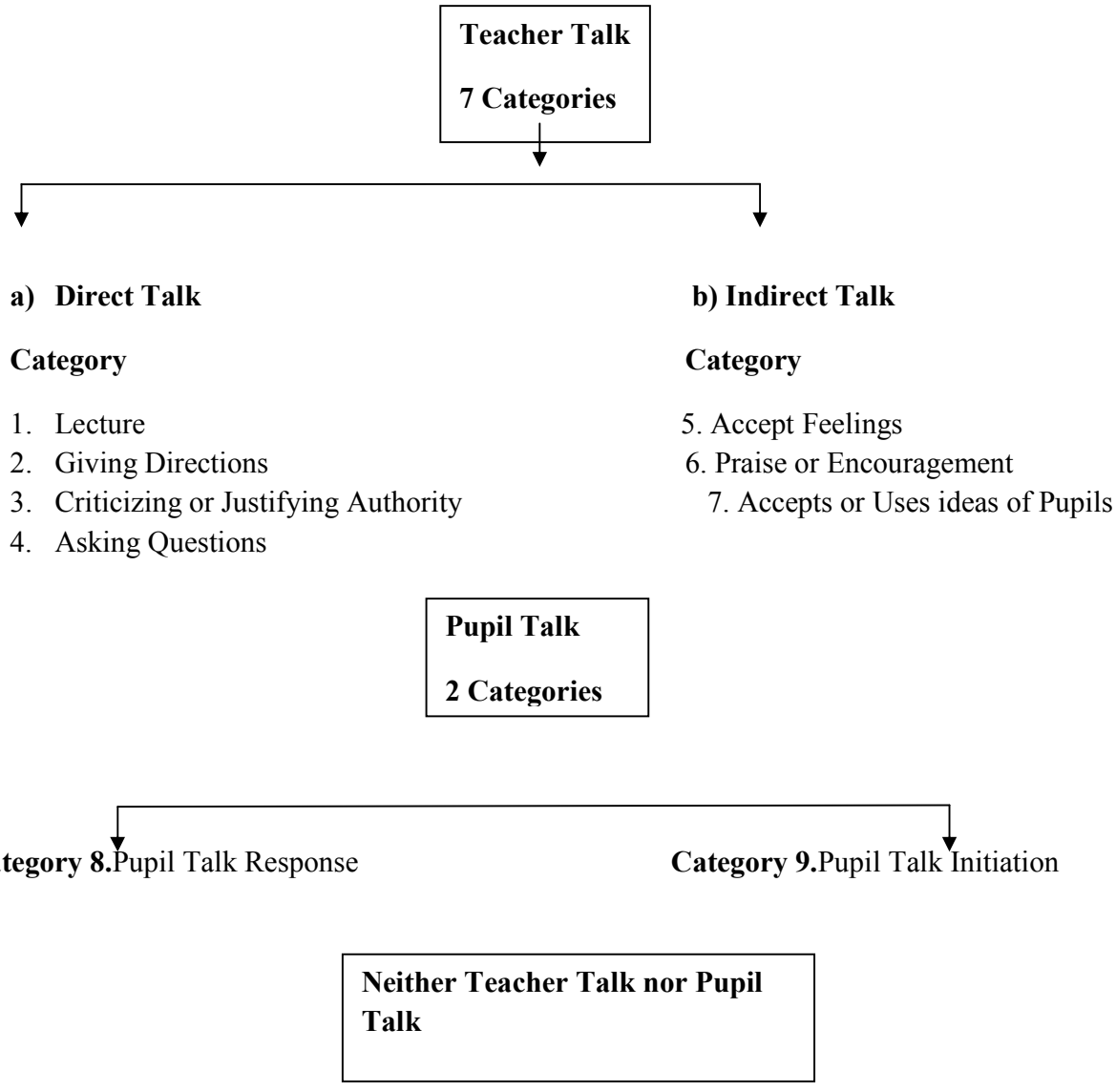
decoding, it codes the classroom events, registers them in a meaningful way, and decodes the data by arranging in a useful display for further study purposes.

The investigators or observers who observe and analyze the classroom interaction focus on the following tasks:-

a) Teacher-pupil Interaction.
b) Pupil-pupil Interaction.
c) Interaction with various materials and the focus is given to the Affective elements, Cognitive elements, Psychomotor elements, Activity, Content, Physical environment and sociological structure.

Flanders Interaction Analysis is classified into ten categories. They include- Teacher Talk-7 Categories, Pupil Talk-2 Categories and Silence or Confusion-1 Category.

FIACS Flow Chart



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Category 10. Silence or Pause or Confusion

Flanders Interaction Analysis is a scientific and systematic recording of the classroom behavior and activities. This analysis depicts the classroom teaching-learning interaction. It helps to evaluate and provide feedback on the aspect of the interaction done between teacher and students. The observers must have some rules to analyze the classroom interaction like knowledge of studying the classroom situation, place of sitting, recording the category number, instant recording, no partiality, recording after every three seconds till the observation is over. Only trained and expert persons can be engaged in this analysis of classroom interaction. The demerits of this system are that they are time consuming, not useful for non-verbal behavior and it is not possible to record each and every reactions of the teacher and students during class.

STOP TO CONSIDER

Flanders Interaction Analysis is a scientific and systematic recording of the classroom behavior and activities.

SELF ASKING QUESTIONS

Q.1. What is asking questions according to FIACS?

Q.2. On which tasks does the observer focus in Flanders Interaction Analysis?

5.4 Summing Up

- FIACS is an essential perspective to enhance the verbal contact between classrooms and their needs.
- Flanders Interaction Analysis is classified into ten categories. They include- Teacher Talk-7 Categories, Pupil Talk-2 Categories and Silence or Confusion-1 Category.
- . It helps to evaluate and provide feedback on the aspect of the interaction done between teacher and students.

- The demerits of this system are that they are time consuming, not useful for non-verbal behavior and it is not possible to record each and every reactions of the teacher and students during class.

5.5 References/Suggested Readings

1)Amidon, Edmund J. and Ned A. Flanders. 1971. A Manual for Understanding and Improving Teacher Classroom Behaviour. Minneapolis: Association forProductive Teaching.

2)Lewis, George Thomas. 1974. The Effects of Training Student Teachers in the Use of Interaction Analysis. Philadelphia: Temple University, unpublished doctoraldissertation.

3)https//article.sciencepublishinggroup.com

5.6 Model Questions

Q.1.What are the ten categories of FIACS?

Q.2.What does Flanders Interaction Analysis encode and decode?

Q.3.What is the task of the observers in Flanders Interaction Analysis?

5.7 Answers to check your progress/Possible Answers to SAQ

Answer no.1 Flanders Interaction Analysis is classified into ten categories. They include- Teacher Talk-7 Categories, Pupil Talk-2 Categories and Silence or Confusion-1 Category.
Answer no.2 Interaction analysis is a process of encoding and decoding, it codes the classroom events, registers them in a meaningful way, and decodes the data by arranging in a useful display for further study purposes.
Answer no.3 The observers in Flanders Interaction Analysis must have some rules to analyze the classroom interaction like knowledge of studying the classroom situation, place of sitting, recording the category number, instant recording, no partiality, recording after every three seconds till the observation is over.

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BLOCK V:
EMERGING TRENDS IN EDUCATIONAL TECHNOLOGY

Unit 1 : Virtual Reality in Education

Unit 2 : EDUSAT & INFLIBNET

Unit 3 : Gamification in Education and SLEs

Unit 4 : E-Learning Tools and M-Learning

Unit 5 : CML & CAE

Unit 6 : OER, MOOC, NPTEL, SWAYAM

UNIT 1:

VIRTUAL REALITY IN EDUCATION

CONTENTS

1.1.Introduction

The current world demands technology in almost every field of our lives. It touches everyday routine of people. New innovations and developments have been possible today due to science and technology. Virtual reality is one of the innovations of technology. It is a high-end user interface that involves real-time simulation and interactions through multiple sensorial channels. In fact virtual reality is a perception of being physically present in a non-physical world. It engrosses total learning environment by the use of images, sound or other stimuli. With the advent of 21st century and rapid advancement of computer technology Virtual Reality in education is taking its prominent place. Besides, Flipped classroom and blended learning are also some technologies that help education grow with time creating congenial environment for learners to learn effectively.

1.2 Objectives

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

- Discuss the meaning of Virtual Reality in Education
- Describe the advantages of Virtual Reality
- Understand the disadvantages of Virtual Reality
- Identify the meaning of Flipped Classroom
- Understand the advantages of Flipped Classroom
- Describe the disadvantages of Flipped Classroom
- Discuss about the Blended Learning
- Know the advantages of Blended Learning

- Understand the disadvantages of Blended Learning

1.3 Virtual Reality in Education

Virtual Reality in education is gaining momentum in the present globlalized world. It is a computer-generated environment which compels user interaction. This virtual environment has become an inseparable mode in education today. Virtual reality in education provides scope for engaging and inspiring students in a unique way. It improves students' learning by providing them with real learning experiences within the classroom itself. Virtual reality in Education provides benefits to students with innumerable better ways of reading and writing. VR encourages creative thinking among the students, provides experiences through extraordinary locations, within the classroom.

1.3.1 Advantages of Virtual Reality

- Virtual reality creates a realistic world.
- It helps students to experience entirely new slide of training.
- It makes education easier and comfortable.
- Virtual Reality helps encountering high quality visualization.
- It helps students to experiment with an artificial environment.

1.3.2 Disadvantages of Virtual Reality

- Virtual Reality got some functional issues.
- It can damage the relation between students and overall human communication.
- Students may get addicted to virtual reality and forget other modes of learning.
- Poor people may find it difficult to have access and experiment such an advanced and costly technology.
- It is only an interaction or communication between the user and software and nothing else.

Despite the disadvantages Virtual Reality in Education drags attention of students more as compared to traditional classroom teaching methods. Students can achieve incredible travel experiences of distant places of learning even without leaving the classroom that saves time and money. Virtual reality in education is inclusive in nature which ensures memorable educational experiences.

STOP TO CONSIDER

Virtual Reality in Education engrosses total learning environment by the use of images, sound or other stimuli.

SELF ASKING QUESTIONS

Q.1 What is Virtual Reality in Education?
Q.2 State a disadvantage of Virtual Reality in education.

1.4 Flipped Classroom

The word Flip means to turn over. Flipped Classroom refers to a turn or reverse of the activities in the class. In this system class activities are to be performed outside classroom environment and home activities of students are to be brought into the classroom. In other words what is traditionally done in the class is now done at home. And what is done at home can be done in the classroom. Flipped Classroom is a pedagogical approach which delivers instructional content, outside the classroom. Activities like projects, assignments, home work etc., are moved into the classroom. Flipped classroom encourages student-centred learning, collaboration and a sense of ownership for learning. This system of classroom is easily accessible as it provides scope to explore the lessons or contents. The primary goal of a flipped classroom is to provide a platform of learning to students where they can enhance the curriculum by better understanding the topics through group work.

1.4.1 Advantages of Flipped Classroom

- Flipped Classroom improves learning performance.
- It provides flexible and increased learning interactions.
- It enhances student satisfaction, enjoyment and engagement.
- It facilitates individualized learning.
- Flipped Classroom provides efficient and reusable sources of learning.
- It has scope for student controlled learning with cost-effective implementation.
- It provides more time to explore the content.

1.4.2 Disadvantages of Flipped Classroom

- It can create a digital divide.
- Flipped Classroom is dependent on technology, preparation and trust.
- It requires greater levels of self-discipline.
- It is resistant to change and takes time to adjust the move from a passive learning style to active ones.
- Teachers have to work extra for preparation of teaching-learning contents.
- Students may be forced to spend time in front of the screen.
- Students might not get engaged in this mode of learning.
- It may be an online distraction and decrease in human element.

Students in a flipped classroom watch an online lecture, review online course material, read physical or digital texts, participate in an online discussion and also perform, research at home. On the other hand at school the students perform skill practice, face-to-face discussion with peers, station learning, debate, lab experiments, presentations, peer assessment etc. However Flipped Classroom does not succeed much due to its time consuming nature. Lack of technology, dearth of teacher training, replacement of teacher, unrealistic expectations cause problems in its way.

STOP TO CONSIDER

Flipped classroom encourages student-centred learning, collaboration and a sense of ownership for learning.

SELF ASKING QUESTIONS

Q.3 What is Flipped Classroom.
Q.4 Mention an advantage of Flipped Classroom.

1.5 Blended Learning

Blended learning is a new mode of teaching-learning process involving both face-to-face and online learning. It is an approach that combines multiple learning environments and activities for a certain group along with web based or electronic sources to the traditional learning. Blended learning tools include short lectures, case studies, role play, multi-media presentation and review, experiential Indoor/ Outdoor activities, scenario thinking, group discussion and presentation, self-assessment tool. According to Alex Hernandex, "Blended instruction combines the best of empowering technology and human touch so we can help each student learn more than ever."

1.5.1 Advantages of Blended Learning

- ✓ Blended Learning provides freedom to students to study when and how they want.
- ✓ It tailors learning experiences to each student's unique requirements and preferences.
- ✓ It provides increased engagement and improved retention.
- ✓ It is very accessible, cost-effective and collaborative.
- ✓ Students can learn at their own paces and track their learning progress easily and give feedback.
- ✓ Blended Learning assists students to develop critical technology skills effective in both academic and professional settings.
- ✓ This learning is very common and useful in higher education that makes the students more equipped for their future academic and professional pursuits.

1.5.2 Disadvantages of Blended Learning

- ✓ Blended Learning requires reliable internet access and functional technology that may be a problem to students.
- ✓ There may be limited individualized feedback from instructors.
- ✓ It requires self-motivation and discipline on the part of the students.
- ✓ It can reduce the amount of interaction between students and teachers.
- ✓ This learning system may distract students easily through social media, gaming etc. and negatively focus on their productivity.

- ✓ It may lead to feelings of isolation and disconnection for those students who strive to learn through online mode.
- ✓ This learning may give inconsistent learning environment due to variability in teacher practices and technological limitations.

Blended learning being a formal educational program helps students to achieve better experiences and academic outcomes. It involves a mixture of delivery modes, teaching approaches and learning styles. It effectively integrates information and communication technologies into designing course. Additional courses, flexibility, scheduling, variety of experiences, use of technology, personalized learning are some of the benefits of Blended learning. According to a report by the Innosight Institute, there are six major types of blended learning-face-face driver, rotation, flex, online lab, self-blend and online driver.

STOP TO CONSIDER

Blended learning is a new mode of teaching-learning process involving both face-to-face and online learning.

SELF ASKING QUESTIONS

Q.5 Define Blended Learning.
Q.6 Does Blended Learning provide increased engagement and improved retention?

1.6 Summing Up

- ❖ With the advent of 21st century and rapid advancement of computer technology Virtual Reality in education is taking its prominent place.
- ❖ Virtual reality in education provides scope for engaging and inspiring students in a unique way.
- ❖ It can damage the relation between students and overall human communication.
- ❖ Flipped Classroom is a pedagogical approach which delivers instructional content, outside the classroom.
- ❖ It can create a digital divide.
- ❖ Blended learning is a new mode of teaching-learning process involving both face-to-face and online learning.
- ❖ This learning system may distract students easily through social media, gaming etc. and negatively focus on their productivity.

1.7 References and Suggested Readings

1) A. Steed and S. Julier. Design and implementation of an immersive virtual reality system based on a smartphone platform. In Proceedings IEEE Symposium on 3D User Interfaces, 2013.

2) Sharma Shweta (2023) Blended Learning Advantages and Disadvantages.
3) Traxler, J. (2009) Learning in a Mobile Age. International Journal of Mobile and Blended Learning, 1 (1), 1-12, January-March 2009.
4) Y. Akatsuka and G. A. Bekey. Compensation for end to end delays in a VR system. In Proceedings IEE Virtual Reality Annual International Symposium, 156-159, 1998.

1.8 Model Questions

Q.1. Write the meaning of Virtual Reality in Education.

Q.2. State some advantages of Flipped Classroom.

Q.3.Define Blended Learning.

Q.4. Mention the disadvantages of Blended Learning.

1.9 Answers to check your progress

Answer no.1:- Virtual Reality in Education is a computer-generated environment which compels user interaction. This provides scope for engaging and inspiring students in a unique way. It improves students' learning by providing them with real learning experiences within the classroom itself. VR encourages creative thinking among the students, provides experiences through extraordinary locations, within the classroom.

Answer no.2:- Some advantages of Flipped Classroom are as follows-

a. Flipped Classroom provides efficient and reusable sources of learning.
b. It has scope for student controlled learning with cost-effective implementation.
c. It provides more time to explore the content.

Answer no.3:- According to Alex Hernandex, "Blended instruction combines the best of empowering technology and human touch so we can help each student learn more than ever."

Answer no.4:- The disadvantages of Blended Learning are as follows-

a. Blended Learning requires reliable internet access and functional technology that may be a problem to students.
b. There may be limited individualized feedback from instructors.
c. It requires self-motivation and discipline on the part of the students.
d. It can reduce the amount of interaction between students and teachers.

Unit 2:

EDUSAT and INFLIBNET

CONTENTS

2.1 Introduction

In the current world of rapid globalization and digitalization there are many training courses that can be attended from a distance with different types of technology and tools. At present the advanced types of courses are e-learning. Here the students can avail the content of courses through the Internet, stream the lectures using Internet and also have interaction with teachers on a specified date. EDUSAT based training follows more or less e-learning method and provides direct interaction with the teacher or expert when the lecture is delivered using EDUSAT satellite communication. INFLIBNET also being a part of the e-learning runs a nationwide high speed data network connecting university libraries and other information centres.

2.2 Objectives

- Discuss the meaning of EDUSAT
- Identify the meaning of INFLIBNET
- Understand the objectives of INFLIBNET

2.3 EDUSAT

EDUSAT is a satellite fully developed for the purpose of education. EDUSAT is a combination of two words-EDUCATION and SATELLITE. Hence it means education through satellite. EDUSAT was launched into the space on 20th September 2004 by Indian Space Research Organization (ISRO). It enhances distance education in the country especially in medical technical & higher education system. It is used at all levels of education, right from primary schools to higher levels of education along with professional courses covering all geographical area. It facilitates quality, equality in education along with provision of lectures from various experts and meets the demand for an interactive satellite based distance education. EDUSAT is designed for an audio visual medium employing a digital classroom interaction and use of multimedia.

EDUSAT is a culmination of India's determined efforts to launch an exclusive educational satellite.

- This exclusive satellite for education will overcome the dearth of quality teachers.
- Science classes and laboratory experiments too can thus be beamed from virtual classes.
- A single lecturer can reach 10,000 students at the same time.
- The lecture can be stored as a computer file and the student can access according to their convenience Audio CD can also be made if necessary.
- EDUSAT is used for teaching learning process.

EDUSAT is basically meant for providing connectivity to school, college and higher levels of education and also to support non-formal education including developmental communication. EDUSAT employs virtual classroom in rural areas, online teaching, video programmes, Television or Radio Broadcasting, exchange of data, video conferencing, audio conferencing, computer conferencing, web based education to meet the demands of distant learners. EDUSAT offers opportunities for using satellite for human development in general and for education in particular. EDUSAT can be used for:

a) Conventional Radio and Television broadcasting.
b) Interactive Radio and Television (phone-in, video on demand.)
c) Exchange of Data.
d) Video conferencing, Audio conferencing & Computer conferencing.
e) Web based education.

EDUSAT is thus beneficial to students due to the advantages like availability of expert or trained teachers, use of educational movies, broadcast of many useful programs for health, environment, family planning etc. EDUSAT is a two-way communication process that creates a stress free learning environment which increases learning capacity of students. However EDUSAT has certain disadvantages such as interruption due to bad weather, delay in sending and receiving data through satellite etc.

STOP TO CONSIDER

EDUSAT is a combination of two words-EDUCATION and SATELLITE.

SELF ASKING QUESTIONS

Q.1 When was EDUSAT launched into the space by Indian Space Research Organization (ISRO)?

2.4 INFLIBNET

INFLIBNET refers to Information and Library Networks. It was established in April 1991 by UGC. It became an autonomous Inter-University Centre (IUC) in May 1996. It is situated at Gujarat University Campus Ahmedabad. The goal of INFLIBNET is to improve the library and information centres in the country. It enhances speedy and efficient communication among academicians and researchers. Its major activities include E-pgPathshala, IndCat, INFOPORT, NLIST, OJAS, Research Project, SOUL 2.0, ShodhGanga, E-Shodh Sindhu, Vidwan Database. INFLIBNET promotes automation of libraries in educational institutions, creates digitalization and content in e-format. It develops experts in digital content creation, process of digitalization and managing digital repositories.

2.4.1 Objectives of INFLIBNET are as follows-

1) To establish gateways for online access to knowledge.
2) To provide access to peer-reviewed scholarly electronic resources.
3) To provide document delivery service by enriching information sources of libraries in specific subject areas.
4) To evolve a national network, interconnecting various libraries and information centers in the country.
5) To promote open access digital repositories in universities.
6) To improve capability in information handling and service.
7) To strengthen educational institutions with value added services.
8) To develop tools and techniques to access information anywhere and anytime.
9) To enable users to have access to information regarding books, monographs, theses, non-book materials etc. irrespective of location and distance.
10) To evolve standards and uniform guidelines in techniques.

INFLIBNET is thus a very effective source of providing access to large information resources to users all over the country. It links all libraries belonging to universities, colleges, laboratories and other national information centres.

STOP TO CONSIDER

INFLIBNET refers to Information and Library Networks. It was established in April 1991 by UGC.

SELF ASKING QUESTIONS

Q.2 What is the goal of INFLIBNET ?

2.5 Summing Up

- ✓ EDUSAT was launched into the space on 20th September 2004 by Indian Space Research Organization (ISRO).
- ✓ EDUSAT is a two-way communication process that creates a stress free learning environment which increases learning capacity of students.

- ✓ The goal of INFLIBNET is to improve the library and information centres in the country.
- ✓ INFLIBNET enables users to have access to information regarding books, monographs, theses, non-book materials etc. irrespective of location and distance.
- ✓ It links all libraries belonging to universities, colleges, laboratories and other national information centres.

2.6 References and Suggested Readings

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2.7 Model Questions

Q.1. Why is EDUSAT designed?

Q.2.For what can EDUSAT be used?

Q.3.What are the major activities of INFLIBNET?

Q.4.Is it true that INFLIBNET evolves standards and uniform guidelines in techniques.

2.8 Answers to check your progress/Possible Answers to SAQ

Answer no.1: EDUSAT is designed for an audio visual medium employing a digital classroom interaction and use of multimedia.

Answer no.2: EDUSAT can be used for the following:

a) Conventional Radio and Television broadcasting.
b) Interactive Radio and Television (phone-in, video on demand.)
c) Exchange of Data.
d) Video conferencing, Audio conferencing & Computer conferencing.
e) Web based education.

Answer no.3: The major activities include of INFLIBNET ARE E-pgPathshala, IndCat, INFOPORT, NLIST, OJAS, Research Project, SOUL 2.0, ShodhGanga, E-Shodh Sindhu, Vidwan Database.

Answer no.4: True.

UNIT 3:

GAMIFICATION IN EDUCATION AND SLEs

CONTENTS

3.1 Introduction

In recent years, the teaching methods in the education system have evolved and almost all higher institutions use e-learning platform to deliver courses and learning activities. However the desired objectives might not have been achieved due to lack of student motivation and engagement. In such cases Gamification and Smart Learning Environment (SLEs) play significant roles to make the students involved in learning process. The right combination of game elements by the game designers for educational purposes can stimulate learners' involvement in the course. The Smart Learning Environment (SLEs) also adds motivation in the learning of the courses effectively by the students. SLEs provide students everything they need integrated in one place, with a structure and a logical sense. It offers learning flexibility, effectiveness, efficiency, engagement, adaptivity and reflectiveness.

3.2 Objectives

- Discuss the meaning of Gamification in Education
- Identify the meaning of Smart Learning Environment (SLEs)
- Understand the characteristics of SLEs

3.3 Gamification in Education

According to Kapp (2012), "Gamification is using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems." Thus gamification in education means the use of game mechanics and elements in educational environment. Gamification is the use of game design in what is typically considered non-game environments as the classroom. Some of the examples of gamification in Education are as follows-

a) A challenge or activity with more than one way to be solved.
b) Grading by adding points.

c) A teacher giving badges instead of grades.
d) Tracking the progress of students in a fun /visual way.
e) Avatars or Role-playing.
f) Promoting levels of learning, status through interesting competitions, quizzes.

This mode is very interesting specially, for the small children. In this mode the learners learn spelling, name of places, general knowledge, problem-solving skills etc. through playing various games opposite to the computer. Gamification in education helps in setting clear goals and objectives, offers immediate feedback, provides personalized learning, motivates students learning, encourages collaboration and competition, creates a positive learning environment, and overall enhances opportunities in learning. Bringing education and game elements together may lead to results that are very significant for developing 21st century skills. Gamification in education is not only beneficial for students but also for teachers. It provides teachers with better tools to guide and reward students through joyful learning environment. While designing gamification in education the designers must take care of projects that focus on real challenges of schools. Teachers must define students' characteristics in order to determine whether the new tools and techniques would be suitable. They also need to define the learning objectives, create educational contents and activities for gamification, add game elements and mechanisms.

In this rapidly changing world gamification in education is sure to become a part of students' lives. Therefore gamification in education requires special attention to utlize the energy, motivation and potential of the game-play. Appropriate direction of game-play will encourage learners to become winners in real life situations too.

STOP TO CONSIDER
Gamification in education means the use of game mechanics and elements in educational environment

SELF ASKING QUESTIONS
Q.1. State an example of gamification in Education.

3.4 Smart Learning Environment (SLEs)

An environment that provides the use of innovative technologies with learner centred flexibility, adaptation, engagement and feedback is called Smart Learning Environment. SLEs are very comprehensive in nature as they call for efforts from different fields such as psychology, pedagogy, education, computer science and engineering. SLEs can fulfil the current educational needs or demands of learners. Teaching and learning have become easy with increased learner engagement. Teachers are the leading elements of SLEs who act as facilitators and support faculty development.

3.4.1 Characteristics of SLEs -

1) SLEs provide access to information and the ability to add or modify that information.

2) They enable the learners to perform a task with the required or necessary tools and information.
3) They maintain and make use of learner's profile to provide appropriate support and knowledge.
4) The design of SLEs is based on personalized learning.
5) Learning community, teaching community, learning ways, learning resources, teaching ways, intelligent tools are the elements of SLEs.
6) In SLEs sensor technology is provided to the learners with a comfortable physical environment in learning. SLEs are so smart that they can even monitor air, temperature, light, sound, smell other physical environment too.
7) SLEs can track the knowledge acquisition, classroom interaction and group collaboration of the learners by using various interesting modes of technology.
8) SLEs are able to recognize learning time, learning place, learning peers and activities.
9) They are great platforms of connecting learning community through interactions and exchange of ideas on prominent aspects of learning.
10) SLEs use digital resources, specialized tools and miniaturized tools for effecting learning communication among learners and teachers.

The SLEs are great sources of learning in the current era of digitalization. Every now and then we are associated with the digital world. With the inclusion of intelligent tools, modern teaching learning ways and methods SLEs serve the educational needs of the young generation.

STOP TO CONSIDER
SLEs can fulfil the current educational needs or demands of learners.

SELF ASKING QUESTIONS
Q.2. On which learning is the design of SLEs based?

3.5 Summing Up

- Gamification is the use of game design in what is typically considered non-game environments as the classroom.
- Gamification in education helps in setting clear goals and objectives, offers immediate feedback, provides personalized learning, motivates students learning, encourages collaboration and competition, creates a positive learning environment, and overall enhances opportunities in learning.
- An environment that provides the use of innovative technologies with learner centred flexibility, adaptation, engagement and feedback is called Smart Learning Environment.
- They are great platforms of connecting learning community through interactions and exchange of ideas on prominent aspects of learning.

3.6 References and Suggested Readings

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3.7 Model Questions

Q.1. Define Gamification.

Gamification in education helps in setting clear goals and objectives, offers immediate feedback, provides personalized learning, motivates students learning, encourages collaboration and competition, creates a positive learning environment, and overall enhances opportunities in learning.

Q.2. How does gamification help in education?

Q.3.Who are the leading elements of SLEs that act as facilitators and support faculty development?

Q.4.What can SLEs track in the learning process?

3.8 Answers to check your progress/Possible Answers to SAQ

Answer no.1: According to Kapp (2012), "Gamification is using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems."
Answer no.2: Gamification in education helps in setting clear goals and objectives, offers immediate feedback, provides personalized learning, motivates students learning, encourages collaboration and competition, creates a positive learning environment, and overall enhances opportunities in learning.
Answer no.3: Teachers are the leading elements of SLEs who act as facilitators and support faculty development.
Answer no.4: SLEs can track the knowledge acquisition, classroom interaction and group collaboration of the learners by using various interesting modes of technology.

UNIT 4:

E-LEARNING TOOLS AND M-LEARNING

CONTENTS

4.1 Introduction

People today are totally dependent on the Internet to find answers to their queries rather than going through the books or asking someone. This has led to the importance of E-learning and M-learning. In the E-learning process knowledge can be shared through various channels viz; e-books, CDs, webinars and many more. E-learning has brought learners, tutors, experts, practitioners and other interested groups to one place. The e-learning tools are basically of three types-Curriculum tools, Digital Library tools and Knowledge representation tools. M-learning enables learners to take their learning materials with them. Other than communication with friends and family, online shopping, playing games, consuming news, mobile phones are very useful mode of M-learning providing enormous opportunities for learning.

4.2 Objectives

- Discuss the meaning of E-learning tools
- Know the classification of E-learning
- Understand the modes of E-learning.
- Know the characteristics of M-Learning
- Describe the advantages of M-Learning
- Understand the advantages of M-Learning
- Identify the disadvantages of M-Learning

4.3 E-learning tools

E-learning was pioneered by Bernard Luskin. He explains “e” as exciting, energetic, enthusiastic, emotional, extended and educational. E-learning refers to electronic learning. In other words, e-learning is an innovative technique or a form of Information and Communication Technology (ICT). Its services include advance electronic information and communication media such as teleconferencing, video-conferencing, computer-based conferencing, e-mail, e-banking, e-booking, e-commerce, live chat, surfing on the Internet, video games, customized e-learning courses, web browsing, online reference libraries, etc. E-learning is the demand of today’s world. Our educational system should be suitable enough to help students cope with the current technological challenges. E-learning is dynamic, individual and comprehensive. It operates in real time and often learning can be done within the fraction of time.

Most of the teachers want to create a sparking and joyful learning environment for students. But this is not an easy task. There are greater demands in a classroom. In fulfilling such demands the teachers often get frustrated. To make the classroom student centred and more interesting, E-learning is instrumental. E-learning tools help the students to be more responsive to the teaching stimuli. It is very essential to meet the challenge and potential of the students in the classroom environment. Co-operative learning is possible through the use of e-learning. Teachers who are able to integrate e-learning technology in classroom may reorganize their roles in keeping with the changing demands of time. E-learning means the use of Information and Communication Technology (ICT) that helps in enhancing education. E-learning is basically an education via the Internet, network or standalone computer. E-learning process includes Web-based learning, computer-based learning, virtual classrooms and digital collaborations. The mediums used to learn any topic through such learning aspects are called E-learning tools. These tools are mainly divided into three types-Curriculum tools, Digital Library tools and Knowledge representation tools. They are described below-

a) **Curriculum Tools-** Curriculum tools include instructional tools, administration tools and student tools. These tools are widely used by the teachers and students for browsing class materials, assignments, readings, projects, other necessary resources. Sharing and collaboration of discussion forums, self-testing and evaluation facilities can be accessed through curriculum tools. WebCT and Blackboard are used largely curriculum tools.
b) **Digital Library Tools-** These tools consist of numerous correct knowledge or information regarding any subject matter. The users can search, browse and discover the collections on any specific topic they want to know. These tools are store house of books or treasure of information largely useful for students.
c) **Knowledge representation tools-** Knowledge representation tools assist the users specially the teachers and students to visually review, capture or develop knowledge. These tools provide an active learning environment for learners.

4.3.1 Modes of the e-learning tools

Following are some modes of E-learning Tools:

- **E-mail-** This is an electronic service used to send and receive messages in a formatted manner through connection of Internet. It also contains images, videos, audio data which are very useful for learners and users.
- **Google Classroom-** It is one of the digital learning tools that facilitates online classes, invites students and creates a learning environment for students including remote learners.
- **Edmodo-** It is a mobile-friendly platform that acts as a social network to connect teachers and students with the features of a virtual classroom learning environment.
- **Moodle-** The full form of Moodle is "Modular object- Oriented Dynamic Learning Environment." It is designed to have easy access for both learners and instructors. Moodle helps to create and upload learning content, deliver it to students, assess them on that content, track their progresss and recognize their achievements.
- **Online forums-** These forums are places of public meeting through online mode. They allow students and teachers to participate in written discussions, exchange ideas, comments, questions and answers.
- **Grammarly-** It is a cloud-based typing assistant that helps learners and teachers to correct their written work errors. It ensures correct spelling, grammar, punctuation, clarity, engagement in texts.
- **Zoom-** It is an online meeting tool which allows deliberation of lectures, discussions or conduction of workshops and seminars. The teacher can teach the students by sharing the content screen while delivering lecture. It also allows large number of student engagement to join the meeting or discussion at a scheduled time.
- **Google Docs-** It is an online word processor where we can create and format documents and work with other people. As it is a cloud-based software users from any part of the world can access their documents with an internet connection.
- **Google Calendar-** It is a handy feature that helps to add notes, send text notifications, and schedule recurring reminders.
- **Google Drive-** It is a form of cloud storage that provides a secured and central location where teams working in different locations can access the files they need at any time.
- **Youtube-** It is a huge repository where users create and upload videos related to learning suitable to interests of people.
- **LinkedIn-** It is a repository of instructional videos covering multiple contents on various important fields providing personalized courses to develop the full potentialities or skills of the users.

E-learning is thus a very important and updated way of learning beneficial to all kinds of learners be it formal, informal or non-formal. This learning process can reach learners of almost every corner of the world. E-learning directly or indirectly help to achieve the objectives of education in an innovative way.

STOP TO CONSIDER

E-learning refers to electronic learning. In other words, e-learning is an innovative technique or a form of Information and Communication Technology (ICT).

SELF ASKING QUESTIONS
Q.1. What does E-learning process include?
Q.2. What is Edmodo?

4.4 M-Learning

According to Molenet, Mobile Learning can be broadly defined as "the exploitation of ubiquitous handheld technologies, together with wireless and mobile phone networks, to facilitate, support, enhance and extend the reach of teaching and learning." M-learning or mobile learning is a new way of online learning where learners can access benefit from any corner and any time by using their mobile devices. Students can enrol in various course programs, study assigned lessons, watch video lectures, attend live classes and take tests from the devices with location and schedule conditions.

4.4.1 Characteristics

- M-learning provides concise relevant information and attracts learners' attention and retention.
- It includes newsfeed, chat function, forums or comments section for learners to interact with one another, ask questions and share their insights.
- It increases student engagement and involvement.
- It provides the users with optimal privacy.

4.4.2 Advantages of M-learning

- M-learning provides easy access to learners with helpful learning materials whenever they need them.
- It is task-oriented and practical.
- Many lectures videos and step-by-step tutorials of M-learning help learners to develop new skills in them.
- Learners can stay connected with the learning community and instructors through peer discussions or can leave comments.
- M-learning facilitates interactive learning environment.
- It is more cost effective as compared to traditional learning settings.

4.4.3 Disadvantages of M-learning

- Mobile learning devices can have varying storage and processing capacities that creates problems in this mode of learning.
- Poor Internet facilities in the remote areas may hinder the learning in such areas.
- M-learning can reduce training effectiveness as learners may get distracted to the use of social media.
- There is lack of common operating system and devices can become out of date quickly.
- Lack of common hardware platform makes it difficult to develop content for all.
- Wireless bandwidth is limited and may degrade with a larger number of users.

STOP TO CONSIDER
M-learning provides concise relevant information and attracts learners' attention and retention.

SELF ASKING QUESTIONS
Q.3. Does M-Learning provide the users with optimal privacy?
Q.4.Mention a disadvantage of M-Learning.

4.5 Summing Up

- ✓ E-learning is an innovative technique or a form of Information and Communication Technology (ICT).
- ✓ E-learning is dynamic, individual and comprehensive.
- ✓ M-learning or mobile learning is a new way of online learning where learners can access benefit from any corner and any time by using their mobile devices.
- ✓ M-learning includes newsfeed, chat functions, forums or comments section for learners to interact with one another, ask questions and share their insights.
- ✓ Mobile learning devices can have varying storage and processing capacities that creates problems in this mode of learning.

4.6 References and Suggested Readings

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4.7 Model Questions

Q.1.Into how many types are E-learning tools divided?

Q.2.What is LinkedIn**?**

Q.3.Define M-learning.

Q.4.What does M-Learning include?

4.8 Answers to check your progress/Possible Answers to SAQ

Answer no.1: E-learning tools are mainly divided into three types-Curriculum tools, Digital Library tools and Knowledge representation tools.

Answer no.2: LinkedIn is a repository of instructional videos covering multiple contents on various important fields providing personalized courses to develop the full potentialities or skills of the users.

Answer no.3: According to Molenet, Mobile Learning can be broadly defined as "the exploitation of ubiquitous handheld technologies, together with wireless and mobile phone networks, to facilitate, support, enhance and extend the reach of teaching and learning."

Answer no.4: M-Learning includes newsfeed, chat function, forums or comments section for learners to interact with one another, ask questions and share their insights.

Unit 5:

CML and CAE

CONTENTS

5.1 Introduction

Computer Managed Learning (CML) is an instructional delivery system through computers. The computer is used to provide learning objectives, learning resources and assessment of learner performance. The computer system provides an administrative framework through which the learner interacts for such tasks as enrolment, unit or module selection, direction to or provision of study material, assessment and feedback. Computer Aided Evaluation (CAE) encompasses the use of computers to deliver, mark and analyse assignments or examinations. It is used for student monitoring, early detection of problems, testing a broad range of topics, easing the marking load, enabling more frequent testing and many more.

5.2 Objectives

- Discuss the meaning of Computer Managed Learning (CML)
- Identify the meaning of Computer Aided Evaluation (CAE)

5.3 Computer Managed Learning (CML)

In this type of instruction the computer manages the instructional process by gathering information, storing information to provide self-learning. It guides the learners to learn from different modes and sources. The computer forms some learning objectives of some topics and asks the learners to identify them. The computer instructs the learners to study some pages from some books to achieve the objectives. After this the computer puts some questions to the learners and evaluates their learning. Following this the next step includes some practical tasks that the learners are to perform. They have to perform a laboratory experiment to make learning permanent. According to Hofmeister, “Computer Managed Learning is the systematic control of instruction by the computer, prescriptions, and thorough record-keeping. CML is an electronic learning management system that allows data from tests to be analysed, providing information which can be the basis of educational decisions.”

CML helps both the teacher and students to follow suitable learning services by assuming every user as an individual. CML is an accessible software and relevant to the learning needs. It provides feedback to the users and helps the teachers to refine and improve the teaching method. CML assists in sharing valuable resources developed by teachers from time to time. The teaching environment can be controlled to achieve the goals of learning. However the users must be careful while using this CML as many unknown problems related to informatory materials may arise and make the users confused. CML further helps the Principals, management bodies of schools and also the Government to formulate some educational policies by collecting necessary data.

5.4 Computer Aided Evaluation (CAE)

Computer Aided evaluation is a process of evaluation of students' learning with the help of computers. It is extensively used by teaching staff and students. It is a programme which is designed to provide proper guidance to the learners as to which task has been learnt properly by the students and which tasks are learnt incorrectly. Different grades of questions are asked to the students according to the programmed textbooks and tasks related to their subject of study. The responses of the students to those questions are evaluated through the computers already processed in the programmed learning.CAE is such a software that helps to create more suitable learning strategies at different levels and it tracks the progress of the students. The easy access of CAE makes it significant and special for the users. The computers never get tired and hence the learners can repeat the question answer process of the programmed task and get appropriate feedback and achieve mastery on a particular subject or topic. The teachers get more free time if the CAE is used for students' learning evaluation. Perhaps this evaluation may also include the evaluation of the OMR answer sheets of any competitive examination.

STOP TO CONSIDER

In Computer Managed Learning the computer manages the instructional process by gathering information, storing information to provide self-learning.

CAE is such software that helps to create more suitable learning strategies at different levels and it tracks the progress of the students.

SELF ASKING QUESTIONS

Q.1. What is the full form of CMI?

Q.2. What is the need of CAE?

5.5 Summing Up

- ✓ CML is an electronic learning management system that allows data from tests to be analysed, providing information which can be the basis of educational decisions.
- ✓ CML is an accessible software and relevant to the learning needs.
- ✓ Computer Aided evaluation is a process of evaluation of students' learning with the help of computers.
- ✓ The easy access of CAI makes it significant and special for the users.

5.6 References and Suggested Readings

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5.7 Model Questions

1) Define CML.
2) Mention the characteristics of CML.
3) Why is CAE designed?
4) Why CAE makes it significant and special for the users?

5.8 Answers to check your progress/Possible Answers to SAQ

Answer no.1: According to Hofmeister, "Computer Managed Learning is the systematic control of instruction by the computer, prescriptions, and thorough record-keeping. CML is an electronic learning management system that allows data from tests to be analysed, providing information which can be the basis of educational decisions."

Answer no.2: Two characteristics of CML are as follows:

a) CML is an accessible software and relevant to the learning needs.
b) It provides feedback to the users and helps the teachers to refine and improve the teaching method.

Answer no.3: CAE is a programme which is designed to provide proper guidance to the learners as to which task has been learnt properly by the students and which tasks are learnt incorrectly.

Answer no.4: CAE is such a software that helps to create more suitable learning strategies at different levels and it tracks the progress of the students. Thus the easy access of CAE makes it significant and special for the users.

Unit 6:

OER, MOOC, NPTEL and SWAYAM

CONTENTS

6.1 Introduction

Open Educational Resources (OER) are teaching-learning materials that are freely available online for anyone to use. OER includes learning materials such as textbooks, virtual labs, interactive videos, audio-video lectures, animations, audio, collections of Journal Articles, digital images, software tools etc. The users of OER include Faculty/Teachers, Researchers, Students, Self-Learners, Industry personals etc. MOOC, NPTEL, SWAYAM etc. are some of the open educational resources helpful for the teachers and students.

6.2 Objectives

- Discuss the meaning of Open Educational Resources (OER).
- Identify the meaning of MOOC.
- Understand the meaning of NPTEL.
- Identify the characteristics of NPTEL.
- Describe the meaning of SWAYAM.

6.3 Open Educational Resources (OER)

Generally speaking Open Educational Resources (OER) are teaching, learning and research materials in either digital form or otherwise. These resources are open and free to be used by

public. These are openly licensed educational materials. They are helpful for educators, teachers, students, self-learners etc. The available educational resources in OER are lesson plans, power point presentations, full courses, course materials, textbooks, videos related to education, tests, software, quizzes, syllabi, instructional modules, simulations etc. These can be used, re-used, shared, posted and adapted. Some of the important resources helpful for the teachers and students are described below-

a) **Lesson Cast:-** It is a website where many important information and ideas related to teaching are submitted by experienced teachers and personnel. They submit ideas on lesson planning, classroom management strategies in 2 minutes 30 seconds or less. The documents are in the form of Power Point, Document, Pictures or Web Cam etc. The submitted documents are further reviewed by experts and accomplished teachers and then shared online. This website assists the teachers greatly to learn and apply the classroom management techniques practically in the classroom situation.
b) **Glogster EDU:-** This webpage or poster is created to make possible an interactive visual platform consisting audio, video, text, images, graphics, drawing, data etc. This webpage can be used for lesson planning or preparation, presentations, distance teaching and much more. The benefit of this Glogster is that it provides diversified ways to teach and it also helps in saving papers.
c) **Teacher Tube:-** In this website the teachers create and upload self ideas and videos useful for classroom. It is a safe mode to upload and share their ideas online without any risk of inappropriate content.
d) **Story Birds:-** In this webpage there are short art inspired stories with the help of which teacher can make their classroom teaching interesting and full of life.
e) **Flashcard Machines:-** Flashcard is a card bearing information as words or numbers, on either only one side or both the sides. The teachers can create flashcards for students and make the classroom interesting.
f) **Edmodo:-** Edmodo is a networking site which helps a teacher to communicate with students online. Teachers can share or post assignments, test notifications, create polls, award grades etc. Students can check the important notifications and become updated.
g) **Bitstrips for Schools:-** Here the teachers can design own cartoon characters, write dialogues and create online comic strips to teach the students any number of subjects and topics.
h) **Kidblog:-** It is a very useful platform with advanced primary features specially for elementary and middle school students. Teachers have administrative control on the posts that are uploaded.

These resources have proved to be useful and effective in the teaching-learning process. They have benefitted both the teacher and students to build a modern technological educational environment.

STOP TO CONSIDER

Lesson Cast, Glogster EDU, Teacher Tube, Story Birds, Flashcard Machines, Edmodo, Bitstrips,

Kidblog are some of the very useful resources which the teachers and students can avail.

SELF ASKING QUESTIONS

Q.1. What is Edmodo?

6.4 MOOC

The first MOOC experiments in India took place in 2012 with a course offered by Dr. Gautam Schroff of Tata Consultancy Services (TCS) and an adjunct faculty at Indian Institute of Technology (IIT), Delhi. The word MOOC was coined by Dave Cormier in 2008, from the University of Prince Edward Island. MOOC stands for Massive Open Online Course. It is an online course which basically emphasizes on 3A's-Anytime, Anyone and Anywhere. The meaning of MOOC can be given as follows-

Massive means it includes large enrolment of learners at a time.

Open means it is free of cost and requires no pre-requisite qualifications.

Online means it is digitally available to the learners.

Course is a syllabus to be studied.

There are certain categories of MOOC such as Distributed Online Collaborative Courses (DOCC), Big Open Online Courses (BOOC), MicroCredentials MOOCs, Blended MOOCs, Vocational Open Online Courses (VOOC), Transfer MOOCs, Nano Open Online Courses (NOOCs), Asynch MOOCs, Adaptive MOOCs, Corporate MOOCs, Foreign Language Open Online Course (FLOOCs), Synchronous Massive Online Courses (SMOC), Small Private Online Courses (SPOC) etc.

There are four essential elements of MOOC. They include Autonomy, Diversity, Openness and Interactivity. Autonomy refers to participation of students according to their own decision. Diversity means learners belong to different geographical and social backgrounds. Openness refers to free participation of anyone, anywhere, anytime. Interactivity means students chat, network socially, collaborate, meet digitally through meetings and discussions.

6.4.1 Characteristics of MOOC

- MOOC is a huge website where interactive courses are designed and offered.
- The platform of MOOC include SWAYAM, MooKIT, nptel, Udemy, Coursera, Edx, Canvas, Udacity, Fututure Learn.
- The courses of MOOC are offered by various esteemed Universities, Colleges, Institutions, NGOs, Teachers and Experts from any corner of the world.
- The courses offered through MOOC are valid and are available in India along with many countries of the world.

- The minimum requirements to join a MOOC course are PC/Smart phone, Internet, Willingness.
- The required technical skills to join a MOOC course are- knowing how to access Internet, how to download and read files, play videos, chat, access links, routine trouble shooting.
- Most of the courses in MOOC are free however some courses require fees depending on the terms and conditions of a specific course.
- The admission, learning, evaluation etc. all processes are done through online mode by some app or website.
- No minimum qualification is required to join a MOOC Course.
- Some of the subjects offered in MOOC are Teaching, Engineering, tourism, management, law, cyber security, humanities etc.
- Learning Material in MOOC is provided through E-books, Websites, Blogs, Videos, Podcasts, Links, Online Tests

Some of the limitations of MOOC include non-availability of courses in local languages, short courses are more popular rather than long term courses, most of the courses are in English language.

MOOC has a significant importance in the present digitalized world. It is easily accessible and engages a large number of students from all corners of the world through discussion forums. Learners can select courses according to their choices, learn at their own pace by watching and re-watching the lecture videos. Participants interact with each other and improve their life-long learning skills. Immediate feedback is possible in this platform. Willingness on the part of the learners is a basic factor to learn through MOOC rather than any degrees.

STOP TO CONSIDER

MOOC stands for Massive Open Online Course.

The four essential elements of MOOC include Autonomy, Diversity, Openness and Interactivity.

SELF ASKIG QUESTIONS

Q.2. Mention the categories of MOOC.

6.5 NPTEL

The full form of NPTEL is National Programme on Technology Enhanced Learning (NPTEL). It is basically designed to provide quality education to people across the country. Providing curriculum based video and web courses are also the aims of this learning system. NPTEL is a project funded by Ministry of Human Resource Development (MHRD). It was

first conceived in 1999 to introduce multimedia and web technology to enhance learning of basic science and engineering concepts. It offers self study courses across engineering, humanities and science streams. The NPTEL emphasizes on higher education, professional education, distance education, continuous and open learning.

6.5.1 Characteristics of NPTEL

- More than 900 courses are available across Disciplines.
- The learning modules are of a shorter duration.
- Users include all from every corner of the world out of which 80% is from India.
- There are 240 million website views in NPTEL.
- NPTEL is the most visited academic You Tube channel in the world.
- Web courses of NPTEL include pdfs, html files, lessons in the tect format, files with animation, equation, diagrams etc. These are available for download too.
- NPTEL provides learning opportunities to people at anytime and anywhere.
- It provides information about upcoming courses.
- Through NPTEL students get motivated by fellow students and group work.

NPTEL is currently being widely used all over the world. This is due to its easy accessibility among learners. NPTEL makes video lectures in an appropriate format for broadcasting that would provide quality content through the technology channel. It is a supplement of classroom teaching as it makes e-learning material available in the web for the video lectures.

STOP TO CONSIDER
NPTEL is a project funded by Ministry of Human Resource Development (MHRD).

SELF ASKING QUESTIONS
Q.3. Is it true that through NPTEL students get motivated by fellow students and group work?

6.6 SWAYAM

SWAYAM was launched by Shri Pranab Mukherjee on 9th July 2017 in India. SWAYAM stands for Study Webs of Active Learning For Young Aspiring Minds. It is regarded as the national MOOC platform of India. Access, equity and quality are the three pillars of this program. Swayam hosts courses from class 9th to Post Graduation level covering all disciplines. It aims to provide Internet Cloud and sufficient bandwidth for concurrent viewings of 1 Million users. This digital platform conducts examination and awards certificates to participants having successfully completed the course. The vision of SWAYAM is to host more than 10000 online courses for 30 million learners starting from 9th Class till post-graduation. It aims to improve gross enrolment ratio (GER) and bring all educators and leaders to this platform. Creating awareness on digital education system in India is also an objective of this program.

SWAYAM is conducted through various approaches including e-Tutorial videos, audio contents, video demonstration, documents and interactive simulations, animations, virtual labs, web resources links, open content on internet, case studies, anecdotal information, historical development of the subjects, Articles, e-Contents, e-books/PDF/illustrations, Problem quizzes, Discussion forums self-assessment containing MCQ., Assignments and solutions, Peer group interaction,. SWAYAM is thus a very reliable digital platform where thousands of MOOC courses are available by best teachers from prestigious institutions.

6.6.1 CHARACTERISTICS OF SWAYAM

- SWAYAM provides accessible mobile learning.
- The courses on the platform are available in the audio-visual multimedia format.
- It keeps track of the progress and issue a certificate for the students after an online exam.
- The learners in SWAYAM can have Interaction forums and clear their doubts.
- The courses of SWAYAM are designed by renowned and expert professors and faculties of Universities.
- The courses offered in SWAYAM are free of cost.

POINTS TO REMEMBER

SWAYAM stands for Study Webs of Active Learning For Young Aspiring Minds.

SWAYAM is a very reliable digital platform.

SELF ASKING QUESTIONS

Q.4. State the approaches of SWAYAM.

6.7 Summing Up

- Open Educational Resources (OER) are teaching, learning and research materials in either digital form.
- The available educational resources in OER can be used, re-used, shared, posted and adapted.
- MOOC is easily accessible and engages a large number of students from all corners of the world through discussion forums.
- NPTEL is basically designed to provide quality education to people across the country.
- NPTEL users include all from every corner of the world out of which 80% is from India.
- The vision of SWAYAM is to host more than 10000 online courses for 30 million learners starting from 9^{th} Class till post-graduation.

6.8 References and Suggested Readings

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6.9 Model Questions

Q.1.What are the available educational resources in Open Educational Resources (OER)?
Q.2.What is Teacher Tube?

Q.3.What are the four essential elements of MOOC?

Q.4.On which aspects does the National Programme on Technology Enhanced Learning (NPTEL) emphasize on?

Q.5.What is the main aim of Study Webs of Active Learning For Young Aspiring Minds (SWAYAM)?

6.10 Answers to check your progress/Possible Answers to SAQ

Answer no.1: The available educational resources in Open Educational Resources (OER) are lesson plans, power point presentations, full courses, course materials, textbooks, videos related to education, tests, software, quizzes, syllabi, instructional modules, simulations etc.

Answer no.2: Teacher Tube is a website where the teachers create and upload self ideas and videos useful for classroom. It is a safe mode to upload and share their ideas online without any risk of inappropriate content.

Answer no.3: The four essential elements of MOOC include Autonomy, Diversity, Openness and Interactivity.

Answer no.4: The National Programme on Technology Enhanced Learning (NPTEL) emphasizes on higher education, professional education, distance education, continuous and open learning.

Answer no.5: The main aim of Study Webs of Active Learning For Young Aspiring Minds (SWAYAM) is to improve gross enrolment ratio (GER) and bring all educators and leaders to this platform.