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SELF LEARNING MATERIAL
FOR
B.ED. SEMESTER - II

Subject : Educational Technology and ICT **Unit : I - IV**
Course No. : 203 **Lesson No. 1 - 13**

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Educational Technology and ICT

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BACHELOR OF EDUCATION (B.Ed.)

Semester - II

(For the examination to held in the year 2018, 2019 & 2020)

Course No. 203 (Theory) **Title : Educational Technology and ICT**
Credits 4 **Total Marks : 100**
Maximum Marks Internal : 40
Maximum Marks External : 60
Duration of Exam : 3 hrs

Objectives :

To enable the pupil teacher to :

understand the nature and scope of educational technology and also about the various forms of technology

know the systems approach in Education and its components

familar with the steps involved in the construction of programmed learning

describe the concept of ICT in education and appreciate the scope of ICT for improving the personal productivity and professional competencies

acquaint with different approaches of ICT integration in education

Course contents

Unit I

Introduction to Educational Technology

Educational Technology: concept, Need, scope and Forms of educational technology (Teaching technology, Instructional technology: Hardware and software, Multimedia and Mass media approach

Relationship of the term teaching with other similar concepts such as conditioning, instruction, training and indoctrination

Unit II

Systems Approach in Education

Systems Approach to Education and its Components : Task Analysis, Content Analysis, Context Aalyais and Evaluation Strategies

Programmed Learning – Concept, origin, basic structure of Linear (Extrinsic) and Branching (Intrinsic) styles of programming, various steps involved in construction of programmes

Bloom's Taxonomy approach in Educational Technology to integrate teaching – learning process.

Unit III

ICT in Education

Information & Communication Technlogy : Concept, Need and Scope

Paradigm shift in Education due to ICT content, with special reference to Curriculum, Role of Teacher, Methods of Teaching, Classroom Environment, Evaluation procedure, Educational management

Challenges in Integrating ICT in School Education

Unit-IV

ICT supported teaching- learning strategies

Project Based Learning (PBL)

Co-operative & Collaborative Learning

Computer assisted learnrng (CAL)& Computer Managed Learning(CML), Teaching Machines

Sessional Work:

Developing Programme Leaming Material

Organise seminar/ debates on ICT supported teaching leaming strategies

Presentation on Systems approach to education

Prepare a chart on different approaches of educational technology (Multi media and mass media)

Note for Paper Setters

The Question paper consists of 9 questions having Q no 1 as Compulsory having four parts spread over the entire Syllabus. with a weightage of 12 marks .The rest of Question paper is divided into four Units and the students are to attend four Questions B.-om these units with the intemal choice. The essay type Question carries 12 marks each. Unit IV haying the sessional work/field work (section) could also be a part of the theory paper.

Internship/field work Unit TV having the components/activities of the intemship is to be developed in the form of the Reflective Joumal. All the activities under the intemship are to be evaluated for . credits and hence all the activities are to be showcased by the trainee and are to be fully recorded with the complete certification of its genuineness.

The Theory paper is to have 60 marks (external). 40 Marks are for the In House activities

Books recommended & web resources

Agarwal, J.P (2013). Modern Educational Technology. Delhi: Black Prints.

Chauhan. S.S. (1978).A Text-Book of Programmed Instruction. New Delhi: Sterling Pub. Co.

Mangal, S.K. & Uma Mangal (2009). Essentials of Educational Technology. New Delhi.

Mohanty, J. (J007). Modern trends in Educational Technology. Neel Kamal publications Pvt.Ltd: New Delhi- 110063 www.neelkamalpub.com

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Sharma, Y.K. & Sharma, M, (2006). Educational Technology and Management. Vol: 1 New Delhi: Kanishka Publishers and Distributors.

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www2.rgu.acu.uk/celt/pgcerttlt/systems/sys3.htm

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EDUCATIONAL TECHNOLOGY AND ICT
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CONTENTS

EDUCATIONAL TECHNOLOGY: THE CONCEPT

LESSON NO 1 **UNIT- I**

Structure

1.1 INTRODUCTION

Modern age is the age of a science, technology and industrial development and we hear about development of new techniques in these fields .There is no aspect

of human life which is not touched by technology. The contribution of science and technology has been experienced in almost all the spheres of human life including education. The developments that have taken place in the field of education are called educational technology. Educational technology has become the irresistible tool of modern education. It helps in improving the task of teacher, facilitating the teaching -learning process and enriching the aims of education.

1.1.1 Origin of Educational Technology

- In nineteenth century, the educational technology existed in the form of educational toys and tactics.
- Its frequent use started in 1926 in Ohio University, it was used in the form of a teaching machine by Sidney Pressey of America.
- Around 1930 – 40, Lumsdein and Glaser tried to make education mechanical by presenting some special types of scrambled books, cards and boards.
- Important work was carried out during 1950 when B. F. Skinner developed programmed learning.
- In 1950, Brynmor in England, used educational technological steps for the first time.
- In 1960 America, Russia and other countries started progressing in the field of educational technology.
- In 1967 – In NCERT, a separate department of educational technology has been established too.
- The NCERT is the main centre of activities in the field of educational technology in India.

Thus the beginning of educational technology took place in 1950 from USA and USSR and it has reached England, Europe and India. Besides, radio, tape-recorder, television, computer, CCTV, electronic video tapes and other audio – visual aids and many other technologies are being used in education.

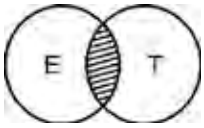
1.2 OBJECTIVES

After going through this lesson, you shall be able to:

- explain the term educational technology,
- reproduce one definition of educational technology
- explain the scope of educational technology in teaching -learning process, and
- distinguish between three forms of educational technology.

1.3 EDUCATIONAL TECHNOLOGY : THE CONCEPT

Educational technology is comprised of two words –Education and Technology. The two disciplines i.e. education and technology – have gradually mingled with each other. They have been acting and reacting with each other.



Educational Technology

Educational Technology

↓

Education → To bring out desirable change in behavior or all round development of personality → Draw out the best in child & man and modification of behavior.

Technology → It is science of industrial art, applied science and technology → derived from the Greek word Technikos which means- an art (technic + logia) → Technique of art or skill + Science or systematic study → Technology is the science or systematic study of technique or skills

Hence we can say that in the field of education to develop the child in every aspect, what we use practically or scientifically all is the Educational Technology. In other words, development of systems of teaching and learning, the techniques of evaluation and the use of teaching – learning material all this is known as the Educational Technology.

1.3.1 Different Meanings of Educational Technology

1. **First Meaning** Educational technology means the science of methods, techniques through which educational goals can be achieved. It involves four steps:—

- Identifying and analyzing the components.
- Explore the various functions of components.
- Effect of manipulating the components.
- Translate all the research findings in some kind of guideline.

2. **Second Meaning** Educational technology is mechanization of process of education. It involves three steps:-

Mechanisation of Education

- Preservation of Knowledge
- Transmission of Knowledge
- Advancement of Knowledge

3. **Third Meaning.** It includes Hardware, Software and System Analysis. It is related to art of teaching and science of learning. Education Technology acts as a mediator, blending of teaching art and learning science which are two essential process of education.

Art of Teaching ⟹ Educational Technology ⟹ Science of Learning

⟹ As mediator ⟸

Roles of Educational Technology

❖ Planning (Objective)

- ❖ Implementation (Learning Experiences)
- ❖ Evaluation (Learning outcomes)

1.3.2 Definitions of Educational Technology

The phrase 'Educational Technology' was used for the first time by Brynmor Jones Report in U.K.

1. Arthur Melton (1959) says, "Educational technology deals with the application of many fields of science to the educational needs of the individual as well as of society."
2. The National Council of Educational Technology (N.C.E.T.) defined it in 1967 in its second meeting as "the development, application and evaluation of systems, techniques and aids to improve the process of human learning."
3. The National Council of Educational Technology in Britain, in a working paper in 1971 defined it as "Educational Technology involves the application of human learning."
4. Marilym Nickson (1971) says, "Educational technology deals with the application of many fields of science to the educational needs of the individual as well as of society."
5. G.O.M. Leith (1967), "Educational Technology is a systematic application of scientific knowledge about teaching –learning and the conditions of learning to improve the efficiency of teaching and learning."
6. Shiv. K. Mitra (1968) says, "Educational Technology can be conceived as a science of techniques and methods by which educational goals can be realized."
7. S.S. Kulkarni (1969), "Educational Technology may be defined as the application of the laws as well as recent discoveries of Science and Technology to the process of education."

8. E.E. Hadden, "Educational Technology is that branch of educational theory and practice which is concerned primarily with the design and use of messages which control the learning process."

9. Robert A. Cox (1970), "The application of scientific process in learning situation of man is educational technology."

10. J.R. Gases (1971), "Educational Technology has to be seen part of a persistent and complex endeavor of bringing pupils, teachers and technical means together in an effective way."

11. B.C. Mathis et.al, "Education Technology refers to the development of a set of systematic methods, practical knowledge for designing, operating and testing school as educational systems."

12. John Leedham, "Educational Technology is concerned with the systematic use of modern methods and technologies in teaching and learning. It involves teachers in variety of roles, some of which are traditional, some still are emerging."

13. D.E.S.Working party (U.K), "Educational technology is the development application and evaluation of systems, techniques and aids in the field of human learning."

14. Robert M. Gagne defined Educational technology as, "The development of a set systematic techniques and accompanying practical knowledge for designing, testing and operating school as educational systems."

15. Jaicota Bloomer, "Educational Technology is the application of scientific knowledge about learning to practical situation."

On the basis of above mentioned definitions it is clear that educational technology implies a behavioural science approach to teaching and learning, in that it makes use of pertinent scientific and technological methods and concepts developed in Psychology, Sociology, Communications and other related fields. It also attempts to incorporate the management principle of cost effectiveness and the efficient development and use of available resources in man and materials. It involves media, methods, equipments and resources.

Check Your Progress - 1

Note : (a) Answer the questions given at the end of the lesson

(b) Compare your answers with those given at the end of the lesson

Q1. _____is the main centre of activities in the field of educational technology in India.

Q2. The phrase Educational Technology was used for the first time by_____.

Q3. The application of scientific process in _____of man is educational technology.

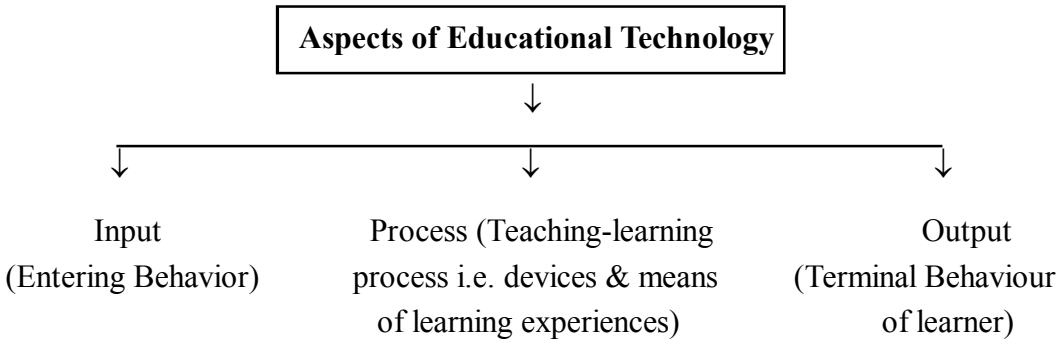
Q4 Which of the following is not a charateristics of educational technology:

a) Stresses organization of learning situation

b) Helps in class management

c) Shifts emphasis from the learner to the teacher.

d) Efficiency in teaching and learning.



Characteristics of Educational Technology

On the basis of analysis of these definitions the following characteristics of educational technology are drawn: -

1.4 NEED AND SCOPE OF EDUCATIONAL TECHNOLOGY

Educational technology as we find today has a meaningful present and promising future because it is contributing a lot for the improvement of the products and processes of education at all levels and stages-planning, implementation and evaluation. Need of ET is increasing day by day because it is serving the cause of formal as well as informal education and help in the developmental tasks of the country.

By scope of educational technology we mean the jurisdiction, the limits or the boundaries with in which it works. It needs demarcation of the boundaries with in which the process of education can go on. Accordingly, the concept or the scope of educational technology can be described in the following steps:-

1. Efforts to Attain Optimum Educational Purposes. This requires thorough analysis of process of teaching and learning which on one hand includes concept variables, levels, phases, theories of teaching and the other hand, includes concepts,

theories and factors related to learning. It also analyses the relationship between teaching and learning and impact of teaching on learning.

2. Determination of Educational Objectives. The software aspect of educational technology contributes in the formation of teaching objectives.

3. Teaching and Learning Process to be Analyzed. That is how we began in this paper. What is teaching? What is learning? What are the levels and theories? This is to be studied.

4. Deciding Tactics and Strategies. Here suitable tactics and strategies of teaching are discovered, selected and then developed. It provides ways and means of selecting strategies so that learning is maximized in the light of available resources.

5. Curriculum Development. Scope of educational technology not only includes identification of educational goals, but also moulding these goals into a perfect curriculum for achieving those goals. It also highlights ways and means to select contents of the curriculum, sequencing those contents in such a way so that instruction becomes more effective.

6. System Approach to Education. It includes treating education as a system and study of its different subsystems and their inputs, processes and outputs. It also gives due consideration to organization and management of systems to specify the role of each and every subsystem.

7. Developing Material Resources. This area includes the development of material needed for teaching -learning to achieve specialized goals.

It consists of techniques for following:-

(a) Programmed Learning

(b) CAL or Computer Assisted Learning

(c) Mass media instructions

(d) Individualized system of instruction

8. Modification in Existing System. Educational Technology also has provision for modification in existing system in the light of evaluation results so as to improve the effectiveness for future.

National Policy on Education (1986) recommends that "Educational technology will be employed in the spread of useful information, training and retraining of teacher to improve quality, sharpen awareness of art and culture, inculcate abiding values both informal and non-formal sectors. Maximum use will be made of infrastructure."

9. Multi – Sensory Aids. This pertains to development of teaching aids in a way that maximum of our sense are involved. Aids should be such that not only sense of hearing but also sense of sight and touch are used by learners so that they get maximum benefit out of them.

10. Aids. The scope includes types of educational technology. It is hardware-Projectors, transistors, slides or software technology – Simple text-books. These methods have to be used in education.

11. Teacher Preparation. This perhaps is the foremost topic. Teachers have not only to be prepared but also to keep up to-date. They have to be provided feedback. This we do, with the help of interaction –analysis. As such that topic is also to be studied.

12. Developing Human Resources. Area of human resource development providing special training to the teachers since the responsibility of using resources to attain objectives to fullness lies in the hand of teacher. For this, it has models of teaching; simulated teaching, micro teaching helps in to modifying the behavior of teacher by making him interact in the class and then interaction analysis using Flanders's technique.

13. Individual Differences. One of the problems in education is that of individual differences. No two children are alike. Educational technology has given to us many new practices which are to help us in overcoming the problems of individual differences.

14. Feedback Mechanism. It deals with proper control over the process of teaching and learning. It develops tools and techniques to determine the extent to which educational goals have been achieved. It throws light on worthwhileness of learning system.

The scope of educational technology is very wide. It is not possible to limit it. We see that it touches all branches of education.

1.5 FORMS OF EDUCATIONAL TECHNOLOGY

Various forms of Educational Technology are:

1.5.1 Teaching Technology

1.5.2 Instructional Technology

1.5.3 Behavioural Technology

1.5.1 Teaching Technology

In the light of teaching – learning process, teaching as a technology has been viewed broadly as the technique adopted to focus on the learning process rather than only on the teaching process. It is the application of psycho – social and scientific principles of knowledge to bring about effective instruction. In fact, it centres around the entire instructional strategies keeping in view the teaching and learning as inter – related and inseparable components of education process. Let us examine how these instructional strategies are designed in a normal classroom situation.

There are three basic steps one needs to follow while designing the teaching or instructional strategies. These are:

1. The planning step
2. The implementation step
3. The evaluation step

These three steps are sequential and interrelated. In other words, a teacher, in developing any learning experience, first plans, then implement those plans, and finally evaluate the success of the activity. We will discuss briefly about each of these steps in the following sub – sections.

1. The Planning Step

All teaching begins with some kind of planning .At this point, you as a teacher may ask yourself: “What do I want the students to know, understand, appreciate and be able to do?”

The answer to this question is, we as teacher must be able identify our goals. Hence, the first step of the planning phase is the establishment of some kind of goal. This goal may be as mundane as keeping the students quite for an hour or as lofty as developing students' moral or spiritual values. Whatever may be the intention of a teacher, the establishment of some type of goal or purpose is the first priority in teaching.

You may ask yourself what determines the goals? or, From where does this goal come? Every teacher has some kind of goal when she teaches, but the goals selected by various teachers differ in their value to the student. For example, some teachers have as their goal keeping the students busy and quite until the bell rings; others have as their goal getting through a text book or covering a chapter of the following week. The value of each of these goals in question as best and is hard to defend from a professional standpoint. However, the sources for those goals could be the students themselves, the society from they belong and the academic discipline itself.

The second step in planning phase is selecting appropriate strategies and gathering the supportive materials to reach those goals. Research evidence supposes the value of the planning process .Peterso, Marx, and Clark (1978) found that teacher behaviors in the classroom depend on the plans teacher make. Clark and Yinger (1979) and Mc Cutcheon (1980) both found that planning tends to give teachers confidence and security.

2. The Implementing Step

Having determined the goal and selected an appropriate means to reach the goal, the teacher then must consider have to implement that strategy. The teacher attempts in the implementation phase to accomplish the teaching through the selected strategy. The teaching activity in the implementation stage is the actual performance of the strategy the teacher has selected. Essentially, the importance of this step could be felt if one does the teaching activity with the idea of reaching a pre – established goal. Peterson et.al (1978), and McCutcheon, (1980) all found that teachers do not typically start the planning process with a consideration of goals but rather with a concern for activities, content, or materials.

It's more often come to our mind in implementation of the activities in the classroom situation is, "How will I get the students to the goals?" The answer to this question is that the teaching procedure, strategy, or the technique that we use or adopt in the classroom. Deciding the most appropriate method to use depends on goal, the students' characteristics, the teacher's style and many other such factors. In addition to considering and implementing a teaching strategy to real predetermined goal, teachers must organized and manage their classrooms so the learning process can proceed smoothly. Management procedures range from something as simple as a word spoken to a student to complex procedures that require the creation of learning environments.

3. The Evaluation Step

The purpose of evaluation in the instructional system point of view is to determine whether the learning has been a success. The teacher at this stage attempts to gather information that can be used to evaluate the teaching-learning process. These information can be collected in a number of ways including administering tests or quizzes, or noting student reactions to question or comments. Each of these methods can be used by the teacher in making decisions concerning whether or not the goal established in the planning stage has been reached.

Then the question comes, "How will I determine if the students know, understand or appreciate the goal I have identified?" The answer to this question specifies the way in which the students' understanding will be measured and evaluated. Different standardized techniques have been devised to measure student performance and also different types of suitable evaluation techniques have been evolved for interpretation of those results. As a classroom practitioner we must have a fair idea on using those tools.

Although described as three separate phases, the continuity and interrelationship of the phases should be emphasized. The goal that a teacher has for a particular group of students should determine both what is taught and how it is taught and should influence the manner in which the learning is evaluated. This relationship is shown in the following figure1.

Figure:1 The Three Phases Approach To Teaching

The Three Phase Approach to teaching as described here is a sequentially related series of steps which proceed from the establishing of goals to verification of the attainment of these goals. On Other hand teaching is a logical operation in which the goals are determined; attempts are made to reach these goals, and the effectiveness of those attempts is evaluated.

1.5.2. Instructional Technology

Instruction is concerned with those activities which help in learning but in this no interaction takes place between teacher and student. Instruction is not teaching but in every type of teaching, instruction is always there. In instruction only information's are given where as in teaching, various activities are done. In teaching, we as a teacher take care of all the three domains i.e cognitive, psychomotor and affective where as in instruction it hardly exceeds cognitive domain. So instruction, in brief, is mainly concerned with the development of knowledge and understanding in an individual.

Instructional Technology is mainly concerned with those methods by which already decided learning objectives can be achieved. In order to achieve these learning objectives, teacher takes the help of scientific, psychological and social principles. The basis of instructional technology is psychology. Its important example is Programmed instruction. In this technology, hardware approach is used. The main contributions in Instructional technology have been given by B.F.Skinner, (1955); Robert Glaser, Norman .A. Crowder (1954) and Gilbert (1962).

Basic Assumptions of Instructional Technology are:

- Student can learn in absence of a teacher
- Content/ subject matter can be divided into small parts and students can learn or can create learning situations while learning through these parts of content.
- Students can learn according to his needs and capabilities.
- Necessary reinforcement required for learning can be given to students through Instructions.
- Learning objectives can be achieved through instructional technology.

Content of Instructional Technology

It includes i). Meaning and development of Instructional Technology; ii) Programmed Instruction- its meaning, definition, rules; iii) Styles of Programming – Linear, Branching and Mathetics; iv) Computer Assisted instruction (CAI); and v) Development of Programmed Instructional Material.

Characteristics of Instructional Technology

Instructional Technology helps in achieving cognitive objectives i.e. objectives related with intellect by providing student's opportunities to learn according to their individual differences. Here students learn at their own pace and continuous reinforcement is provided to the students on their correct responses.

In nut shell, instructional technology which is based on psychological and learning principles help in filling the gap which has arisen due to shortage of capable teachers.

1.5.3. Behavioural Technology

Behavioural Technology is concerned with human behavior and based on psychology. Psychology is said to be science of human behaviour. Generally Psychologists study nature and forms of animal behaviour. The main purpose of teaching and learning is to bring change into the behaviour of learners. For that purpose, in teaching various teaching activities are performed to provide specific learning experiences to learners.

As a result, changes take place in the students' behavior. The field of behavioral technology is very wide. In the field of education, the concern of this technology is to bring changes in the teacher behaviour. That's why, it is also called Training Technology.

In behavioural technology, individual differences are given due care. In classroom teaching, we find the behaviour of teacher verbal as well as non- verbal. B.F.Skinner, N. A. Flanders, Amidon, Anderson etc played an important role in the development of this technology which is concerned only with the study of teacher's behaviour.

Basic assumptions of Behavioral Technology are:

- ❖ Teacher behaviour can be observed, measured and modified.
- ❖ Teacher behaviour is social and psychological in nature.
- ❖ Teacher are not born rather they can be made.

1.5.4 Contents of Behavioral Technology

Contents of Behavioral Technology include:

i) Meaning & Definition of Teacher behavior, its assumptions and Principles;

ii) Observation methods of teacher behaviour, Recording and Interpretation of Teacher Behavior

iii) Evaluation of Teacher Behavior ;

iv) Models of Teacher Behavior;

v) Micro Teaching

vi) Simulated Teaching

vii) Flanders interaction analysis;

viii) Team Teaching;

In nutshell, the basis of behavioral technology is psychology. Its main purpose is to develop affective domain of the personality by this technology specific teaching skills can be develop. We can study different types of classroom behaviour of teachers

and help us in providing required suggestions in the form of reinforcement and feedback. Training colleges can prepare better and effective teachers by bringing desirable changes in their behaviour with the use of this technology.

Check Your Progress - 2

Note : (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 Which one is not a a form of Educational Technology?

a) Teaching Technology

b) Instructional Technology

c) Behavioural Technology

d) Hardware Technology

Q2 What basic steps need to be followed while designing the instructional strategies.

a) The planning step

b) The implementation step

c) The evaluation step

d) All of the above

Q3 In the field of education, the concern of _____technology is to bring changes in the teacher behaviour.

a) Teaching Technology

b) Instructional Technology

c) Behavioural Technology

d) Hardware Technology

1.6 LET US SUM UP

ET has emerged as an innovative teaching-learning approach which provides for systematic combinations of human and non-human resource. It is an additional help to a teacher to achieve his goals more efficiently. A systematic way of evolving and applying machines and techniques to education can be termed as education technology. ET adds to the effectiveness of teaching-learning process and thus solves educational problems. ET, therefore, is more concerned with teaching-learning and deployment of human skills. ET has three main elements: goal oriented, systematic approach and optimum outputs.

ET has a number of advantages for teaching. It has improved the effectiveness and efficiency of education. ET has contributed to the development of distance education- print and non- print are being used to impart education to the masses. ET plays an important role in facilitating teaching –learning process and in achieving educational goals. ET and its three forms i.e. Behavioural / Instructional / Teaching Technology help in modernization of process of education. The scope of ET is very wide. It teaches i) Teacher- art of teaching; ii) Learner- Science of Teaching; iii) Educationist –Planning the structure of teaching- learning and iv) Manager - skill of administration and organization.

1.7. LESSON END EXERCISE

Q1 Define ET.

Q2 Mention three applications of ET.

Q3 List three characteristics of behavioral technology.

Q4 Who were the main contributors of instructional technology?

1.8 SUGGESTED FURTHER READINGS

Kulkarni, S.S. (1986). *Introduction to Educational Technology*. New Delhi : Oxford & IBH Pub.

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Sharma, R. A. (1987). *Technology of Teaching.* Meerut : R. Lal Book Depot.

1.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress - 1

Q1 NCERT

Q2 Brynmor Jones

Q3 Learning situation

Q4 C

Check Your Progress - 2

Q1 d

Q2 d

Q3 c

APPROACHES TO EDUCATIONAL TECHNOLOGY

LESSON NO 2 **UNIT-I**

Structure

2.1 INTRODUCTION

In the first lesson, we discussed and learnt about meaning, concept, need and scope of educational technology. Discussions carry out in analyzing the concept of educational technology (ET) helped us to conclude that 'Educational technology has a multifaceted concept.' It has led to view in terms of some approaches. Lumsedine (1964) has classified educational technology in three distinct approaches i.e. Hardware, Software and System approach .In this lesson, we will discuss in detail about these approaches.

2.2 OBJECTIVES

After going through this lesson, you shall be able to:

- enumerate the distinct approaches of ET,
- describe different types of approaches of ET,
- differentiate between different type of approaches,
- define multimedia approach, and
- discuss effectiveness of multimedia and mass media approach.

2.3 APPROCAHES TO EDUACTIONAL TECHNOLOGY

2.3.1 Hardware Approach

In one meaning ET refers to the application of engineering principles in the development of electro-mechanical equipments used for instructional process. This type of technology is known as hardware. In some books you may find this type of ET as Educational technology – I or Media. Beginning with simple audio – visual aids , as properly known in early 1960s , charts , slides , film- strips to the most sophisticated electronic gadgets such as radio, television ,computer, videotext, videodisc and so on fall in this type of ET. Even before that, technologies such as paper, ink and print, were invented based on the principles of physical science and subsequently were used for educational purposes. Use of media in education including teaching –learning and educational management, has revolutionized the educational system all over the world. These technologies constitute the supreme instrument of modern process of a country in general and the educational system in particular. There are three main contributions made by media in the educational sector.

(i) **Preservation of knowledge**: Modern electronic gadgets provide tremendous capabilities to preserve knowledge / information for future uses including print medium. Information can be preserved in the form of audio – video programmes, computer software, videodisc, etc., for use as and when required. As a result, it is hoped that in coming ten years the bulk of information would be preserved electromechanically which would be an asset for the future generations .For example, a videodisc is capable to preserve a complete set of encyclopedia.

(ii) **Transmission of knowledge**: Use of modern media in education has made it possible to reach and teach student in any part of the globe. Radio and television broadcasts can cater to a large number of students located at different parts of the country. Even the entire country can be covered simultaneously through radio or television networking system. Communication satellites have added to the effectiveness and efficiency of communication at a distance and made it possible to link more than one location and more than one group of students through two – way talkback system. Because of tremendous capabilities of various electronics media, it is possible to teach students at their home or work place as effectively as we teach in a classroom. This mode of education is now as distance education.

(iii) **Quality Education**: Because of advance planning and involvement of experts available in the area of study, meditated – teaching imparts quality education to unlimited number of students. In meditated – education we can use the expertise of the best teachers available in the area. Besides, educational system is being equipped with tremendous inputs to achieve objectives placed before it. For example, the topic such as oceanography, war operations, space science including launching of satellites, etc., can be taught more effectively through televised education in a classroom situation. Moreover, computers are being used these days for various purposes: teaching, learning, and analysis and interpretation of data. It is found that analysis of data through computers is more reliable, dependable and time saving.

2.3.2 Software Approach

ET is more than machines .It is a process and a way of thinking about a problem. Substantial contribution of social sciences, specifically principles of psychology, operant conditioning of Skinner, etc., contributed a lot in the development of ET. This type of technology is concerned with designing the conditions for learning and different modes of teaching to accomplish pre-defined objectives. Thus technology of education refers to the detailed application of psychology of learning

to practical teaching problems. This is based on the assumption that the psychology of learning includes /brings about all forms of relatively permanent changes in behavior which result from experience, including, the experience of the student in school (De Cecco & Crowford, 1977). In this type of technology, our emphasis is on the scientific way of teaching, designing, structuring and implementing teaching to achieve well defined objectives. As a result, a greater diversity of strategies is being used to meet diverse needs and learning styles of students. This type of technology is known as software or programmed instruction. Some educationists have termed it as Educational Technology – II. We, as educational technologists, are, therefore, concerned with planning and production of learning materials with clear-cut behavioral objectives, presentation scheme and evaluation technique. Technology of education will tell us such innovative techniques.

The two meanings of ET discussed are two sides of a coin and supplement each other in the assigned functions. Technology in education gave us a number of devices (media) with tremendous capabilities to facilitate the learning process of a given group of students. Technology of education suggests us the best way to use those media to accomplish specific objectives.

The important functions of educational technologists are to make specific use of these technologies – printing press, radio, television, computer, videodisc, etc., i.e. technologies in education, for teaching – learning activities. These functions are performed through systematic analysis of learning situations, selection of techniques and media, preparing instructional materials arranging feedback and planning of classroom environment to promote learning i.e. Technology of education (Kulkarni 1986) .The above mentioned functions are carried out by programmed instruction also. Therefore, programmed instruction is an example of technology of education. But remember, that programmed instruction is a part of ET not the whole of ET. Not only programmed instruction, the teacher in classroom also may carry these functions to make his teaching more effective in terms of change in students' behavior in a more economic and systematic way. Therefore, by implication, systematic teaching is a technology of education, which is based on theories of psychology- attitudes, perceptions, IQ, individual differences, learning etc. It is important to note here that

the principles of psychology are not ET, rather application of those principles to improve teaching - learning process is termed as ET.

2.3.3. System Approach

We have indirectly mentioned in the preceding sub –sections that educational technology absolutely refused to be confined to a single definition. We must note that in addition to machines, ET includes process management, control mechanisms both human and non-human, the attitude- a way of looking at problems as to their interest and difficulty, the feasibility of solution and the economic values (Bhatt and Sharma 1992). Educationists call these types of technology- Educational Technology-lll or operating System or Management Technology. The concept system refers to a dynamic order of parts and process in mutual interaction. A classroom, for instance, is a system of bigger system, namely school. All the system has goals in accordance with the overall goal of the bigger system. The term system approach refers to the method of performing tasks i.e. a systematic way to design, carry out and evaluate the total process of education to meet the pre-fixed objectives set before the education. A system approach can also be defined as a persistent and standardized way of doing something, teaching-learning activities in this reference. By persistent, we mean that the method is used not simply on one occasion but is used over and over so that it becomes a routine practice. By standardized, we mean that its basic feature do not change from one situation to another, instead, remain essentially the same over time (we do not oppose here the flexibility in the system to accommodate situational factors).

The system approach is based on the assumption that teaching is a science – a professional activity aimed at to achieve certain educational objectives.

In organizing teaching as a system, we combine the application of psychology of learning with electro-mechanical engineering to produce the desired results. Systems approach in teaching includes the following steps (Kulkarni, 1986):

- ❖ Defining the boundaries of the whole system and its environment/subsystem.
- ❖ Defining the objectives

- ❖ Determining the structure and relationships among the sub-system of the system.
- ❖ Defining the system management and mode of operation – including media of delivery, classroom management and evaluation procedures.

  Systems approach is a broad concept. It includes everything that contributes to meet the objectives or solve the problems. It encompasses school buildings, administration, management, finance etc. But our main concern in this course is with teaching-learning systems: principles of teaching and learning, teaching norms, behavior modification, etc.

2.3.4. Multimedia and Mass Media Approach

From the above discussion, we understood that Educational Technology, the science and technology of teaching and learning, has devised various technology, strategies and approaches for both the teachers and learners to achieve their teaching-learning objectives. The use of multimedia approach represents one of such strategies and approach to improve the process and products of teaching-learning.

We should clearly understand here that no medium is superior or inferior to one another. Every medium has its potentials and limitations. Their effectiveness depends on the nature of objectives to be achieved. Access to the medium, nature of content and objectives, and the students, etc. are main considerations that decide the selection and use of particular medium. Depending on the educational capabilities of media, two or more media can be combined to achieve more complex objectives. Such an approach is known as multi- media approach.

Experiments and researches in the field of teaching-learning have established that teaching-learning is the best organized and facilitated through the use of multimedia. Now question arises what this approach is and what we understand by the word multimedia and mass media?

In the following subsection we will learn about this approach.

Multimedia: - The word Multimedia consist of two words Multi means many and Media (Two or more media combined to provide information about a subject or concept). So, Multimedia is an important component of I.C.T. can be described as

two or more media combined to provide information about a subject or concept with the help of computer.

Multimedia is an offshoot of computer technology. This technology made its headway in India in mid-seventies. Initially, there was a feeling among the people that the multimedia being an important luxury from the west, did not contribute to the teaching-learning process. But with the passage of time, it is now established that multimedia based learning approach is of utmost benefit to all the stake holders, not only in enhancing the academic achievement but also in making learning environment, lively, joyful and enriching.

Multimedia has been defined by writers in many ways such as

- ❖ It is defined as a system which exploits the computer to combine its different elements i.e. text, graphics, animation, audio and video into a single synchronized production and presentation. In brief, a combination of multiple media types including text, graphics, animation, audio and video is called multimedia.

  Multimedia encompasses a wide spectrum of applications and technology. In teaching-learning, the term multimedia may be referred to use of "multiple media" or "combination of media" in such a way as to help the learner in achieving predetermined teaching-learning objectives in an effective way.

Elements of Multimedia

Text, graphics, audio, video and animation are the elements of multimedia.

i. Text used in multimedia may be Title texts, Body texts, Menu and Miscellaneous text.

ii. Audio which play a vital role in multimedia is put in the form of natural sounds, music, dialogues and narration.

iii. Video- A video clip is a sequence of images that are displayed rapidly to give the impression of movement.

iv. Animation literally means to bring something to life. It may be two dimensional such as cartoons or three dimensional such as Computer Aided Design (C.A.D.).

v. Graphics – It plays major role in multimedia application. An image is a still picture or photograph used for adding visual effects to the multimedia.

Types of Multimedia

There are two types:

i. Linear

ii. Non-Linear

i. Linear media: It is general in nature. In this, the end user receives a program, which plays a sequence of sound, video and images without any control over the presentations content.

ii. Non-Linear: In this, the end user controls the sequence by selecting different options. That is why it is also called "Interactive Multimedia".

Interactive multimedia if properly developed and properly implemented could revolutionize education (Menn, 1993). According to Menn, 1993, as humans, we seem hard wired for the multiple inputs. We remember only 10% of what we read ; 20% if we hear it; 30% if we can see visuals related to what we are hearing; 50% if we watch someone doing something while explaining it but almost 90% if we do the job ourselves – if only as a simulation.

Benefits of Multimedia Approach

This approach has benefits for both the teacher and the learner in the classroom.

In classroom, the simplicity and power of multimedia enriches teacher's creativity and leads to multisensory students learning. It reaches all the senses and gives fodder to students to use their imagination. In other words, multimedia takes children beyond what they would be learning through Textbook.

Multimedia helps the learners in understanding the concept faster; creating their interest, increasing their participation in classroom activities; making classroom lively and in boosting their achievement. Since it has multisensory approach, which is very useful for children with special needs.

On the other hand, multimedia gives teachers a creative medium without requiring them to certified "techies" with modern user friendly computers, it is so easy to use multimedia that teachers don't even need a lot of technical training. Teachers can handle multimedia as a tool to reach a wide variety of learners.

Mass Media

Another approach which can be used for effective teaching-learning is Mass Media. As the name suggest- approach through which large number of learners can be benefitted at a time or receive any given information. Popular Mass Media are Print, Radio and Television. They broke the four walls of school and reach simultaneously to unlimited number of students. Combined with print medium, these media could make it possible to import education at a distance that has revolutionized the educational system all over the world. Communication satellites of course, added to the effectiveness and efficiency. Beside wide reach, satellite introduced two-way educational communication by linking simultaneously more than one location and catering to more than one group of students.

The most popular, economical and powerful mass media even in the age of computer and satellite communication is print based material. i. e Print Media. The educators still depend on the printed text for teaching and learning both in face-to-face (f2f) and distance mode learning. The print media used in various forms includes newspaper, magazines, journals, handbooks, dictionaries, encyclopedias and self instructional study materials for distance learners.

As print material demands the skill of literacy, therefore, it is not a suitable media for illiterate people. To cope up with this difficulty, other media like Radio and Television can be used as an effective instrument in instructional technology and education system. Radio-one of the strongest means of Non-Print Mass Media, (presently used by our Prime Minister for 'MANN KI BAAT') can reach every corner of the country or even the entire globe instantaneously. It caters to the people of

different ages and levels of maturity ranging from a primary school child to his grandfather. It can help the students in their learning by developing their command over vocabulary, stimulate their interest, promote concentration and critical listening, and improve fluency and confidence in speech and discussion.

Formal education through radio is imparted in two forms- through radio broadcast and audio cassettes. Both the forms are used in pedagogic transaction. In these days, radio is used for developmental education by our worthy Prime Minister. Under 'Mann ki baat' Prime Minister Mr.Narender Modi are transmitting broadcasts under developmental education which comprise programmes on agriculture, health and hygiene, social education, rural development programmes etc. The purpose through these broadcasts under development education is to sensitize people about their problems and motivate them to find a common solution.

So in brief, Radio as a mass media approach is capable of solving various problems in the field of education arising out of illiteracy shortage of man and material resource. By listening new words and sentences in the radio their thinking, knowledge and imagination grows. The main drawback of teaching-learning through radio is that it makes teaching-learning one way communication because of no face-to-face (F2F) interaction or discussion.

Television

Another strong mass media for spreading education is Television. It is considered as an effective medium for source of information and entertainment for a large number of people.

It helps both the teachers and students in the realization of teaching-learning objectives because television program have the potential of improving the process and products of learning as they are well planned and systematically presented than the usual classroom instruction. Another major advantage of this medium is that it makes educational opportunities equal throughout the country whether students living in the remote rural and deprived areas of the country. They get the same quality of education as their counterparts getting in urban areas. Being a combination of both the audio as well as video it has greater appeal than the radio and print media.

Like Radio, it is also one way communication so lacks active participation on the part of the learners because of no interaction and discussion.

For the widely scattered student population another type of media can be used like teleconferencing which may be audio/ video/ computer but this require highly sophisticated technology and expert human power.

Check Your Progress - 2

Note : (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 In the educational sector, main contributions made by media are

a) Preservation of knowledge

b) Transmission of knowledge

c) Quality Education

d) All of the above

Q2 Which one is not the element of multimedia?

a) Text

b) Charts

c) Audio-Video

d) Graphics / animation

Q3 Popular Mass Media are

a) Print

b) Radio

c) T.V.

d) All of the above

Q4 Which mass media makes teaching learning one way communication?

a) Radio

b) Television

c) Both a and b

d) Only Radio

2.4 LET US SUM UP

ET has emerged as an innovative teaching-learning approach which provides for systematic combinations of human and non human resources. It is an additional help to a teacher to achieve his/her goal mere efficiently. By ET, we mean Hardware, Software, System Approach and Multimedia to Mass media approach.

Hardware refers to the application of the principle of physical science i.e. which can preserve and transmit knowledge to a large number of students through Radio, television, computer etc. Software refers to the application of social sciences, particularly theories of Psychology. The third meaning of ET refers to design, carry-out and evaluate the total process of education to meet the pre-fixed objectives. Another approach i. e. multimedia and mass media offer the different types of media to reach large number of learners both living in urban as well as in remote and in accessible areas. This multimedia and mass media approach helps in removing disparity in educational facilities and provide individualized instruction to learners, conveniently suited to their needs and pace of learning.

2.5 LESSON END EXERCISE

Q1. Describe hardware approach of ET.

Q2. How software approach is different from hardware approach?

Q3. Name different elements of Multimedia.

Q4. Define multimedia

Q5. List two advantages of radio as a source of mass media for instructional purpose.

Q6. Why we call "Television" as a medium of one way communication?

2.6 SUGGESTED FURTHER READINGS

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2.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress - 1

Q1 d

Q2 b

Q3 d

Q4 c

TEACHING AND ITS RELATIONSHIP WITH OTHER CONCEPTS

LESSON NO 3 **UNIT- I**

Structure

3.1 INTRODUCTION

In the last two lessons of this unit- I, we have learnt about Meaning, Concept of Educational Technology, Forms & Approaches to Educational Technology. In this third lesson of this unit, we will focus on Meaning, Concept of teaching and its relation with other similar related concepts-Conditioning, Training, Instruction and Indoctrination.

Education is a complex concept and refers to both- a product as well as a process. Education as a product is viewed as the sum total of what is received through learning that is acquisition of knowledge, skills, attitudes and values, transmission of culture, development of personality and self-actualization. As a process, education involves the act of developing these products in someone else or in it. One of the important activities of the educational process is teaching which includes training, instruction and development of cognitive processes and abilities. We will learn in this unit about teaching and its relation with other related concepts i.e. conditioning, training, instruction and indoctrination.

3.2 OBJECTIVES

After going through this lesson, you shall be able to:

- explain teaching in the context of classroom instruction process,
- discuss different modes of teaching,
- distinguish teaching with conditioning, training, instruction and indoctrination, and
- explain different modes of teaching.

3.3 CONCEPT OF TEACHING

3.3.1 Definitions

The word teaching has innumerous meaning. For a layman teaching may mean coaching systematically done at a fixed time, by fixed person and at a fixed place. Idealists may consider teaching a 'process of self-realization'.On the other side pragmatist may view it as a manipulation of the situation where the learners get lot of opportunities of acquiring skills and insights with his /her own initiatives. Learning theorists may consider it as an act of causing association between stimulus and response.

Teaching is essentially an interactive process. In this process, there is an interaction between the teacher, learner and the learning material. It is a contrived process that involves several activities, the students participate in, which are necessarily 'interactive' in nature that is, both the teacher and the

student interact in a specified manner. Here, teacher deals with the learners in various forms—Let us see how-teacher presents an idea, sets a task, poses a question, guides, explains, describes, demonstrates, reads and so on. Similarly, students participate in the activities individually and collectively. They listen, obey, answer, question, discuss, write, read, share and so on. In all these activities, the nature of students' participation is different but students are interacting with some persons or things or both (NCTE, 2003). Thus teaching is a system of activities which are likely to result in learning. The concept of teaching is not very simple. It is a quite complex, social, cultural and ethical process designed in a social and cultural context.

By all means and in any shape, it is always designed in social context and therefore, related with social structures, cultural environment, values and ideals of the people, society and the government. All these factors always stand for dynamicity and therefore, the meaning and definitions of teaching have always been in a state of change depending upon the need of time, place and society. It has resulted into various definitions of the term teaching, each is based upon different theory of teaching.

Teaching is a term used by many people in different ways in different situations. Let us try to understand the concept of teaching by analysing the various definitions of the term teaching and studying its relationship with other related terms.

Let us study carefully some definitions of teaching

H.C. Morrison (1934) - 'Teaching: intimate contact between a more mature personality and a less mature one, which is designed to further the education of the latter'.

J. Brubacher (1939) –'Teaching: arrangement and manipulation of a situation in which there are gaps and obstructions which an individual will seek to overcome and from which he will learn in the course of doing so'.

M. M. Hughes (1963) -'A description of teaching as it was in progress in the classroom could be secured by defining teaching as interaction. Interaction is used in its dictionary sense of mutual or reciprocal action or influence'.

N. L. Gage (1963) – 'Teaching is an act of interpersonal influence aimed at changing the ways in which other persons can or will behave.'

Thomas F. Green (1971) – 'Teaching is an instance of human action aimed at enhancing the human capacity for action.'

Philosophical Analysis of Teaching- Teaching is a triangular process, in which three interconnected poles are teacher, student and the subject matter. These three poles are organised in a systematic way to attain some pre-determined goals.

From the above definitions, it can be concluded that teaching is a task of teacher which is done for the development of child.

Thus you must have seen how varied viewpoints exist on the concept of teaching. Teaching has always been considered as study of both art as well as science. As an art, it emphasises the imaginative and artistic abilities of the teacher in creating a worthwhile situation in the classroom, in which the learners understand and learn the immediate and ultimate goals of education. As a study of science, it focuses on the logical, mechanical and procedural steps to be followed to attain an effective accomplishment of goals. However, this scientific definition of teaching has led to the evolution of a new concept of teaching which is popularly known as teaching technology. Deviset. al (1962), Gagne et.al (1974) and Gage (1978) have contributed significantly in defining this concept and their views could be summerised as follows:

i) Teaching is a scientific process and its major components are content, communication and feedback;

ii) Teaching strategy has positive effect on student learning;

iii) It is always possible to modify, improve and develop the new teaching activities and hence the flexibility is in built into the system; and

iv) The terminal behaviour of the learner in terms of learning structures can be established by appropriate teaching environments.

To understand the definition of teaching in the operational context, let us examine the definition given by Davis and Glaser (1962). While giving the definition of teaching, they have pointed out that the entire structure of teaching has four steps:

Step I: Planning of teaching which includes content analysis, identification of objectives and writing those in behavioural terms.

Step II: Organisation of teaching which indicates the teaching strategies for achieving the objectives of teaching.

Step III : Identification of suitable teaching-learning strategies.

Step IV: Managing teaching-learning, whereby the focus is placed on the assessment of the learning objectives in terms of student performance and this forms the feedback to teacher and students.

We have learned from the above discussion, teaching is a planned and organised activity to achieve the broader goals of classroom interaction process.

According to **NCTE (2003) :**Two ends of this continuum are:-

i) Teaching is human engineering and soul doctoring.

ii) Teaching refers to the multiple tasks carried out by teacher for leading the learners to the expected learning.

If we analyse these two statements we found that the first statement suggests that teaching is both technical and noble. The term 'human engineering' has an implicit meaning of the possibility of modifying and constructing human behaviour in intended ways on the basis of certain technical procedures. The term 'Soul doctoring', on the other hand puts it on an altogether different plane. Teaching deals with the inner spirit or soul of the individual to ensure its nurturing. The second statement on the other hand, has teacher in focus. Teacher performs several activities in the classroom for the sake of learners in order to lead them to intended learning. That is, the teacher 'knows' or decides what learners must learn as well as the needed tasks to lead them to it.

On the basis of the descriptions of teaching given above by different researchers, it can be said that on the whole, teaching is an interactive process between the teachers and students, under certain conditions for facilitating effective construction of knowledge by students.

If we try to evaluate the definitions quoted so far, none of the definition is said to be a comprehensive and functional of the term teaching. I would appreciate if you could build on your own definition of teaching by taking cues from the definitions suggested above.

Teaching is divided into three phases- pre-active, interactive and post-active. Memory, Understanding and Reflective are three levels of teaching. In addition to the above, there are four modes of teaching i. e. conditioning, training, instruction and indoctrination. Conditioning and training are considered lower levels of teaching while instruction and indoctrination are considered higher level of teaching. About these modes, we will learn in detail in the next subsection.

3.3.2 Nature and characteristics of Teaching

On the basis of the above definitions of teaching. Let us discuss a few characteristics:

- Teaching is an interactive process which is carried out for the attainment of some specific purposes and intended objectives.
- Teaching is both art as well as science.
- Teaching is purposive and leads to intended learning. It is created and is not something that occurs naturally.
- Teaching may have various forms like conditioning, formal training/informal training, instruction and indoctrination.
- Teaching is a tri-polar process whose three poles are educational objectives, (learning experiences related to three domains cognitive, affective and psychomotor domain and change in behaviour), teachers and students.
- Teaching is dominated by communication skill.

- Teaching is a professional activity involving the teacher, the student and results in the development of the student.
- Interaction carried out by the teacher during the teaching is amenable to scientific observation and analysis. Through observations, quality of communication carried out by teacher can be analysed.

3.4 RELATION OF TEACHING WITH RELATED CONCEPTS

As already discussed, teaching has four modes- Conditioning, training, instruction and indoctrination. Sometimes they are mistaken as synonymous with teaching, in the following sub sections; we will try to evaluate their relationships. In fact, teaching is a broader concept and each of these terms is a part of aspect of this larger concept.

Teaching has four modes of behaviour. It means that teaching is a continuum for developing behaviour to the formation of beliefs. Thus, teaching is a continuum from conditioning to indoctrination. It starts from conditioning and reaches up to indoctrination.

3.4.1 Teaching and Conditioning

Conditioning is the lowest level of teaching which refers to shaping of behaviour and habits. It refers to teaching someone to do. Its main objective is formation of habit. It relates to psychomotor domain. The nature of conditioning is concerned with memorisation e.g. teaching alphabets to small children. Similarly many of the animals and human beings may be taught to responds to signals, alarms, signs and warning through conditioning.

3.4.2 Teaching and Training

Training is a mode of teaching which refers to shaping a conduct and skills. It is concerned with a little more raised level of teaching that is conditioning. It also does not go beyond the psychomotor domain and considered to be thoughtless level of learning. A person or a worker may be trained to perform certain tasks requiring very specific skills. For example, xeroxing the paper from xeroxing machine. He may do xeroxing skillfully without knowing the basic structure and operation of xeroxing machine. Similarly, animals may

also be trained to perform highly specific tasks for the circus show. Here both-worker and circus animals are being taught through a particular mode of teaching i.e. training. Teaching implies the high degree of intelligence. Training is related to conditioning.

3.4.3 Teaching and Instruction

Instruction is a mode of teaching which refers to communication of knowledge. It is mainly concerned with the development of knowledge and understanding in an individual about a thing, system or process. Training may be pre-requisite for instruction.So in nutshell, purpose of instruction is to transmit knowledge and objective is formation of knowledge. It is concerned with cognitive domain as conative and affective domains are badly neglected in instruction.

In instruction, teacher can be replaced by programmed material, computer machine, radio, television, video and tape recorder. In this mode, pupil's abilities, interest, aptitudes, developmental level and other potentialities are ignored. Readymade knowledge is forced into their minds. Instructions are generally imported in face to face interaction through lecture and notes giving method. Here cramming is encouraged. Instructions are formed, planned and deliberate.

3.4.4 Teaching and Indoctrination

Indoctrination is a kind of teaching which refers to formation or shaping of beliefs. It require highers level of intelligence and results in bringing quite stable changes in the cognitive and affective domain of one's behaviour. So its purpose is to shape beliefs and objective is related with formation of values, attitudes and beliefs.

Indoctrination means education by authority, imposition, strict discipline and controlled instruction. Authoritarianism is the hallmark of indoctrination. It is one sided with the sole purpose of forcing information, ideas and practices from outside as part of education. Pupil's initiatives, freedom and curiosity are generally killed when freedom to learn by pupil himself is snatched.

Lecture method is emphasised. Learning takes place at reflective level as it is higher level of teaching.

Check Your Progress - 1

Note : (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 Teaching is a scientific process and its major components are content, _____ and _____.

Q2 Teaching is both _____as well as _____.

Q3 Teaching is dominated by _____skills.

Q4 _____ is the lowest level of teaching.

Q5 _____is a mode of teaching which refers to shaping a conduct and skills.

Q6 _____is the hallmark of indoctrination.

3.5 LET US SUM UP

Teaching is a process to bring a planned change in the behaviour of an individual or a group of individuals through a set of activities performed by teacher, sometimes by learners also, to achieve predetermined objectives of education. Teaching is a professional activity that helps to bring about harmonious development of children. There are three phases of teaching i. e. pre-active, interactive and post-active. It can be carried out at three levels-memory, understanding and reflective. It has four modes of teaching-conditioning and training considered to be lower level of teaching while instruction & indoctrination are at higher level of teaching. So teaching is a continuum for developing behaviour to the formation of beliefs.

3.6 LESSON END EXERCISE

1. Define teaching.
2. Why teaching is considered both art as well as science?
3. List five characteristics of teaching.
4. What are the four modes of teaching?

3.7 SUGGESTED FURTHER READINGS

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3.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress - 2

1. Communication, Feedback
2. Art, Science
3. Communication
4. Conditioning
5. Training
6. Indoctrination

SYSTEM APPROACH IN EDUCATION

LESSON NO 4 **UNIT-II**

Structure

4.1 INTRODUCTION

System approach has been introduced in the field of education to manage, control and improve the process of education. The system approach to the design and analysis of teaching-learning situations is the basis of the great majority of modern educational technology-related developments.

Systems approach makes it possible to analyse teaching-learning situations for the purpose of taking decisions. The development of systems analysis make it possible to take all the components of a system into consideration, understand their inter-relationships, perceive alternative solutions and fore see their impact, and make adjustments when needed through constantly checking results. The most basic concept of this approach is that no one element exists in a vacuum, but that each always relates to other components of the system. Thus, if one element is altered, the relationships between it and the other factors are potentially affected.

In this lesson, lets discuss a systematic approach to teaching. The systematic approach to teaching provides a method for the functional organization and development of instruction. This method applies to preparation of materials for classrooms use. Visual illustrating the concepts are included. The system approach views the entire educational program as a system of interrelated parts. Systems approach is a management tool that allows individuals to examine all aspects of the organization, to inter relate the effects of one set of decisions to another and to optimally use all the resources at hand to solve the problem.

4.2 OBJECTIVES

After going through this lesson, you shall be able to:

- define the system approach,
- explain the process of system approach,
- explain the components of system approach,
- explain the task analysis, content analysis and context analysis with suitable examples, and
- discuss the evaluation strategies of system approach

4.3 SYSTEM APPROACH

The education system, which was once very easy, today has become very complex. System approach has been introduced in the field of education to manage, control and improve the process and products of education.

System Approach as applied to Instruction is a "rational problem solving method of analyzing the educational process taken as a whole, incorporating all of its parts and aspects, including the students and teachers, the curriculum content, the instructional material, the instructional strategy, the physical environment and the evaluation of the instructional objectives".

According to Bertalanfly "The systems approach involves a consideration of alternative solutions and of choosing those promising optimizations at maximum efficiency and minimal cost in a complex network of interactions."

According to Dearden "The systems approach is nothing more or less than what a competent, smart, adequate business executive adopts in the ordinary conduct of his business."

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

In the systems approach to instruction, the teacher has to plan completely the utilization of selected resource material and the classroom activities. 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 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 modify the plan of approach to achieve the stated objectives.

4.3.1 Steps in the Systems Approach in Education are:

1. Formulating of specific instructional objectives to be achieved and defining instructional goals,
2. Deciding appropriate media to achieve these goals,
3. Defining learner characteristics and requirements,

4. Selecting appropriate methods suitable for effective learning to take place,
5. Selecting appropriate learning experiences from available alternatives,
6. Selecting appropriate materials and tools required,
7. Assigning appropriate personal roles for teachers, students and supporting staff,
8. Implementing the programme,
9. Evaluating the outcome in terms of original objectives measured in student performance,
10. Revising to improve efficiency of the system to improve student's learning.

4.3.2 Role of Teacher in System Approach

- Thoroughly assess the input of the system.
- Gather as much data as possible about the subject matter.
- Think of alternative processes for achieving his/her objectives.
- Analyses his/her objectives into a well-defined learning task.
- Make discussions regarding processes and components based on the best means of furthering the purposes.
- Activates the system by putting the plan to action.
- Gather feedback data accordingly and systematically.
- Modifies the system's component and processes based on the feedback.
- Assesses the effectiveness of the system by comparing the output with the inputs.
- Modifies the system based on all resources of feedback.

4.4 COMPONENTS OF SYSTEM APPROACH

Components of system approach are:

Input : Input refers applied to what is put into a system :

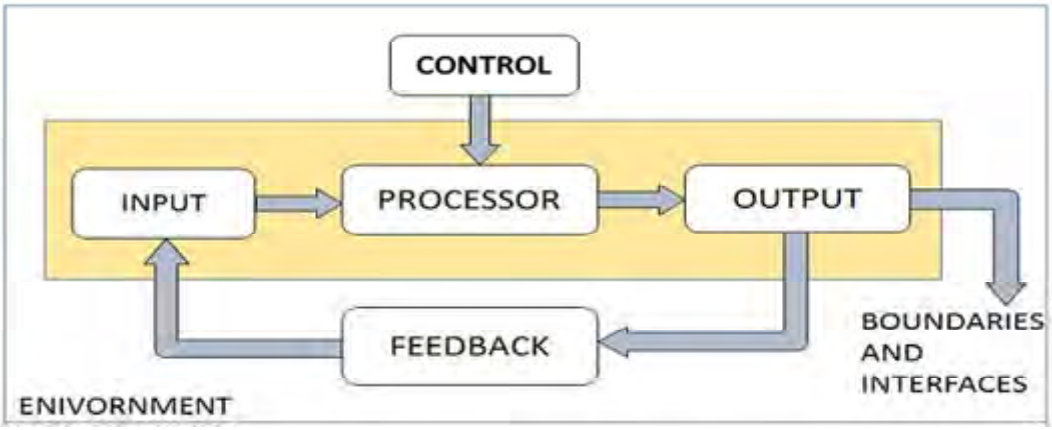
a) Student b) Teacher c) Administration d) Curriculum e) Instructional material f) Job opportunity g) Rural and urban local institute h) Hostel facility

Process : Process refers to what goes on in a system :

a) Curriculum b) Institute c) Facility d) Teachers

Output : Output is the product of a system. Monitored output which is used to revise, improve and evaluate.

Analysis and Feedback : Monitored environment provides feedback to the learner and teacher. A system operates in a physical and social environment. A system cannot operates beyond the limits and boundaries of its environment context and constraints.



4.4.1 Advantages of system approach

- System approach provides a framework on which the plans for implementing changes in education can be built.
- It assist in identifying the suitability or otherwise of the resource material to achieve the specific goal.
- It helps in assessing the resource needs, their sources and facilities in relation to quantities, time and other factors.
- It assists in making use of technological advance to provide integration of machines, media and people for attaining the defined goals.

- It permits an orderly introduction of components required to be demonstrated for system's success in terms of student learning.

Check Your Progress-1

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q)1. System approach includes

a) Input b) Output

c) Both (a) and (b) d) None of the above

Q)2. Evaluating effectiveness in achieving the objectives of system approach involves

a) Applying criterion test to determine how students have fared

b) Determining which objectives have been achieved

c) Determining broad aims of the course

d) All the above

Q)3. A teacher in a system approach first does the following

a) Analysis the objectives into well defined learning task

b) Activates the system by putting the plan into action

c) Both (i) and (ii)

d) None of above

4.5 TASK ANALYSIS, CONTENT ANALYSIS AND CONTEXT ANALYSIS

4.5.1 Task Analysis

I. K. Davies has given this concept of "Task analysis". Task analysis is the process of breaking a skill into smaller, more manageable steps in order to teach the skill. As

the smaller steps are mastered, the learner becomes increasingly independent in his or her ability to perform the larger skill.

Types of Task Analysis : There are several types of task analysis but among the most common techniques used are:

a) Cognitive Task Analysis : It is focused on understanding tasks that require decision-making, problem-solving, memory, attention and judgement.

b) Hierarchical Task Analysis : It is focused on decomposing a high-level task subtasks.

Approaches to task analysis:

a) Task decomposition

- splitting task into (ordered) subtasks

b) Knowledge based techniques

- what the user knows about the task
- and how it is organized

c) Entity or object based analysis

- relationships between objects, actions and the people who perform them

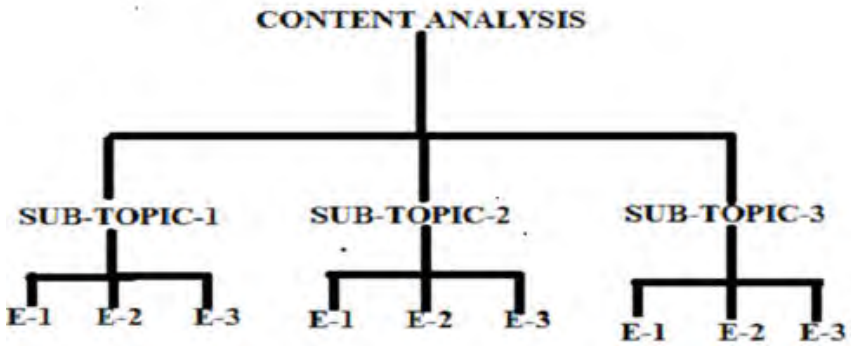
d) Lots of different notations or techniques

Use task analysis to help your students stay organized. Telling your class to "clean up" after art class, snack time or recess is too vague and doesn't clearly explain what you want them to do. Break the job into smaller components, such as "Throw your paper scraps away and rinse out your paint brushes.

Content Analysis

Content Analysis is a process by which teacher make the teaching content easy for the students. For good content analysis a teacher needs some basic things such as teaching material, teaching method, teaching aid etc.

According to I.K. Davies " Content analysis is the analysis of topic or content units are to be taught, into its constituents and elements and arrange them in a logical sequence". This has been illustrated with the help of a chart:-



Sources of Content Analysis

The following sources are essential for content analysis:-

a) Study of standard of text- books

b) Considering the needs of the learners

c) Keeping in view the objectives of teaching-learning

d) Considering the examination system

f) Use of teaching aids

g) Teacher's own skills of teaching

Context Analysis

The performance and learning contexts were analyzed by thinking about the resources available in the classroom and then thinking about the classroom set up and the students' preferred way of learning. The learning context's physical characteristics are simple as well, since learning will take place in the classroom.

The main difference between context and content is that content refers to the topics or matter treated in a work, particularly a written work whereas context refers to the components of a text that surround a word or passage and help the reader to understand its meaning.

Context can refer to a circumstance that shape the setting for an event, idea or statement and in terms of which it can be fully understood. For example, the term historical context refers to the period time in which something took place or was created. If we are looking at a past custom or practice, we cannot understand it properly without looking at the historical context.

The purpose of a context analysis (sometimes referred to as a situational analysis) is to ensure an initiative is informed by all of the contextual factors that might affect its implementation and sustainability. The context analysis should be completed at the first stage of the planning process.

Check Your Progress-2

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q) 1. The concept of task analysis is given by

a) Hanna b) Dearden

c) I. K. Davies d) None of the above

Q) 2. Types of task analysis are

a) Cognitive task analysis b) Hierarchical task analysis

c) Both(a) and (b) d) None of these

Q) 3. Sources of content analysis are

a) Examination system b) Needs of the students

c) Text books d) All the above

4.6 EVALUATION STRATEGIES

In education how much a child has succeeded in his aim, can only be determined through evaluation. Thus, there is a close relationship between evaluation and aims. Evaluation plays an enormous role in the teaching-learning process. It helps teachers and learners to improve teaching and learning. Evaluation is a continuous process and a periodic exercise.

According to Quillen & Hanna "Evaluation is the process of gathering & interpreting evidence on changes in the behaviour of the students as they progress through school".

Evaluation is concerned with assessing the effectiveness of teaching, teaching strategies, methods and techniques. It provides feedback to the teachers about their teaching and the learners about their learning.

4.6.1 Types of Evaluation

1. Formative Evaluation 2. Summative evaluation

1) Formative Evaluation : It refers to evaluation taking place during the program or learning activity. It is conducted while the event to be evaluated is occurring and focuses on identifying the progress towards purposes, objectives, or outcomes to improve the activities, course, curriculum, program or teaching and student. For example, in an educational setting, a teacher may ask the students to write a short note reflecting on the topic just presented. The teacher can look at these reflections to determine if the students are understanding the material and make changes in their instruction to help students as they progress in the classroom.

2) Summative Evaluation : A summative evaluation (sometimes referred to as external) is a method of judging the worth of a program at the end of the program activities (summation). The focus is on the outcome. Summative assessment usually involves students receiving a grade that indicates their level of performance, be it a percentage, pass/fail, or some other form of scale grade. Summative assessments are weighted more than formative assessments. For example-test after 6 months in schools, semester exams in B. Ed after each 6 months.

4.6.2 Evaluation Techniques

1. Subjective: Subjective tests aim to assess areas of students' performance that are complex and qualitative, using questioning which may have more than one correct answer or more ways to express it. Subjective test include the following items:

a) Short answer: Short-answer questions are open-ended questions that require students to create an answer. They are commonly used in examinations to assess the

basic knowledge and understanding (low cognitive levels) of a topic before more in-depth assessment questions are asked on the topic.

b) Essay test: Essay test is a test that requires the student to structure a rather long written response up to several paragraphs. Essay tests are classified into two types:

i) Extended response: These are responses to essay questions in which the examinee is only restricted by time as no bound is placed as regards the in-depth, breadth and the organization of the response.

ii) Restricted response: In this type, the questions are so structured that the students are limited, the scope of the response is defined and restricted. The answers given are to some extent controlled.

2. Objective: Objective test is generally call for single words, phrases, numbers, letter and other symbols as response to items. Objective tests are classified into two types:

i) Selected Response Format (Selection type):

- True or False
- Matching Type
- Multiple Choice

ii) Constructed Response Format(Supply type):

- Enumeration
- Labeling
- Identification
- Completion type
- Simple Recall

Check Your Progress-3

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q) 1. According to Quillen & Hanna "Evaluation is the process of ____ and ____evidence on changes in the behaviour of the students as they progress through school".

Q) 2. Types of evaluation are

a) Formative evaluation b) Summative evaluation

c) Both (a) and (b) d) None of these

Q) 3. Objective type tests are

a) Selection type b) Essay type

c) Supply type d) Both (a) and (c)

Q) 4. Restricted responses are

a) Unstructured b) Structured

c) Both (a) and (b) c) None

4.7 LET US SUM UP

From the above discussion, it is understood that system approach is a systematic attempt to coordinate all aspects of a problem towards specific objectives. In education, this means planned and organised use of all available learning resources, including audio-visual media, to achieve the desirable learning objectives by the most efficient means possible. System Approach is beneficial in efficient learning, improving quality of education and to maintain control but it is complex. So we have to find ways to make this approach handy.

4.8 LESSON END EXERCISE

Short Answer Type Question

Q) 1. Define system approach.

Q) 2. Discuss the advantages of formative evaluation.

Q) 3. Give some examples of objective type test.

Q) 4. Compare content analysis and context analysis.

Essay Type Questions

Q) 1. Explain the meaning of evaluation along with its types.

Q) 2. Explain content analysis with suitable example.

Q) 3. Compare subjective and objective type of evaluation technique.

4.9 SUGGESTED FURTHER READINGS

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4.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress-1

Q1. c Q2. d Q3. c

Check Your Progress-2

Q1. c Q2. c Q3. d

Check Your Progress-3

Q1. Gathering, interpreting Q2. c Q3. d Q4. c

PROGRAMMED LEARNING

LESSON NO 5 **UNIT-II**

Structure

5.1 INTRODUCTION

Programmed learning is one of the important innovation of the 20th century in the teaching-learning process. Programmed instruction or programmed learning is one of the important innovations in the teaching learning process. Programmed learning is a carefully specified, systematically planned and effectively controlled self-instructional technique for providing individualized instruction to the learner. The subject matter or learning experience is logically sequenced into small segments. The learning experience is self-corrective. It is an application of the principles of behavioral sciences and technology in the field of education. Programmed learning emerged in the beginning of the 20th century from the efforts of American psychologists. E.L. Thorndike was the first psychologist whose findings bear direct relevance to programming. Other important psychologists who have made significant contribution in the field are, Sidney L. Pressy, Robert M. Gagne, Robert Mager and B.F. Skinner.

5.2 OBJECTIVES

After going through this lesson, you shall be able to:

- define the concept of programmed learning,
- explain the principles of programmed learning,
- explain types of programmed learning,
- discuss the concept of linear programming with suitable examples, and
- discuss the concept of branching programming with suitable examples

5.3 CONCEPT OF PROGRAMMED LEARNING

Programmed learning is a research-based system which helps learners work successfully. The method is guided by research done by a variety of applied psychologists and educators. The learning material is in a kind of textbook or teaching machine or computer.

Programmed learning is a part of educational technology. It is a strategy of teaching and learning and self-instructional texts. Programmed learning is different from teaching machines and devices. Programmed learning is a process of constructing sequences of instructional material in a way that the rate and depth of learning are maximized, understanding is fostered and the motivation of the student is enhanced.

Programmed learning is based on behaviouristic principles of psychology. A fair amount of stress is laid on the examination and development of understanding through the handling of various cues in the learning process.

According to Smith and Moore "Programmed instruction is the process of arranging the material to be learned into a series of sequential steps that is from known to unknown".

According to Susan Markle "Programmed learning is a method of designing a reproducible sequence of instructional events to produce a measurable and consistent effect on behavior of each and every acceptable students".

5.3.1 Characteristics of Programmed Learning

- Individualized instruction
- Logical sequence of material (Small Steps)
- Interaction between the learner and the programme
- Immediate knowledge of results
- Organized nature of knowledge
- Learners own speed (Self Pacing)
- Constant evaluation

5.3.2 Objectives of Programmed Learning

- To help the students for learning by doing
- To provide the situation to learn at his/her own speed
- To help the student to learn without the presence of teacher
- To present the mater in a logical manner
- To study himself
- To evaluate himself
- To compare his/her answer with the key

5.4 TYPES OF PROGRAMMED LEARNING

Three basic types of programmed learning:-

1. Linear programming : The founder of linear programming is **B. F. Skinner**. Linear programming are exposed to small amount of information and proceed from one frame or one item of information, to the next in an orderly fashion.

2. Branching programming : The founder of Branching programming is **Norman A. Crowder.** In branching programming frame is larger; much information is presented at each step. A step may consist of two or more paragraphs and sometimes a full page.

3. Mathetics : The founder of Mathetics is **Thomas F. Gilbert**. 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".

Check Your Progress-1

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q) 1. Linear programming is given by

a) Norman A. Crowder b) B.F. Skinner

c) Thomas F. Gilbert d) All the above

Q) 2. Branching programming is given by

a) Norman A. Crowder b) B.F. Skinner

c) Thomas F. Gilbert d) None of these

Q)3 Mathetics is given by

a) Norman A. Crowder b) B.F. Skinner

c) Thomas F. Gilbert d) All the above

5.5 LINEAR PROGRAMMING

The founder of linear programming is **B. F. Skinner**. Linear programming style is related to "operant conditioning". Operant conditioning states that human behavior is shaped through suitable reinforcement to the responses. It tells that "A Certain direction can be given to human behavior", for this purpose activities is needed to divide in small parts and make their analysis. It is a gradual process and the responses are conditioned in a step by step manner.

A linear programme is called a straight line programme as the learner starts from his/her initial behaviour to the terminal behaviour following a straight line. The student proceeds from one frame to the next until he/she completes the programme.

5.5.1 Fundamental Principles of Linear Programming

Linear programming is based on five fundamental principles-

1. Principle of small steps

2. Principle of active responding

3. Principle of immediate confirmation

4. Principle of self-pacing

5. Principle of student testing

5.5.2 Characteristics of Linear Programming

1. Linear Programming are exposed to a small amount of information and proceed from one frame or one item of information to the next in an orderly fashion.

2. The learners respond overtly so their correct responses can be rewarded and incorrect responses can be corrected.

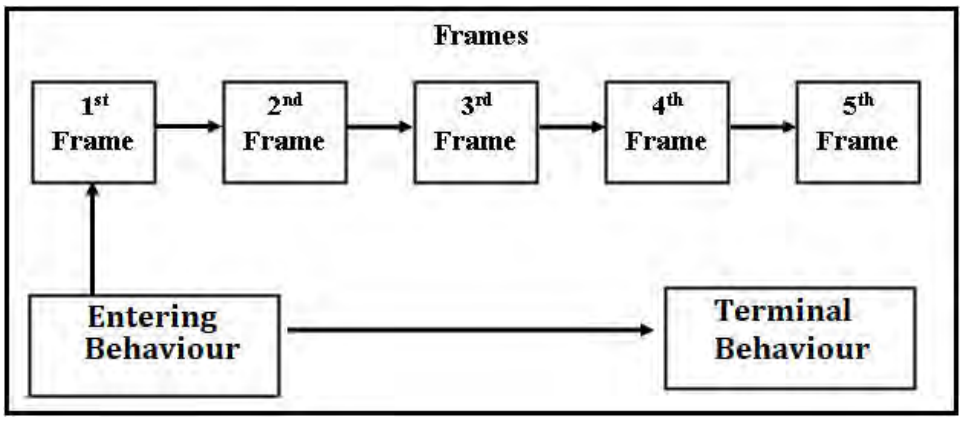
3. The learners are immediately informed about whether or not their response is correct (feedback).

4. The learners proceed at their own pace (self pacing).

5.5.3 Structure of Linear Programming

In this strategy subject matter is essential in small steps in sequence. Every step provides new knowledge or new information. The learn has to emit right respone on each step, the response is an integral part of the terminal behaviour. The learner takes at a time is known as 'Frame'. The steps are arranged in a gradual progression. Every frame of the programme has three aspects :

1) Stimulus 2) Response 3) Reinforcement



5.5.4 Frames of Linear Programming

The frames of linear programming can be divided in four types :

1) Introductory Frames : The main function of these frames are to relate entering behaviours (previous knowledge) of learner to terminal behaviours (new knowledge). This is over prompting (hints) situation. The responses of introductory frames are related to entering behaviours in the beginning then terminal behaviours.

2) Teaching Frames : The main purpose of these frames to impart new knowledge among the learners. This is full prompting (hints) situation. The responses of teaching frames are related to terminal behaviours.

3) Practice Frames : The main purpose of these frames are to practice the acquired new behaviours through teaching frames. This is half prompting (hints) situation. The responses of practice frames are related to terminal behaviours.

4) Testing Frames : The main focus of these frames are to assess that how much the students have learnt. This is unprompted situation. The responses of testing frames are related to terminal behaviours.

5.5.5 Merits of Linear Programming

- Immediate knowledge of results acts as a great motivator and releases anxiety and tension.
- The smallness of the frames brings the sub-goals within the reach of the learner and thereby facilitates secondary reinforcement.
- Repetition strengthens the responses and ensures learning.
- Easy nature of the programme provides 'success experience' to the learner.

5.5.6 Limitations of Linear Programming

- Based on learning theories which were formulated by experience conducted on animals. A human being is more intelligent, than animals, he has got an intelligent brain.
- Every learner has to follow the same path; therefore, student may cheat from one another.

- Wrong responses are avoided in the programme.
- No remedy is provided for them.
- In linear programming, the learning process becomes quite dull on account of the following reasons i) Subject matter is broken into very small pieces. ii) Responding is quite mechanical and restrictive. iii) The learning process is quite slow.
- Linear programming does not develop the discriminating power of the students.

Check Your Progress-2

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q) 1. Linear programming is based on the principles of

a) Small steps b) Self pacing

c) Active responding d) All the above

Q) 2. _____ programming is also called single track programme.

a) Branching b) Linear

c) Mathetics d) None

Q)3. Frames of linear programme are

a) Introdutory b) Teaching

c) Practice d) All the above

Q)4. _____ frame is also known as unprompted frame.

a) Introdutory b) Teaching

c) Testing d) All the above

5.6 BRANCHING PROGRAMMING

The founder of Branching programming is **Norman A Crowder**, hence it is also known as Crowderian Model. It is based on configuration theory of learning. It is a problem solving approach. It is stimulus centered approach of learning. The learner within himself makes the decision to adopt the instruction to his needs according to his background of the subject. Hence its also called intrinsic programming.

5.6.1 Basic Assumptions of Branching Programming

A. Student learns better if he is exposed to whole situation or content.

B. Student errors help in diagnosis.

C. Student learns better if remediation is provided side by side.

D. Student learns better in democratic environment.

5.6.2 Principles of Branching Programming

1. Principle of Exposition

2. Principle of Diagnosis

3. Principle of Remediation

5.6.3 Characteristics of Branching Programming

- A frame may contain two or three related ideas.
- Each frame is of relatively bigger size as compared with the linear type.
- The learner moves forward, if his responses are correct but is diverted or branched to one or more remedial frames, if he does not give the correct response.
- The cycle goes on till the learner passes through the whole instructional material at his own pace.
- In a branching programme, all learners do not follow the frame route. Rather, the route depends on the response made by the learner. Thus, learners branch according to their responses.

5.6.4 Structure of Branching Programming

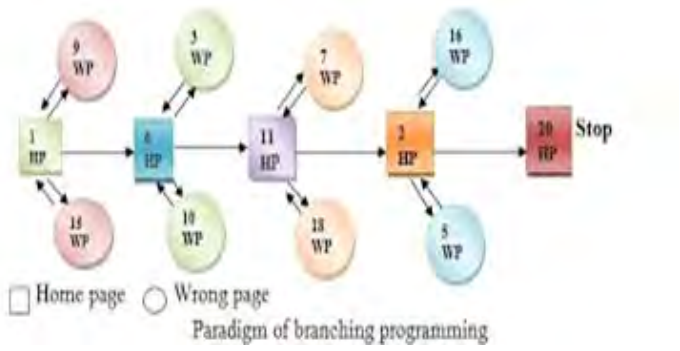
The programme text is called **Scrambled Text**. This consists of two types of pages:

1. **Home Page :** This page consists of content or concept and followed by multiple choice questions which involve four aspects :-

a) Teaching b) Response c) Diagnosis d) Reinforcement

2. **Wrong Page :** Wrong page or remedial frame involves :-

a) Repeating student response b) Negative confirmation c) Reason as to why he/ she is wrong



Paradigm of branching programming

Branching programming is used for secondary as well as higher classes. Higher objectives can be achieved such as multiple discrimination etc. It is useful for students of above average and high intelligence.

5.6.5 Merits of Branching Programming

- Big size of a frame as well as the branching minimizes unnecessary repetitions and responding, thus reducing the amount of learning time and fatigue.
- Instead of simple response it provides alternatives in the form of multiple choices.
- Branching programme is helpful in the development of the power of discrimination of the learner.
- Branching is most useful in the areas beyond facts, definitions and basic skills.

- It helps in the development of creativity and problem solving.

5.6.6 Limitations of Branching Programming

- It does not consider learning process whether learning is taking place or not. Main emphasis is on diagnosing the weakness of learners and providing remedy to them.
- More emphasis on remediation rather than teaching. Hence, it is only a tutorial approach.
- It is difficult to cover the entire subject-matter.
- The programme is not suitable for small children as they are unable to express the symbolism. The diagnostic questions framed by the programmer may or may not suit the needs of the individual learner.

Check Your Progress-3

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q) 1. In branching programme, a frame consist of

a) Two or three related ideas b) A series of small linear steps

c) Both (i) and (ii) d) None of these

Q) 2. Branching programming is based on the principles of

a) Exposition b) Diagnosis

c) Remediation d) All the above

Q) 3. Branching programming is also called

a) Skinnerian programming b) Crowderian programming

c) Extrinsic programming d) None of these

Q) 4. Functions of home page in branching programming

a) Diagnosis b) Teaching

c) Response d) All the above

Q) 5. Wrong page is also known as

a) Teaching frame b) Practice frame

c) Remedial frame d) All the above

5.7 LET US SUM UP

In this lesson, we discussed the programmed learning and its types, linear and branching programming. Linear programming is developed by B. F. Skinner. In this style the learning material is presented before the learner in small size frames but meaningful frames in such a way as to allow the learner to respond immediately with his/her own pace.

Branching programming is developed by Norman A. Crowder. In this style, the learning material is presented before the learner in large size frames. Usually, the multiple response type of questions are used in the branching programme. The learner moves forward if answers correctly, but is diverted to one or more remedial frames if he/she does not. These frames explain the matter afresh, ask him/her questions to elicit the right answer and reveal the learner's previous mistake, and then return to the original frame.

5.8 LESSON END EXERCISE

Short Answer Type Questions

Q) 1. Define the concept of programmed learning.

Q) 2. Discuss the structure of linear programming.

Q) 3. Discuss the advantages and disadvantages of branching programming.

Q) 4. Explain the fundamental principles of programmed learning.

Essay Type Questions

Q)1. Explain the meaning of programmed learning along with its types.

Q) 2. Define the concept of linear programming along with its advantages and disadvantages.

Q) 3. Compare linear programming and branching programming.

5.9 SUGGESTED FURTHER READINGS

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5.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress-1

Q1. b Q2. a Q3. c

Check Your Progress-2

Q1. d Q2. b Q3. d Q4. c

Check Your Progress-3

Q1. a Q2. d Q3. b Q4. d Q5. c

VARIOUS STEPS INVOLVED IN CONSTRUCTION OF PROGRAMMES

LESSON NO 6 **UNIT II**

Structure

6.1 INTRODUCTION

In the previous lesson, you learnt about the nature and concept of programmed learning along with its characteristics. You also understand the structure and advantages of linear and branching programming. In this lesson you will understand the steps which are involved in the development of programmed learning material.

6.2 OBJECTIVES

After going through this lesson, you shall be able to:

- explain the different steps involved in development of programmed learning material, and
- discuss the different steps of development of programming learning material.

6.3 STEPS FOR CONSTRUCTION OF PROGRAMMED LEARNING MATERIAL

The following ten steps are used for construction of programmed learning material:-

6.3.1 Selection of Topic or Unit to be Programmed

The following criteria for the selection of a topic:-

a) The topic selected for a programme should belongs directly to the programmer's own field of interest.

b) The programmer should have mastery of the topic.

c) The programme length has to be such that desired objectives for the unit can be realised.

6.3.2 Identification of Objectives

The second step for the development of programme is to identify the objectives in terms of Bloom's Taxonomic categories. Programmed learning material is effectively used for achieving the congnitive objectives. Therefore, taxanomy of congnitive domain is taken into consideration in identifying the objectives for the programmed unit. Bloom has classified congnitive objectives into six categories: Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. The programmer

identifies the objectives in these categories by considering the level of students, entering behaviour and nature of the unit. The last three categories are also known as higher order of the objectives. The objectives decide the level and direction of the instructions.

6.3.3 Writing objectives in behavioural terms

After the identifying the objectives in congnitive taxonomic categories it is essential to formulate objectives in behavioural terms. Robert Mager's approach is best fitted into the programme strategies. Mager emphasised the need and importance of behavioural objectives in program learning.

The objectives are based on two types of behaviour:-

a) **Entering behaviours:-**The entering behaviours include those characteristics which are pre-requisites for the programme.

b) **Terminal behaviours:-**The terminal behaviours include all those responses and behaviours which are helpful for disavowing desired objectives.

6.3.4 Content analysis and developing instructional sequence

After writing the specification of entering and terminal behaviours, it is essential for a programmer to develop a suitable content structure which would go with the programme. This task requires analysis of content. The content analyses into units, units are broken down into its elements. These elements are arranged into logical or learning sequence. Thus, content analysis involves both analysis and synthesis process.

6.3.5 Construction of criterion test

After writing objectives in behavioural terms and developing instructional sequence of the unit to be taught, it is very essential to construct a criterion test. The criterion test is constructed by employing the four steps: Planning, Preparing, Tryout and Evaluation.

Criterion test includes objective type items. Every item measure one specific objective of the programame. It is objective centered achivement test. Recall and recognition

types of items are prepared. After preparing the items individual tryout is done for improving items. The items are selected and rejected on the basis of difficulty value and discrimination power of the items. The criterion test are to measure the terminal behaviours of the programme.

6.3.6 Paradigm for the Programme

After preparing the criterion test an appropriate strategy is decided for the programme.

The following aspects are considered in finalising a paradigm for the programme:-

a) Size of frame

b) Mode of response

c) Type of prompts

d) Provision for correct response

6.3.7 Writing Programme Frames

"A frame item is a segment of material which the learner handles at one time." In writing programme frames, programmer has to take decision in respect of :

i) Entering behaviour ii) Content structure iii) Strategy of instruction iv) Terminal behavior

Types of programme frames:- There are four frames in a unit of a programme:

i) Introductory frame

ii) Teaching frame

iii) Practice frame

iv) Testing frame

These frames produce the gradual withdrawing learning situations. The logical sequence of programme frames is develop 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 first draft is prepared by considering about facts. It may be prepared on cards. Each frame is written on a single card. The first draft is improved and modified by individual tryout. After individual tryout revision can be done and may be discussed with experts to seek their opinions for improving and modifying the frames. The purpose of individual tryout is to improve language ambiguity and difficulty of the frames. The structure of the content can evaluated by the experts.

6.3.8 Revising, Editing and Preparation of final draft with help of Group tryout

The first draft of the programme revised after empirical tryout. The sample of subject who take the programme at this stage are carefully selected from the target population on the basis of entering behaviour. 40 or more students are selected from the target population for the empirical tryout test. After this tryout, the frames and student's responses are again analysed to improve frames. A list of common errors are made. At this stage, the programme may undergo several tryout revision cycles.

After revision of the programme the next step is to 'edit the programme' for preparing the final draft of the programme.

a) Technical accuracy

b) Programme technique

c) Composition editing

6.3.9 Evaluation of the Programme

This is the final step to construct the programmed learning material. The evaluation of programme is based on the collection and analyses of diverse type of data obtained as a result of individual testing, small group testing and field testing. The preliminary draft of the programme is evaluated in the following three stages :

a) Individual testing : It is usually carried out informally with the individual student, one at a time. The purpose of the individual testing is to check how for the first version of the programme and to see whether material presented actually goes across the students so that he/she is able to demonstrate the specified behaviour output as a result of learning experience.

Hartley (1972), comment that if there are any serious defects in the programme, these become apparent as the programme is tried out with individuals.

b) Small group testing : After the individual testing, the programme is tried out on a small group of students selected from target population. The information obtained through small group testing is vital before a decision to publish a programme for wide use is taken.

Espich and Williams (1967), comment that the procedure of small group testing is different from that of individual testing in the sense that there is no personal contact between the programmer and the students during the administration of the programme.

c) Field testing : In individual and small group testing stages conditions are controlled and the real performance of a programme in a normal classroom is not duly reflected. In the field testing stage programme is to be taken to the natural conditions of instruction, i.e. exactly where it belongs. In other words, it is to be tested on the population in the field under the same conditions in which the programme is going to be used after its validation.

6.3.10 Master Validation

The programme is evaluated against the following two criteria **:**

1) Internal criteria : These are releted with characteristics of the programme. They are four types-

a) Error rate b) Programme density c) Sequence progression d) Frame inventory

2) External criteria : These are related with the performance gain and attitude of students. There are of three types-

a) 90/90 standard b) Attitude coefficient c) Gain ratio d) Level of performance

6.3.11 Preparation of Manual of the Programme

A good programme material followed by a comprehensive manual. It provides detail informations about the programme which are required by the user. It is assumed that most author and publishers prepare programme manuals to accompany printed programme. Such as manual would be used by teachers, instructors, supervisors and

others who wish to use the programme. It helps the user for an effective use of the programmed material.

Check Your Progress-1

Note: (a) Answer the question given below

(b) Compare your answers with those given at the end of the lesson

Q)1. The process of programmed development is very (simple/dynamic).

Q)2. If each step is small, the learner (is/is not) likely to make errors.

Q)3. The principles on which programmed learning is based were developed in (astrological/psychological) laboratories.

6.4 LET US SUM UP

The development of a programme involves ten steps which includes: i) Selection of a topic to be programmed ii) Identification of objectives iii) Writing Objectives in Behavioural Term iv) Content analysis and developing instructional sequence v) construction of criterian test vi) Paradigm for the programme vii) Writing programme frames viii) Revising, editing and preparation of final draft ix) Evaluation of the programme and master validation x) Preparation of manual of the programme

6.5 LESSON END EXERCISE

Short Answer Type Questions

Q) 1. What do you mean by evaluation of the programme?

Q) 2. Define internal criteria of programme.

Q) 3. How to prepare a good manual of a programme?

Q) 4. Explain the fundamental principles of programmed learning.

Essay Type Questions

Q) 1. Describe different steps involved in the preparation of programmed learning material.

Q) 2. What is programmed learning? Prepare a linear programme material on any topic?

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6.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress - 1

Q)1. Dynamic Q)2. Is not Q)3. Psychological

BLOOM'S TAXONOMY APPROACH IN EDUCATIONAL TECHNOLOGY TO INTEGRATE TEACHING -LEARNING PROCESS

Lesson No.- 7 **Unit-II**

STRUCTURE

7.1 INTRODUCTION

Instructional objectives can be defined as the specific or immediate outcome as result of an instruction. It could be design in such a manner that it shows what the students should be able to recall or perform after the completion of classroom courework. It describes the progressive changes in cognitive, affective and psychomotor domain in terms of knowledge, comprehension, applications, skills, appreciation and so forth. But the problem arise in this case is that, how could a teacher understand whether the student gain any knowledge, able to apply the information he has received from the classroom interaction. It requires the presence of specification or specific objectives. Specifications are the observable and measurable changes in the behavior of the learner. It tells us what the pupil will do

or how they behave if they realize an objective. Hence, it is the behavioural changes showed by the students which can be observable and measurable by the teacher is called as behavioural objectives.

7.2 OBJECTIVES

After going through this lesson, you shall be able to:

- describe the Bloom's taxonomy of educational objectives
- explain the objectives of cognitive domain
- explain the objectives of affective domain
- explain the objectives of psychomotor domain
- discuss the Robert Mager's approach to writing objectives in behavioural term
- discuss the RCEM approach to writing objectives in behavioural term

7.3 BLOOM'S TAXONOMY OF EDUCATIONAL OBJECTIVES

The word taxonomy derived from the Greek word 'taxis' which means systematic classification. Benjamin S. Bloom and his associate, University of Chicago developed and classified the domains of educational objectives. Bloom (1956) presented his taxonomy related to cognitive domain giving emphasis to the hierarchy of cognitive process in attaining knowledge and development of thinking. Later Krathwhol (1964) introduced affective domain and Simpson (1966) developed psychomotor domain. They described the hierarchical development of the three domains of the learner though instruction. This classification of educational objectives is known as Bloom's taxonomy of educational objectives. The classification of educational objectives is:

1) The cognitive domain (knowledge-based)

2) The affective domain (emotion-based)

3) The psychomotor domain (skill- based)

1) The Cognitive Domain (Knowledge-Based)

Bloom's taxonomy contains six categories of cognitive skills ranging from lower-order skills that require less cognitive processing to higher-order skills that require deeper learning and a greater degree of cognitive processing. The six categories are:

a) Knowledge: Knowledge involves recognizing or remembering facts, terms, basic concepts, or answers without necessarily understanding what they mean. Its characteristics may include:

- Knowledge of specifics—terminology, specific facts
- Knowledge of ways and means of dealing with specifics—conventions, trends and sequences, classifications and categories, criteria, methodology
- Knowledge of the universals and abstractions in a field—principles and generalizations, theories and structures

b) Comprehension: Comprehension involves demonstrating an understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating the main ideas.

c) Application: Application involves using acquired knowledge—solving problems in new situations by applying acquired knowledge, facts, techniques and rules. Learners should be able to use prior knowledge to solve problems, identify connections and relationships and how they apply in new situations.

d) Analysis: Analysis involves examining and breaking information into component parts, determining how the parts relate to one another, identifying motives or causes, making inferences, and finding evidence to support generalizations. Its characteristics include:

- Analysis of elements
- Analysis of relationships
- Analysis of organization

e) Synthesis: Synthesis involves building a structure or pattern from diverse elements; it also refers to the act of putting parts together to form a whole. Its characteristics include:

- Production of a unique communication
- Production of a plan, or proposed set of operations
- Derivation of a set of abstract relations

f) Evaluation: Evaluation involves presenting and defending opinions by making judgments about information, the validity of ideas, or quality of work based on a set of criteria. Its characteristics include:

- Judgments in terms of internal evidence
- Judgments in terms of external criteria

2) The Affective Domain (Emotion-Based)

Affective domain is related with the development of heart and mind of the child. It includes the areas of emotions, feelings, interest, attitude, appreciation and values. The teacher should be given emphasis to correlate the development of cognitive domain with affective domain. A person who studied the Gandhian principles, civic right and duties without developing his affective domain is worthless for the country as well as society. Hence the teacher should ensure the development of affective domain in his instructional objectives of the classroom instruction. Bloom and Krathwohl (1964) introduced the following hierarchy for affective domain:

a) Receiving: In the basic level the learner is sensitized to the existence of a certain

phenomena and stimuli. She/he is willing to receive the information whole heartedly by exhibiting awareness on the stimuli and become conscious on particular person, principle, philosophy, incidents etc.

b) Responding: Effective reception prepares the learner to respond seriously. As result of receiving some good message from the first hierarchy, the learner tries to respond to the situation positively. For example students show kindness towards elders and weaker people, hold honest behaviour in day to day life situations etc.

c) Valuing: By responding in good ways, the students set guidelines for their behavior. Accepting values, preference for values, commitment to values are the important behavioural changes in this level.

d) Organization: Student builds a system of value at this level. Value conflict and value crisis are resolved. Through organizing different values students are able to develop their own code of conduct and standard of public life in the society. For example Pupil identifies the inseparability of the values like non violence, truthfulness and tolerance of Indian tradition. They show dislike towards corruption and violence in the country and think against to work.

e) Characterization: This is the highest level of internalization process. Values are imbibed and forms part of the life style of the individual. For example the non-violence value becomes the philosophy of the individual. They will not be ready to compromise on their philosophy at any stage as well as, ready to work for justice even though they are alone their way.

3) The Psychomotor Domain (Skill-Based)

Skills in the psychomotor domain describe the ability to physically manipulate a tool or instrument like a hand or a hammer. Psychomotor objectives usually focus on change and development in behavior or skills. Bloom and his colleagues never created subcategories for skills in the psychomotor domain, but since then other educators have created their own psychomotor taxonomies. Simpson and Harrow (1972)proposed the following levels:

a) Reflex Movements: Segmental, inter-segmental, and super-segmental reflexes.

b) Basic-Fundamental Movements: Locomotor movements, non locomotor

movements, and manipulative movements.

c) Perceptual Abilities: Kinesthetic, visual, auditory and tactile discrimination and coordinated abilities.

e) Physical Abilities: Endurance, strength, flexibility, and agility.

f) Skilled Movements: Simple, compound, and complex adaptive skills.

g) Non Discursive Communication: Expressive and interpretive movement.

Check Your Progress-1

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q) 1. Objectives of psychomotor domain are

a) Physical abilities b) Perceptual abilities

c) Skilled movements d) All the above

Q) 2. Analysis and synthesis are objectives of

a) Psychomotor domain b) Affective domain

c) Cognitive domain d) None of these

Q) 3. Cognitive domain is

a) Skill-based b) Knowledge-based

c) Feeling-based d) All the above

Q) 4. _____developed psychomotor domain

a) Simpson b) Bloom

c) Krathwhol d) All the above

7.4 APPROACHES TO WRITING OBJECTIVES IN BEHAVIOURAL TERM

Behavioral objectives may be defined as a group of statements formulated by the teacher in behavioral terms for describing what the pupils are describing, what the

pupils are expected to do or will be able to do once the progress of classroom instruction is over. Different approaches of writing objectives in behavioural terms are:

I. Robert Mager's approach

II. Robert Miller's approach

III. RCEM approach

7.4.1 Robert Mager's Approach

According to Robert Mager, Instructional objectives can be written in the form of students' Expected Terminal Behaviour. To write these objectives, the following should be kept in mind:

1. Identification of the terminal behaviour and its meaning.

2. Description of the important conditions under which the behaviour is expected to occur.

3. Specification of criteria of acceptable performance.

Mager's approach is based on Bloom's classification of objectives for writing the objectives in behavioural terms. Mager's approach concentrated on cognitive and affective objectives. He has given emphasis on action verbs.

Cognitive Domain Objectives and Associated Action Verbs

Knowledge				
Cite	Identify	Quote	Relate	Tell
Count	Indicate	Read	Repeat	Trace
Define	List	Recite	Select	Write
Describe	Name	Recognize	State	
Draw	Point	Record	Tabulate	
Comprehension				
Associate	Describe	Explain	Locate	Translate
Classify	Differentiate	Express	Predict	
Compare	Discuss	Extrapolate	Report	
Compute	Distinguish	Interpolate	Restate	
Contrast	Estimate	Interpret	Review	
Application				
Apply	Employ	Locate	Relate	Sketch
Calculate	Examine	Operate	Report	Solve
Complete	Illustrate	Order	Restate	Translate
Demonstrate	Interpolate	Practice	Review	Use
Dramatize	Interpret	Predict	Schedule	Utilize
Analysis				
Analyze	Debate	Distinguish	Inventory	
Appraise	Detect	Experiment	Question	
Contract	Diagram	Infer	Separate	
Criticize	Differentiate	Inspect	Summarize	
Synthesis				
Arrange	Construct	Formulate	Organize	Produce
Assemble	Create	Generalize	Plan	Propose
Collect	Design	Integrate	Prepare	Specify
Compose	Detect	Manage	Prescribe	
Evaluation				
Appraise	Determine	Judge	Recommend	Test
Assess	Estimate	Measure	Revise	
Choose	Evaluate	Rank	Score	
Critique	Grade	Rate	Select	

Affective Domain Objectives and Associated Action Verbs

Receiving	Responding	Valuing	Organization	Characterization
Accept	Complete	Accept	Organized	Judge
Attend	Cooperate	Defend	Discriminate	Demonstration
Develop	Discuss	Devote	Display	Change
Recognize	Record	Pursue	Order	Develop
Listen	Write	Seek	Recognized	Decide
Perceive	Respond	Attain	Systematize	Identify
Select	Answer	Influence	Associate	Revise

7.4.3 RCEM Approach

RCEM approach developed by Regional College of Education, Mysore. This approach makes use of mental process or mental abilities in place of action verbs in the writing of instructional objectives. Here there are four categories in place of six given by Bloom; the last three categories (analysis, synthesis and evaluation) of Bloom's taxonomy have been replaced by a category, i.e. creativity. The other difference lies in naming the Bloom's comprehension category as understand in RCEM approach. The four objectives of RCEM approach have been divided into seventeen mental abilities or process. These mental abilities or processes are used for writing objectives in behavioural terms.

Objectives and Mental Process in RCEM Approach

Objectives	Mental Process or Abilities
1) Knowledge	1.1 Recognize
	1.2 Recall
2) Understanding	2.1 Seeing relationship
	2.2 Cite Example

	2.3 Discriminate
	2.4 Classify
	2.5 Interpret
	2.6 Verify
	2.7 Generalize
3) Application	3.1 Reason out
	3.2 Formulate hypothesis
	3.3 Establish hypothesis
	3.4 Infer
	3.5 Predict
4) Creativity	4.1 Analyse
	4.2 Sythesize
	4.3 Evaluate

Check Your Progress-2

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q) 1. Mental abilities of creativity objective are

a) Analyse b) Synthesize

c) Evaluate d) All the above

Q) 2. Last objective of cognitive domain is

a) Analyse b) Synthesize

c) Evaluate d) All the above

Q) 3. Rober Mager has given action verbs of _____domain/domains.

a) Cognitive b) Affective

c) Both (a & b) d) None

Q) 4. In RCEM approach objectives are divided into____mental abilities.

a) 7 b) 17

c) 10 d) 27

7.5 LET US SUM UP

In this lesson, we discussed the Bloom's taxonomy of instructional objectives and approaches to writing instructional objectives in behavioural term. Bloom's classified the educational objectives in three categories: 1) The cognitive domain (2) The affective domain (3) The psychomotor domain

In this lesson we also discussed different approaches of writing objectives in behavioural terms i.e. 1) Robert Mager's approach 2) Robert Miller's approach 3) RCEM approach

7.6 LESSON END EXERCISE

Short Answer Type Questions

Q) 1. Define the concept of instructional objectives.

Q) 2. Discuss Robert Mager's approach.

Q) 3. Write short note on RCEM approach.

Essay Type Questions

Q) 1. Explain Bloom's taxonomy in detail.

Q) 2. Define the concept of instructional objectives and explain different approaches of writing objectives in behavioural term.

Q) 3. Explain RCEM approach in detail.

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7.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress-1

Q1. d Q2. c Q3. b Q4. a

Check Your Progress-2

Q1. d Q2. c Q3. c Q4. b

INFORMATION & COMMUNICATION TECHNOLOGY (ICT): CONCEPT, NEED AND SCOPE

LESSON NO 8 **UNIT- III**

Structure

8.1 INTRODUCTION

One of the unique qualities of human beings is their ability to gain information and what makes this information blossom is man's ability to 'transfer' this to others. Transfer of information, which is one of the bases of learning, is the most important social achievements of human beings. There are numerous ways of transfer of information. For instance, radio and television have for over forty years been used

for open and distance learning. The use of computers in education is also not a new phenomenon. The promoters of computer claimed that it would transform and save the educational system. As world is moving rapidly towards digital information, the role of ICTs in education is becoming more and more important and this importance will continue to grow and develop in 21st century. For example, Prathibha is a trained graduate mathematics teacher working in a village in Chamarajanagara. Recently, Prathibha organized a "Mathematics Day" on the eve of Ramanujan's birthday. She organized a video show on Ramanujan's life and his contributions. She had identified this video from YouTube. Based on the learning form the video, students took a quiz in the afternoon. Since the quiz was online, she could announce the winner immediately. Prathibha used Google forum for this purpose. Prathibha shared pictures of the event in the subject teachers' group via Whats App messenger. One of her friend suggested her to open a blog on her experiences. She has a blog now, in which she regularly posts her teaching experiences and reflections. Prathibha uses web tools and technology in her class regularly. She finds that technology integration in teaching has made the learning experience very engaging. Prathibha is excited about the potentials of technology use in the classroom. This is only an example to show how information and communication technologies have started influencing the classroom practices. With the world becoming more and more digital with time, our classrooms are also headed in this direction. This lesson would introduce to you the basic concepts and ideas related to the field of Information and Communication Technologies. In this unit, we are going to explore the concept of Information and Communication Technologies (ICT), its evolution and its nature. We will also understand the scope of ICT in our daily life in general and education in particular.

8.2 OBJECTIVES

After going through this lesson, you shall be able to:

- state the meaning of Information and Communication Technology,
- define the term Information and Communication Technology,
- explain the concept of Information and Communication Technology,
- discuss the need of ICT in Education, and

- explain the importance & significance of ICT in education.

8.3 MEANING OF INFORMATION & COMMUNICATION TECHNOLOGY (ICT)

To accurately understand the importance of ICT in Education, there is need to actually understand the meaning of ICT first. ICTs stand for Information and Communication Technologies. ICT is a generic term referring to technologies which are being used for collecting, storing, editing and passing on information in various forms. A personal computer is the best known example of the use of ICT in education. It is a diverse set of technological tools and resources used to communicate, create, disseminate, store and manage information.

The beauty of Information and Communication Technologies (ICT) lies in its capability to provide interminable stores of information. Increased information gives people access to increased amount of resources and hence, empowering large number of people, who don't have access to both information and resources, otherwise. It can knit millions of people who are physically unconnected in a string by virtually connecting them. Hence, it has the capability to take a very productive role in making education available to the unconnected.

The Information and Communication Technology is not only technology but it is combination of other technologies like hardware, software, multimedia and delivery systems, desktop, notebook and handheld computers, digital cameras, local area networking, Bluetooth, the Internet, cloud computing, the World Wide Web, streaming and DVDs; and applications such as word processors, spreadsheets, tutorials, simulations, email, digital libraries, computer-mediated conferencing, videoconferencing, virtual environment, simulator, emulator etc.

The rapid development of Information and Communication Technology (ICT), particularly the Internet, is one of the most exciting developments of the Information Age. Information and Communication Technologies (ICT) powers our access to information, enables new forms of communication, and serves many online services in the spheres of commerce, culture, entertainment and education. As a tool, "Information and Communication Technologies (ICT) has the potential to transform the way that education is delivered."

8.4 DEFINITIONS OF INFORMATION & COMMUNICATION TECHNOLOGY (ICT)

"Information and communications technology (ICT) in education is the processing of information and its communications facilities and features that variously support teaching, learning and a range of activities in education."

"ICT is that technology which uses the information to meet human need or purposes including processing and exchanging."

"ICT implies the technology which consists of electronic devices and associated human interactive materials that enable the user to employ them for a wide range of teaching - learning processes, in addition to personal use. These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony".

"Information and Communication Technology is a systemic study of artifacts that can be used to give form to facts in order to provide meaning for decision making, and artifacts that can be used for organization, processing, communication and application of information".

"Information and Communication Technology is a scientific, technological and engineering discipline and management technique used in handing the information, its application and association with social, economical and cultural matters."

From the above discussion, we can conclude that Information and Communication Technology refers to the information processing of the software application on operating systems or hardware applications that includes computers, videos, telephones and related equipments of telecommunications, tapes, CDs etc. All these definitions combine Communication technology and Information technology that have thin line between them but cannot do away without each other. When these technologies are applied in the field of education, it is termed as ICT in education.

Check Your Progress -1

Note : (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 ICT is an abbreviation of which of the following:-

A. Information & Communication Technology

B. Information Community Technology

C. Information Communication Techniques

D. Idea & Community Technology.

Q2 _____ has the capability to take a very productive role in making education available to the unconnected.

Q3 ICI uses the information to meet human need or purposes including _____ and _____.

8. 5 CONCEPT OF INFORMATION & COMMUNICATION TECHNOLOGY (ICT)

- ICT in education is any hardware and software technology that contribute in the educational information processing. In the context of present era, ICT mainly comprises of Computer technology with its hardware, like, Personal computer machine, infrastructure required for setting up Internet facility and also software like, CD ROM including various programme packages, E-learning strategies etc.
- ICT in education is any Information Technology that focuses on the acquisition, storage, manipulation, management, transmission or reception of data required for the educational purpose. For example, the information about students' records, their admissions, updates of their curricular and co-curricular activities.
- ICT in education is any technology that deals with the exchange of information or in other words communication in the teaching learning process. Uses of

Electronic learning technology like, Teleconferencing, power point presentations, CD ROM are Communication Technology which is the part of ICT.

- ICT in education is any educational technology that is applied in the educational process. It encompasses Hardware approach like use of machines and materials, Software approach like use of methodologies and strategies of teaching learning and Systems approach that uses the management technology that deals with the systematic organization of the hardware and the software. Different software packages for the use in different department of education; e.g. library software, administration software, software related to managing the entire teaching learning process.
- ICT in education is the support material in the hands of the human resource involved in the educational process in order to enhance the quality of education.
- ICT in education comprises of the application of science of On-line, Offline leaning with the help of the computer technology.

8.6 SCOPE OF INFORMATION & COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

ICT has a vast scope in the field of education. At all levels of education, whether at school or college, ICT has promising results. These encompass the areas such as teaching- learning in and outside the classroom, in regular face-to-face set-up or distance mode. Thus, the scope of ICT in education can be discussed in detail under the following sections:

- **ICT in Teaching-Learning Process**

The common use of ICT for teaching includes preparation for notes, teaching learning resources and examinations. This does not enable teachers to radically change their pedagogical practices. Teachers need to go beyond such simple use by involving students to use ICT so as to transfer students' learning. The best way of using ICT by teachers in teaching-learning process is to see that students are motivated to use

technology which takes care of concentration on technology or on the teacher at a given time in the classroom.

- **ICT for Publication Purposes**

The educational uses of ICT for publication purpose is mainly to disseminate information or ideas and share them with the school community, public, governmental organizations within the country or abroad. These products of publication take the shape of a newsletter, brochure or a website. Students can publish a newsletter by procuring the information related to an organization-Governmental or non-Governmental. While taking up publishing work, students play roles such as editors, reporters, authors and designers of the newsletter. Later they also plan, design, create and distribute them in and outside the school for the people concern.

- **ICT in Evaluation**

Evaluation is a significant part of teaching which comprises the learning process and also the provision of feedback to learners. Teachers in traditional face-to-face situations use interaction as an opportunity to provide feedback to learners, besides communicating their strength and weaknesses. With the advent of technological developments, there is limited opportunity for face-to-face Interaction. Now, teacher uses a combination of two forms of evaluation: **Formative Evaluation**: This is used as a learning tool, and to give and gain feedback on learner ability and performance.

Summative Evaluation: This is an evaluative method for grading and making a judgement about the participant's achievement in a course.

- **ICT for Research Purpose**

Products and processes of ICT provide access to a lot of information on innumerable topics produced by people of diverse areas and fields across the globe. This information is either singled out in combination of the form of text, images, sounds, videos and animation. For research, sifting through a number of websites in search of relevant, authentic and high quality information is a challenging experience. So, while looking for resources one of the easiest and safest methods of researching is to use directories. These aspects lead to collaboration of research work in which the

different areas or processes of the research project can be shared to produce quality results and achieve the desired goals.

- **ICT for Administration**

ICT for administration purposes include the preparation of school announcements, reports, letters and student registration. ICT makes the work of the heads of school easy and manageable and document storage saves a lot of space, as physical files are replaced by electronic ones.

- **ICT for Personal Purposes**

At the personal level, ICT is used for communication, personal development and entertainment purpose. Again, most usage will be to search for and store information, and submit online application-subscription, purchase or other personal uses.

- **ICT for Professional Development**

An ICT use for professional development is indicated in searching for information for self-study and communication. This enhances teacher's confidence in their areas of specialization. To further their teaching career, few teachers use ICT and consequently motivate others to use ICT.

8.7 NEED OF INFORMATION & COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

- Education is a lifelong process, therefore, anytime, anywhere access to it is the need which is possible though ICT.
- Information explosion is an ever increasing phenomena therefore, there is need to get access to this information with the help of ICT.
- Education should meet the needs of variety of learners and therefore, ICT is important in meeting this need.
- It is a requirement of the society that the individuals should posses' technological literacy.
- We need to increase access and bring down the cost of education to meet the challenges of illiteracy and poverty-ICT is the answer.

- Data related to education sector is also very large therefore it is the need to store the data in safe form with the help of ICT.
- To communicate and discuss with persons at distant places with the help of e-mail, chat, forum, blog etc. is the need to use ICT in education.
- Open and flexible courses which can be run online only are possible with the help of ICT.

Check Your Progress –2

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 ICT in education is the ……. in the hands of the human resource involved in the educational process in order to ……..... the quality of education.

a. enhance, support material

b. diminish, sport material

c. support material, diminish d. support material, enhance

Q2 Use of ICT for teaching includes preparation for notes, _____and _____.

Q3 ICT for administration purposes include the preparation of _____, reports, letters and _____.

8.8 USES OF INFORMATION & COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

ICT is being utilized in every part of life. Due to the increasing importance of the computer, students-the future citizens cannot afford to keep themselves aloof from this potential medium. In education, use of ICT has become imperative to improve the efficiency and effectiveness at all levels and in formal and non- formal settings. Education even at school stage has to provide computer instruction. Profound technical knowledge and positive attitude towards this technology are the essential prerequisites for the successful citizens of the coming decades.

It can be used for the following purposes:

- To broadcast material, online facility or CD-ROM can be used as sources of information in different subjects;
- To facilitate communication for pupils with special needs;
- To use electronic toys to develop spatial awareness and psycho- motor control;
- To use the online resource like, e-mail, chat, discussion forum to support collaborative writing and sharing of information;
- To facilitate video-conferencing or other form of Tele conferencing to involve wide range of students from distant Geographic areas;
- For Blended learning by combining conventional classroom learning with E-leaning systems;
- To process administrative and assessment data;
- To exchange and share ideas -among teachers for the professional growth;
- To carry out internet-based research to enhance educational process.

8.9 IMPORTANCE / SIGNIFICANCE OF INFORMATION & COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION

ICT encompasses all those gadgets that deal with the processing of information for better and effective communication. In education, communication process takes place between teachers, students, management and administrative personnel which requires plenty of data to be stored for retrieval as and when required, to be disseminated or transmitted in the desired format. The hardware and software like OHP, Television, Radio, Computers and related software are used in the educational process. However, ICT today is mostly focused on the use of Computer technology for processing the data. In this context, advantages of ICT in education can be listed down as follows:

- **Access to Variety of Learning Resources**

In the era of technology, ICT aids plenty of resources to enhance the teaching skills and learning ability. With the help of ICT, now it is easy to provide audio visual

education. The learning resources are being widens and widen. Now with this vivid and vast technique as part of the ICT curriculum, learners are encouraged to regard computers as tools to be used in all aspects of their studies. In particular, they need to make use of the new multimedia technologies to communicate ideas, describe projects, and other information in their work.

- **Immediacy to Information**

ICT has provided immediacy to education. Now in the era of computers and web networks the pace of imparting knowledge is very fast and one can be educated anywhere at anytime. New ICT has often been introduced into well-established patterns of working and living without radically altering them. For example, the traditional office, with secretaries working at keyboards and notes being written on paper and manually exchanged, has remained remarkably stable, even if personal computers have replaced typewriters.

- **Any Time & Any Where Learning**

Now in the era of computers and web networks the pace of imparting knowledge is very fast and one can be educated .One can study whenever he wants irrespective of whether it is day or night and irrespective of being in India or in US because of the boom in ICT.

- **Collaborative Learning**

Now ICT has made it easy to study as well as teach in groups or in clusters. With online we can be unite together to do the desired task. Efficient postal systems, the telephone (fixed and mobile), and various recording and playback systems based on computer technology all have a part to play in educational broadcasting in the new millennium. The Internet and its Web sites are now familiar too many children in developed countries and among educational elites elsewhere, but it remains of little significance to very many more, which lack the most basic means for subsistence.

- **Multimedia Approach to Education**

Audio-Visual education, planning, preparation, and use of devices and materials that involve sight, sound, or both, for educational purposes. Among the devices

used are still and motion pictures, filmstrips, television, transparencies, audiotapes, records, teaching machines, computers, and videodiscs. The growth of audio-visual education has reflected developments in both technology and learning theory. Researchers have found that, other conditions being equal, more information is taken in if it is received simultaneously in two modalities (vision and hearing, for example) rather than in a single modality. Furthermore, learning is enhanced when material is organized and that organization is evident to the student. These findings suggest the value of audio-visuals in the educational process. They can facilitate perception of the most important features, can be carefully organized, and can require the student to use more than one modality.

- **Authentic and Up to Date Information**

The information and data which are available on the Internet is up to date. Internet, a collection of computer networks that operate to common standards and enable the computers and the programs they run to communicate directly provides true and correct information.

- **Access to Online Library**

Internet support thousands of different kinds of operational and experimental services one of which is online library. One can get plenty of data from online library. As part of the ICT curriculum, learners are encouraged to regard computers as tools to be used in all aspects of their studies. In particular, they need to make use of the new multimedia technologies to communicate ideas, describe projects, and order information in their work. This requires them to select the medium best suited to conveying their message, to structure information in a hierarchical manner, and to link together information to produce a multidimensional document.

- **Teaching of Different Subjects Become Interesting**

With the help of ICT, teaching of different subjects can be made more interesting by using multimedia, power point presentation, charts, graphs etc. This helps in removing the monotonous environment and making the lessons more effective.

- **Distance Learning**

Distance Learning is a method of learning at a distance rather than in a classroom. Whatever the reason, distance learning widens access for students unable for whatever reason (course availability, geographical remoteness, and family circumstances, individual disability) to study alongside others. At the same time, it appeals to students who prefer learning at home. In addition, it appeals to organizers of professional and business education, providing an incentive to rethink the most effective way of communicating vital information.

- **Better Accesses to Children with Disabilities**

Information and Communication Technology has brought drastic changes in the life of disabled children. ICT provides various softwares and techniques to educate these helpless peoples.

The integration of Information and Communication Technology in teaching is a central matter in ensuring quality in the educational system. There are two equally important reasons for integrating Information and Communication Technology in teaching. First, pupils must become familiar with the use of Information and Communication Technology, since all jobs in the society of the future will be dependent on it and secondly, Information and Communication Technology must be used in teaching in order to improve its quality and make it more effective.

Check Your Progress – 3

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 "ICT has made it easy to study as well as teach in groups or in clusters". This is known as ……..

a. Online Learning

b. Collaborative Learning

c. Enhance Learning

d. Anytime & Anywhere Learning.

Q2	ICT has provided _____to education.
Q3	ICT provides various _____and _____to educate disabled children.
Q4	List in points the significance of ICT in education.

8. 10 LET US SUM UP

Information and Communication Technology is that dynamic and critical system in the field of teacher training which changes rapidly and investigates the different strides of teaching and learning with the assistance of influenced standards and laws of present day psychology, sociology, engineering, arithmetic and other social and physical sciences. It creates educational efficiency by detailing and redesigning as per the requirements. Likewise, it assumes it's imperative part in the classrooms as well as in the whole school condition, educational administration and educational references. Globalization is fuelled to some degree by colossal and fast ICT advances, and youngsters are frequently among the first to exploit new improvements around there. In the wake of perusing this unit, you will get the huge thoughts of Information and Communication Technology.

8.11 LESSON END EXERCISE

1. Describe the meaning and scope of Information and Communication Technology.
2. Write short notes on the following:

   a. Concept of ICT

   b. Uses of ICT in Education

   c. Significance of ICT in Education

8.12 SUGGESTED FURTHER READINGS

Marcelino M., Mendes, A., & Gomes. M. (2016). *ICT in education*. Switzerland: Springer International Publishing.

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Thiyagu, K., & Arul, S. J.M. (2007). *Information and communication technology in education.* Tiruchirappalli: Prophet Publishers.

Kulsum, U. (2008).Information communication Technology in Education. Agra: H. P. Bhargava Book House.

Rao, U. (2005). *Educational technology*. Delhi: Himalaya Publishing House.

8.13 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress-1

1) A (2) ICT (3) Processing, exchanging

Check Your Progress-2

1) D (2) teaching-learning resources, examination

3) school announcements, student registration

Check Your Progress-3

1) B (2) Immediacy (3) Softwares, techniques

4) Significance of ICT in Education

- Access to variety of Learning Resources
- Immediacy to Information
- Any time & Any where learning
- Collaborative Learning
- Multimedia Approach to Education
- Authentic and upto Date Information
- Access to online bibrary
- Teaching of different subjects becomes interesting
- Distance Learning
- Better accesses to children with disabilities.

PARADIGM SHIFT IN EDUCATION DUE TO ICT

LESSON NO 9 **UNIT - III**

Structure

9.1 INTRODUCTION

In the previous chapters we have studied that ICT includes all technologies for the manipulation and communication of information. ICT considers all the uses of digital technology that already exists to help individuals, business and organization. The inclusion of Information and Communication Technology (ICT) issues in the curriculum and provision of these technologies in our schools have raised many issues of concern to educators, parents, and politicians. Some of the most important issues are the role of the ICT in the curriculum, and how these issues should be

addressed in the curriculum, and most importantly how they impact teaching and learning. The other issue of concern is the impact of these technologies in terms of increasing access to quality education. Learners in our schools today will require considerable ICT knowledge, skills and awareness if they are to be successful in the future. So, in the present chapter we will study that how ICT brings a paradigm shift in the field of education.

9.2 OBJECTIVES

After going through this lesson, you shall be able to:

- discuss the different areas of education which are especially affected by integrating ICT in education,
- discuss the curriculum and teaching methods required after integrating ICT in education,
- explain the change in role of teacher after integrating ICT in education, and
- explain the change in methods of teaching after integrating ICT in Education.

9.3 PARADIGM SHIFT IN EDUCATION DUE TO ICT

Information and Communication Technologies are today playing a very important role in transforming the mode of imparting education. Education at all levels has been significantly impacted by the tremendous innovations in ICT especially in the field of telecommunications and multimedia applications. Slowly in our education system the dependence on ICT is increasing. A few decades ago, technological devices like radio, television, film strips, OHP, audio and video cassettes were used to make teaching effective and enhance learning. But now-a-days, teaching and learning has been enhanced by a vast array of ICT based technologies in the form of interactive radio, teleconferencing, web based and satellite based services.

ICT provides opportunities to access an abundance of information using multiple information resources and viewing information from multiple perspectives, thus fostering the authenticity of learning environments. The world in which we live is changing rapidly and the field of education is experiencing these changes in particular as it applies to media services. The old days of an educational institution having an

isolated audio-visual department are long gone! The growth in use of multimedia within the education sector has accelerated in recent years and looks set for continued expression in the future. Educational Technology standards are the roadmap to teaching-learning effectively and growing professionally in an increasingly digital world. During this digital age, we need to have rethinking on our instruction, training and curricula. Old educational models will simply not do any good to anyone. The new and newer technologies have put on pressure to educational practices as well. There is a timely need for new student support mechanisms, teacher-student interactions, assignments handling, assessment and evaluation and providing feedback. There is no denying the fact that technology has changed the way we teach, learn, and think. Movements have been observed from curriculum-oriented to learner oriented methodologies, from individual-oriented to collaborative-oriented tasks and from passive-learning to active learning. In the following section we will discuss the shift in education due to ICT with special reference to curriculum, role of teacher, methods of teaching, classroom environment, evaluation procedures and educational management.

9.3.1 Paradigm Shift in Education due to ICT with Special Reference to Curriculum

Curriculum deals with the goals, content and organization of learning at several educational levels. Increasingly, assessment is also seen as an integrated part of curriculum. A comprehensive approach in which these curriculum components are well attuned to each other is essential to successful curriculum innovations, such as the integration of ICTs in the curriculum. For a long time, the implementation of ICTs was perceived by policy-makers as a matter of provision of hardware and soft ware only. More recently, attention has been paid to the implications of the use of ICTs for curriculum content, learner activities, teacher roles, assessment practices, etc. The integration of ICTs in curricula is a complex endeavour in which many stakeholders are involved. Following changes are observed in curriculum due to increasing use of ICT at school level:-

- **Learning Load Instead of Teaching Workload**

Teachers work remains one of the most over loaded and underrated. This extra load can be reduced by

- Workload Automatization,
- Technology Integration and
- Practical Technology based lesson plans.

By **Workload Automatization** we mean, benefit the classroom using the whiteboard. We can use the interactive whiteboard as a base for other applications that will make things work in a more efficient way. If the classroom is accommodated with the whiteboard and the projector, that could give a perfect start to the broadcast of online video lessons and documentaries, use of interactive sites, and use of videoconferencing tools for inviting experts to classroom discussions. Just using a computer, students can start a collaborative blog. The teacher can devote the whole lesson to blogging activity and assign the students in turns to moderate them. This will help to save time for the lesson planning and supervision.

Technology Integration means even with a single computer in the classroom, it is possible to make the most out of the resources that teacher has. Application integrations in the LMS (Learning Management System) allow doing things quicker as there is no need to log into the numerous apps in separate tabs. Almost all LMSs, like Schoology or Moodle, have inbuilt tools for quick class management and provide students with timely feedback within the system via commenting the assignments, grading or making notes. Students don't have to wait until the next lesson begins, to ask the teacher for advice or share their concerns. They can leave a comment, and the teacher will be quickly notified with a push notification.

Full-time education **Practical Tech-Based Lesson Plans** develops communication skills, provides an opportunity for reflection and feedback while technology-based learning accelerates the process. The practice shows that learning technologies are the most powerful when they are combined with pedagogy. Such mixture lets the educational model benefit from both learning ways and it is called blended learning. For the effective blended learning implementation, it is important

not only to provide them with an equipment and application, but also suit the lessons to the new format beforehand. There are several models of blended learning that became increasingly popular during the last years, which could be used as the basis for further lesson plan development. Some of these are the following: Flipped Classroom, Rotation, flexible Classroom etc.

- **Flexible Curriculum**

Curriculum flexibility is effective implementation of lesson plans in classrooms according to the need of the students. A lot of thought goes in planning and preparing the lesson plans. Children will benefit only if the implementation is strong, whether it be circle time, project work, subject time or music time; a teacher's effort should be to reach out effectively to each child in the group. Lesson plans are prepared much in advance and usually there is a gap between preparation and implementation. Children listen to some teachers and are receptive, while the same group of children could respond differently to another teacher. Some of the requirements of flexible curriculum are planning, clarity of thought, organization, knowing how we will transact, review of the work, team responsibility, clarity of communication, addressing different levels of children, knowing, observing and understanding children at all times, time management, alertness, material organization, room set up, ready alternatives and always being watchful.

- **Rapidly Updating**

Introduction of ICT to education suggests a constant updation in curriculum in this rapidly changing era of technology integration. As soon as a technology is introduced in market, it is thought that how it can be used in education. After discussions and experiments if that technology is found useful it is introduced to the particular level of school or college for which it is found useful. Thus the rapid changes in curriculum are the demand of the technology integration.

- **Variety in Assignments**

Dut to the recent trend in assessment initiatives by NCERT and CBSE, the reach of assessment is more expansive and complex, designed to produce a well-educated, well-rounded student, not just one who could demonstrate discrete literacy and

numeracy skills. Thus, for example, they included not just academic content knowledge, but also outcomes that related to thinking, creativity, problem solving, and the interpretation of information. Some of the major features of assessment are:- Integral to classroom culture, oriented toward clear learning goals, incremental and interactive, providing feedback that is timely and specific, focused on the process of learning as much as the outcome, and using varied methods to deepen learning and meet diverse student needs. Different types of assignment using ICT are Stand Alone Assignments, OSCATS, R-Based Adaptive System and my exam box etc.

9.3.2 Paradigm Shift in Education due to ICT with special reference to Role of Teacher

The role of the teacher in teaching and learning process is vital. The use of information and communication technologies (ICTs) as a tool in this process does not do away with the role of the teacher. Experiences show that there is a great disconnect in the usage of ICTs between students and teachers. Teacher training and on-going relevant professional development are essential if benefits from investments in ICTs are to be maximised.

- **Teachers Remain Central to the Learning Process**

A shift in the role of a teacher utilizing ICTs to that of a facilitator does not obviate the need for teachers to serve as leaders in the classroom; traditional teacher leadership skills and practices are still important (especially those related to lesson planning, preparation and follow-up).

- **Lesson Planning is Crucial When Using ICTs**

Teacher's lesson planning is vital when using ICTs; where little planning has occurred earlier; research shows that student work is often unfocused and can result in lower attainment.

- **Teacher as Motivator**

The best teachers using technology to aid independent learning are the ones who have embraced the power that is already in the pockets of students. Most students have powerful devices, primed and ready to go in their pockets – the dreaded mobile phone. Allowing students to upholster these weapons is a liberating experience for

both teacher and student. Filming a peer assessment or recording a group discussions and uploading to AudioBoo is yet another way of engaging students.

- **Teacher as Creative Thinker**

Teacher can avail the opportunity to do something new and using technology as the tool can open up a cave of treasures that hooks the attention of the students and once he/she has that it can lead students anywhere.

- **Foster Love for Any Subject**

We all feel the stresses of getting students through exam courses and allowing them the freedom to wander is sometimes too much for some to allow. However, it has been observed that allowing the freedom to search and discover the subject through technology has fostered love for any subject.

- **Teacher as a Guide**

The teacher is not used to allowing his/her students space to guide their own learning then it is going to be very intimidating for the students. Allowing the use of technology in classroom has freed teachers from lesson-plan shackles. It feels strange at first but this type of emancipation is addictive.

9.3.3 Paradigm Shift in Education due to ICT with special reference to Methods of Teaching

It is one thing to provide schools with ICTs, and yet another to implement these, that is, use them effectively in teaching and learning to realize their impact. Teachers require more knowledge of, and confidence with ICT, and a better understanding of its potential to help pupils' learn. This suggests that further substantial support for continuing professional development is necessary in order that teachers integrate these technologies and infuse ICT issues in the teaching to improve pupil's attainment. The pedagogical practices of teachers using ICT can range from only small enhancements of practices using what are essentially traditional methods, to more fundamental changes in their approach to teaching. The most effective uses of ICT are those in which the teacher and the software can challenge pupils' understanding and thinking, either through whole-class discussions using an interactive whiteboard or through individual or paired work on a computer. If the teacher has the skills to

organize and stimulate the ICT-based activity, then both whole-class and individual work can be equally effective. To effectively infuse and integrate ICT into teaching and learning teachers need to use a range of practices that are essential pedagogical frameworks.

- **Solutions to Reduce the Problems of the Learning Process**

Common tools used by the majority of teachers in classrooms lend themselves to particular learning methods. Among these methods are those where the teacher presents a knowledge already developed (often using textbooks, or notes on the course) that the students must learn or memorise. The interaction between the teacher, the learner, the program contents and the intellectual skills required are generally limited to pedagogical interventions. The teacher asks questions and the students try to find the answers. There is little room for the formulation of hypotheses, for their verification in various documents, for the processing of data and their communication. These are skills that demonstrate the student's commitment to building his or her knowledge base.

- **New Tools to Learn and Teach**

With the advent of the World Wide Web or internet there are now new tools and learning procedures that support the development of new teaching and learning skills. Information and Communication Technologies could prove to be advantageous because of their interactive and non-linear properties, highlighted by the hypertext technique that supports the construction of knowledge. This technique empowers the user, who proceeds to choose his paths.

The reader of the WWW explores the Web. Not only is he a typical information "miner", but he is also a frantic miner because he scans the Web to find what interests him. He digs, takes a nugget of information, looks at it and throws it either in his bag or rejects it. Above all, he does that quickly! Very quickly! He "surfs".

In this context, knowledge is not deductive-not handed to learner, but inductive, i.e. based on experiments, the explorations and spontaneous constructions carried out in micro-worlds which are displayed on a computer screen subjected to the requirements of the programs used.

- **Constructivist Learning Process**

ICT facilitates constructivist learning process. Doing free research and making a spontaneous effort on the part of the pupil will result in more retention of knowledge. He will acquire a working method, which will serve him all of his life and will unceasingly widen his curiosity without risk of drying it up.

- **Supporting Processes of Checking**

Teachers pointed to ways in which use of ICT could support various processes of checking, trialling and refinement. There was positive comment on courseware – commercial or teacher-devised – which presented sequenced items to pupils, testing them at each step to provide "feedback immediately on how they're doing", and "giving the kids a chance to check their work, because they can't go to the next step unless they get the first question right".

- **Enhancing the Variety and Appeal of Classroom Activity**

Use of ICT could bring variety to classroom activity and enhance its appeal. Students like a change from the routine of classroom and love to go to ICT room. Use of ICT enhances the motivation and attention of students which is very valuable for the teacher for effective teaching.

- **Fostering Pupil Independence and Peer Support**

Use of ICT can create opportunities for pupils to exercise greater independence and share their expertise. They become more self sufficient and given the opportunity to use ICT in learning, that can do amazing things and become independent learners. ICT use teacher then how to do things for themselves, as opposed to just relying on having a teacher there always to do things for them.

- **Focusing on Overarching Issues and Accentuating Important Features**

Use of ICT can help to focus the attention of pupils on overarching issues, and to accentuate important features of situations under consideration. Use of ICT can facilitate or automate subsidiary tasks – typically those involving routine data handling, calculating and graphing – freeing users to give their attention to more overarching matters: The key thing about ICT application is to take away the drudgery

out of doing the calculations, so that you can start to access a higher learning point without the problems of making mistakes along the way clouding the issue.

Check Your Progress -1

Note: (a) Answer the questions given below

b) Compare your answers with those given at the end of the lesson.

Q1 The most effective uses of ICT are those in which the teacher and the software can challenge……

A. pupils understanding and thinking.

B. learners need.

C. learners Ideology.

D. Pupils' marks.

Q2 Enlist various points on the basis of which you can say that school curriculum has changed after the integration of ICT.

….

….

….

9.3.4 Paradigm Shift in Education due to ICT with special reference to Classroom Environment

- **Learning at the learner's pace**

In most learning environments, the speed with which individuals can progress through instruction varies. Since e-learners are able to proceed through courses at their own pace, they can learn the material more thoroughly or less likely to become bored.

- **More Interactivity with the Learner**

The interactivity typical of e-learning tends to captivate the learner. In the traditional classroom environment, a student asks about 1 question per hour. Studies show that

students in e-learning environments can interact with courseware via question and answer up to 120 times per hour.

- **Comprehension Enhanced by Graphic Representation**

Learners can learn faster with multimedia content. They more accurately recall what they learned over a longer period of time and they are able to transfer what they learned to actual performance.

- **Learner Efficiency and Convenience**

E-learning is generally absorbed in less time than the same instructional material delivered in the classroom. By enabling learners to navigate through material at their own pace, e-learning minimizes the time that knowledgeable learners must spend in such training activity. E-learning is more convenient. Unlike traditional classroom training, which is sometimes scheduled at a time inconvenient to the learner, e-learning offers the learner more flexibility with respect to time and place.

- **Faster Roll-Out**

Due to the ubiquity of the Internet and scalability of servers, e-learning can be delivered immediately to thousands of learners and worldwide. Traditional classroom training does not always guarantee that the same information or quality of instruction is provided to all students. It has been reported 50% to 60% improved consistency using some form of e-learning. Furthermore, the ease of updating e-learning material, as compared to classroom instructional material, should be taken into account.

- **Sensory Appeal**

Specific examples of content intended to appeal to multiple senses are: Audio, Graphics, Animation and Video. All have large impact on retention power of learner.

- **Personalized Learning**

Personalized learning may involve the applications adjusted to learner's needs.

- **Learner-Driven Learning**

E-learning uses a learner-determined navigational path through material and instructional material or tests adjusted for learner's familiarity with material.

- **Meaningful Measurement of Learner Progress**

In e-learning there are ample questions directed to learner throughout the course. There is also measurement of "learning outcomes", i.e., measurement of learner's application of knowledge gained—not testing of instructional material memorized.

- **Novel, Humorous, or Relevant Content**

Examples include: Games, Role playing, and Simulations. The Material can be delivered "just in time" for use in classroom.

9.3.5 Paradigm Shift in Education due to ICT with special reference to Educational Management

ICT makes dynamic changes in society. It is influencing all aspects of life. The influences are felt more and more at schools. Because ICT provides both students and teachers with more opportunities in adapting learning, teaching and managing the individual needs, society is forcing schools to aptly respond to this innovation. It provides newer and more effective ways of mitigating some of the challenges being faced by the educational system of the country. These technologies distinguish themselves by their rapid evolution and revolution, continuously changing the modes of engagement with them. A decade long infusion of computers, and more recently ICT, has demonstrated varying impacts on learning. In the current information age, educational institutions are expected to play a crucial role as the engine for knowledge generation and learning environment. In this regard ICT becomes the vital means to facilitate this task. ICT has become an essential part of our everyday life, accordingly this integration in school improvement is not only for the purpose of teaching and learning, but also for educational management use. It has become one of the most effective factors in the school improvement. ICT plays a vital role in improving the functional effectiveness of school system. In this section we will be discussing about how ICT can help the school administrators to improve various administrative tasks of schools:

- **Record Keeping**

School records are books, documents, files and CD ROM in which is embodied information on what goes on in school (e.g. scholastic, co-scholastic, non-scholastic

activities and important events etc), the school plant as well as other relevant information focusing on the growth and development of the school. The school records are official transcripts or copies of proceedings of actions, events, other matters kept by the school administrator. School records could be viewed as authentic registers or instruments or documents of official accounts of transaction or occurrence which are preserved in the school's office. Every school can keep certain specified records stored, safe in computer for use.

- **Administrative Efficiency**

One major setback in achieving the educational objective of the secondary education is inefficiency of the principal in keeping some records. With the introduction of Information and Communication Technologies such as computers, digital libraries, e-mail, internet and so on where information are stored and disseminated, principals can do better in keeping records, and become effective and efficient in performing their prescribed roles as administrators.

- **Availability of Information**

Information and Communication Technologies will help maintain adequate and accurate records in our schools and make it available with ease.

- **Easy Retrieval**

It also leads to easy accessibility and dissemination of information on school records. The information can be made available for national planning, financial budgeting, effective implementation of the educational programs and policies. School record keeping is all about information collection, storage, retrieval, use, transmission, manipulation and dissemination for the purpose of enriching communication, decision-making and problem solving ability in the school system. It is therefore necessary that this process be as accurate and accessible as possible. Using ICT in keeping school records will help to facilitate and enhance the administration of the school towards achieving the goals of the secondary education.

- **Scheduling**

Creating a schedule that will maximize instructional time, provide time to meet the needs of the school's students, provide time for staff to meet and plan, organise

various curricular and co-curricular activities of the school is very important for any school. Use of ICT helps to ensure that such scheduling happens smoothly.

Some of the important activities of the school that need to be planned and scheduled are School calendar, teaching time table, Examination time table and Meetings including PTA. There are many software tools which help in such scheduling. Google calendar and FET time table software are two such commonly used tools. Google Calendar is an internet-based time and task-management online application that allows for access to calendars via web browsers. Calendars can be created by schools and shared with parents, teachers, and students. Reminders of scheduled activities can be sent via email, text message, or pop-up messages within a web browser. Users are allowed to create as many calendars as they choose. One can have day, week, month, and year view of the calendar. Similarly teacher can generate time-table and fix meetings with parents using ICT's like e-mail, websites, blogs, online surveys, virtual environment, media sharing, social networking, online groups and forums, SMS and instant messages etc.

- **School Management Tools**

Interactions sharing ideas and communications with teachers, parents, alumni and community members become the major part of school management. School management includes admission of students to various courses, assigning subjects and classes to teachers, maintaining records, communicating with parents, preparing various certificates, analyzing various data etc. It should help all the stake holders in participating actively in decision-making process. The functions of a school manager are to manage the school and formulate policies that best suit the needs of the school as well as the overall interests of the students. A manager is responsible for school planning with a view to creating learning environment for their students and nurturing talents. Hence, aside from the time and energy spent in school management, a school manager should have a good understanding of the school itself as well as the trend of education development. Going without school administration software could be costing your time and effort. Earlier times school administration was run without software. But present day we are living in a digital world and needs are changed. Some of the school management tools are **FEKARA, School Time, TS School, FEDENA, School Tool and Open Admin for schools**.

9.3.6 Paradigm Shift in Education due to ICT with special reference to Evaluation Procedure

Evaluation plays a major role in student learning. There are many new approaches to evaluation with an emphasis on the process of learning along with the product of learning. Performance based authentic assessment is emphasized world over. In India also there is an emphasis on continuous and comprehensive evaluation of students' learning. Development in information and communication technology has thrown open numerous possibilities for assessing student learning and providing feedback. Teachers can use computers to construct their assessment tasks, to deliver these tasks to relevant students and to record and provide feedback and grades to these students. Computers can also be used to analyse students' responses, both to provide feedback to the student on the quality and relevance of their response, as well as to provide feedback to the teacher on whether the task can differentiate between students with different abilities. ICT based assessment can be used to test many different capabilities and skills that are developed by students. There are only a few tasks that might not be suitable for completing and recording electronically, but the number of such tasks is rapidly diminishing as technology becomes more sophisticated and widespread. In many disciplines laboratory equipment can be manipulated remotely and students can undertake real time physical performances that are able to be recorded and used for assessment purposes. We are quickly approaching the stage where our imaginations will be the limiting factor in designing e-assessment tasks. This section on ICT in Evaluation Procedure discusses about the basics of evaluation practices and explores how various technology tools can be integrated effectively for assessing student learning.

- **Online Exams**

Learning Management System (LMS) based assessment options are a large number of ICT tools and services supporting various kinds of assessment activities. Some of these are offered as specific modules of learning management systems (LMS) like Moodle that enable the management of question banks and items together with the administration and internet-based delivery of tests. The various assessment question types which are available in LMS like **Moodle** are description, essay, matching,

embedded answers (cloze test / gap fill), multiple choice, short answer, numerical, true/false, drag and drop, jigsaw, ordering, multi select, short answer etc.

- **Standalone Assessment Systems**

There are comprehensive assessment management systems with specific focus on summative and formative assessment, like **Rogō.** It is the University of Nottingham e-Assessment management system used to create and deliver online assessments. This online system supports the full process from question and paper creation (including peer and external examiner reviews) to the analysis of exam results and creation of reports. It has support for formative quizzes, summative exams, surveys and several other paper types. Authentic assessments can be created using any combination of 15 question types together with graphics, audio files and video. The question types are area, dichotomous, multiple choice questions (MCQ), multiple response, extended matching, flash interface, fill-in-the-blank, image hotspots, labelling, Likert scales, ranking, script concordance test (SCT), text boxes, true/ false.

- **Enhanced Question Types**

Technology-based assessments allow for a variety of question types beyond the limited multiple-choice, true-or-false, or fill-in-the-blank options that have characterized traditional assessments. Examples of enhanced question types include the following:

• Graphic response, which includes any item to which students respond by drawing, moving, arranging, or selecting graphic regions

• Hot text, in which students select or rearrange sentences or phrases within a passage

• Equation response, in which students respond by entering an equation

• Performance-based assessments, in which students perform a series of complex tasks. Technology-enhanced questions allow students to demonstrate more complex thinking and share their understanding of material in a way that was previously difficult to assess using traditional means.

- **Provide Real-Time Feedback**

Technology-based formative assessments can offer real-time reporting of results, allowing stakeholders to understand students' strengths and weaknesses, while guiding them to make valid, actionable interpretations of the assessment data. Such assessments can enable educators to see, evaluate, and respond to student work more quickly than can traditional assessments. Similarly, learners and their families can access this information almost in real time. Technology-based summative assessments also facilitate faster turnaround of results.

- **Increase Accessibility**

Advances in technology grounded in Universal Design and systems that align to Universal Design for Learning (UDL) have made assessments more accessible and valid for a greater number of students, including those with diverse abilities and language capabilities. These advances have allowed a greater proportion of the population access to assessments. Special features include the ability to increase font sizes and change colour contrast, text-to-speech, bilingual dictionaries, glossaries, and more. Similarly, assistive technology, such as text-to-speech, alternate response systems, and refreshable Braille, supports students with disabilities in accessing learning.

- **Adapt to Learner Ability and Knowledge**

Computer adaptive testing has facilitated the ability of assessments to estimate accurately what students know and can do across the curriculum in a shorter testing session than would otherwise be necessary. Computer adaptive testing uses algorithms to adjust the difficulty of questions throughout an assessment on the basis of a student's responses. For example, if the student answers a question correctly, a slightly more challenging item is presented next; if the student answers incorrectly, he or she receives another opportunity to construct knowledge in a different manner.

- **Assessment for On-going Learning**

Technology provides students with multiple pathways to create assessable work throughout the year. To demonstrate their understanding, students can create multimedia productions, construct websites to organize and analyze information,

and design interactive presentations to serve as products for assessment. These pathways allow teachers to understand how students access and understand information across given categories.

Technology has transformed the assessment practices by providing several soft wares. Now software features have become an integral part of the test design, validation, norms etc. Assessment information is now linked to multiple systems and reused. Several technology enabled assessment models are available online. These models can be used for making an effective assessment of students' learning and performance.

Check Your Progress -2

Note: a) Answer the questions given below

b) Compare your answers with those given at the end of the lesson.

Q1 ROGO is a type of …….

A. Scheduling software.

B. Evaluation Software.

C. Administration Software.

D. All the above

Q2 Enlist four ICT tools available for School Management System.

….....

….....

….....

9.4 LET US SUM UP

During the teaching-hour the teacher proceeds to creative combinations of various types of teaching. All teaching methods and activities should link harmoniously. The combination of instructive methods should include tasks and activities, which the students have to do alone, in small groups or as a whole in class. Mainly, the teacher should not rely on the known methods and practices, because there is always space for improvement or need for a change for something new, as the implementation

of ICT. The school class is a permanent challenge. We believe that it becomes obvious from the above that it is not enough that the teacher knows how to use the ICT in class. He needs to have a full notion of what e-learning is and what activities the students can do so as to be able to be an e-tutor taking full profit of the advantages it offers. More specifically, the e-learning tutor must combine the competencies of the tutor of a traditional classroom and some new competencies produced by the needs depicted by the e-learning process.

9.5 LESSON END EXERCISE

1. Describe various areas of Education which are affected by the integration of ICT in Education.
2. "ICT has impacted the school curriculum". Explain.
3. Explain the nature and advantages of online assessment.
4. What roles can ICT play in the administration of schools?
5. How does learning about ICT tools help teachers in changing their roles?

9.6 SUGGESTED FURTHER READINGS

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9.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress-1

Q1 "A"

Q2 Change in Curriculum due to ICT

- Learning Load Instead of Teaching Workload
- Flexible Curriculum
- Rapidly Updating
- Variety in Assignments

Check Your Progress-2

Q1 "B"

Q2 Four ICT tools available for school management are :

FEKARA, School Time, TS school, FEDENA

CHALLENGES IN INTEGRATING ICT IN SCHOOL EDUCATION

LESSON NO 10 **UNIT - III**

Structure

10.1 INTRODUCTION

Acknowledging education as a tool for social change necessitates incorporating changes in the methods of dissemination of knowledge to synchronise with emerging trends in all sectors of life. According to a World Bank report, disparities in the levels of ICT readiness and use could translate into disparities in level of productivities and hence could influence a country's rate of economic growth. Understanding and leveraging ICT is therefore critical for developing countries like India; striving for continued social and economic progress. Hence, the necessity for Information and Communication Technology (ICT)-based resources to be embedded in educational systems to facilitate students to be acquainted, familiarised and skilled in such tools and environments. But this is a mammoth task and policies, programmes and

initiatives are to be taken for this. This lesson tries to mark out certain key areas which pose a great challenge to all the stake holders in Indian education system.

10.2 OBJECTIVES

After going through this lesson, you shall be able to:

- explain the aims of integrating ICT in School Education,
- discuss the history of Integrating ICT in School Education,
- explain the challenges in integrating ICT in School Education, and
- discuss the remedies of the challenges in integrating ICT in School Education.

10.3 AIMS OF INTEGRATING ICT IN SCHOOL EDUCATION

In diverse socio-economic and cultural contexts, ICTs can be successfully leveraged to reach out to a greater number of students, including those to whom education was previously not easily accessible, and help in promoting learning, along with exposing students to the technical skills required for many occupations. Other aims of integrating ICT in school education are:-

- ❖ To improve education system of the nation.
- ❖ To transform the nature and quality of education as a whole.
- ❖ To enhance the quality of education by facilitating new forms of interaction between students, teachers, education employees and the community.
- ❖ To acts as and provides students and teachers with new tools that enable improved learning and teaching and adds to skill formation.
- ❖ To improves the learning process through the provision of more interactive educational materials that increase learner motivation and facilitate the easy acquisition of basic skills.
- ❖ To make education more accessible for all, bringing education to the doorstep of children living in remote rural locations by means of enabling distance learning.

- ❖ To provide access to a vast treasure of educational resources and content for improving literacy.
- ❖ To integrate technology with traditional educational activities although it can never replace the conventional teacher-student relationship that is so crucial to the development process.
- ❖ To offer more challenging and engaging learning environment for students of all ages.
- ❖ To enable a knowledge network for students.
- ❖ To provide greater flexibility and individualized learning facilities to learners.
- ❖ To enhance the overall teaching-learning process.
- ❖ To avail high speed delivery of uniform quality content at reduced cost bringing the cost of education from very high to very low.

10.4 HISTORY OF INTEGRATING ICT IN SCHOOL EDUCATION

Broadly, ICT in education can be defined as "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephone communication. It should be understood that information and communication or ICT singularly does not generate learning. Rather, it is a tool that can be effectively utilised to enhance, improve and complement learning-skills already in use that is the conventional methods of pedagogy that have been used so long. To increase the effectiveness and efficiency of education at all levels, the computers and the internet has been used, in the recent past, in addition to the already-available and utilised resources of radio and television, in both classroom and distance-mode of education. However, as educational resources, printed texts were and still are the most accessible, both in terms of cheap availability as well as popularity all across the world, and are in no threat of being upstaged, as the book continues to remain the chief and most powerful visual symbol of education.

The Government of India assessed the importance of the ICT intervention in education as early as 1984-85 with the introduction of **Computer Literacy and Studies in Schools (CLASS)** as a joint venture of the Ministry of Human Resource Development in collaboration with the Department of Electronics, where in 12000 secondary and senior secondary schools were beneficiaries. This project was later on adopted as a centrally sponsored scheme during the 8th Five Year Plan (1993-1998), and beneficiary institutions increased in number and were provided financial assistance for purchase and maintenance of computers, text books as well as provision for computer instructors. The National Policy on Education (NPE), 1986 did not specifically mention the use of ICTs for promoting primary and secondary education, but the 1992 Programme of Action (POA) on NPE stressed the need to improve access to computers in schools. This move was followed by the constitution of the National Task Force on Information Technology and Software Development (IT Task Force), by the Prime Minister in 1998 that introduced certain attractive schemes such as Vidyarthi Computer Scheme, Shikshak Computer Scheme and School Computer Scheme to inspire and initiate both teachers and the taught to make themselves tech-savvy. These schemes were supported by a suitable cache of initiatives such as lowering the cost of PCs, easy instalment bank loans, computer donations by IT companies and other business houses, bulk donations of computers by NRI organizations and individuals, large-volume bargain price imports, multi-lateral funding, etc. Computers and Internet was to be made accessible to schools, polytechnics, colleges, and public hospitals in the country by the year 2003. Though this initiative failed to make a comprehensive impact, yet the concept of SMART Schools attracted the attention of many schools and higher educational institutions such as colleges, universities where the emphasis was not only on Information Technology in Schools, but also on the use of skills and values that will be ultimately beneficial to all stake-holders.

The Sarva Shiksha Abhiyan (SSA) – Education for All Movement is a programme launched by the Government of India that aims to Universalization of elementary education "in a time bound manner", as directed by the 86th amendment to the Constitution of India making free education to children aged 6–14 (estimated to be 205 million in number in 2001) a fundamental right. SSA is being implemented in partnership with State Governments of the country to address the needs of 192

million children in 1.1 million habitations. Beside opening new schools in those habitations without schooling facilities and to strengthening existing school infrastructure through provision of additional class rooms, toilets, drinking water, maintenance grant and school improvement grants, the SSA also provides additional teachers in existing schools with inadequate teacher strength. Capacity-building of existing teachers is also being initiated by extensive training, grants for developing teaching-learning materials including supplementary teaching resources in digitalized form, and strengthening of the academic support structure at a cluster, block and district level. SSA seeks to provide quality elementary education including life and value-education skills. Most importantly, SSA specially focuses on education and empowerment of the girl-child and children with special needs. SSA also seeks to provide computer education to bridge the digital divide.

Among the first ICT resources to be used in India was the radio, where educational programmes started being broadcast as far back in 1937, known as the School Broadcast Project, simultaneously from Delhi, Bombay, Calcutta and Madras. However, due to regional disparity in school curricula, this project was not successful in the long run. However, the three main strengths of radio are a) improving education quality and relevance, b) lowering educational costs, and c) improving access to educational inputs, particularly to disadvantaged groups. After independence, radio proved to be a major educational resource medium for promoting adult education and community development, beside farm and home-broadcast topics. The University Broadcast Project started in 1965 and the Language Learning Project started in 1979-80 were worthy precursors of the next chain of radio-programmes that were adopted by IGNOU as part of their distance learning, the IGNOU-AIR Broadcast and the IGNOU-AIR Interactive Radio Counselling. In November, 2001, Gyan Vani , an FM Radio channel started functioning as media operatives, with day - to - day programmes contributed by various ministries, educational institutions and NGOs. EDUSAT, the first Indian satellite designed and developed exclusively for serving the educational sector was launched by the Indian Space Research Organisation (ISRO) in September, 2004. This system was primarily for school and college education, but beside the formal sector, it was also supposed to support the non-formal educational sector. Meanwhile, the Information Technology Act 2000 emphasized technical higher education, so that students would get better placement

opportunities in the emerging IT sector in India. This also was bolstered by the Science and Technology Policy 2001 that called for the teaching of science at school and college levels.

The launching of INSAT, INSAT-1A and INSAT-1B were important milestones in the promotion and development of ICT in educational sector. The Information Technology Policy 2005 recognized the strategic importance of ICTs as key components of socio-economic development, governance and enhanced service-delivery. Additionally, the policy also called for improvement and spread of education to achieve computer literacy among students. The VISION 2020 programme, initiated by President A.P.J.Abdul Kalam, encompassed a holistic development module that included integrated information technology tools with a sustainable environment-conscious approach to education. The Ministry of Human Resource Development (MHRD) also undertook several long-term strategies to ensure spread, development and optimisation of ICT tools in Indian classrooms, integrating them with traditional frameworks of knowledge- dissemination.

In measuring indicators for sustainable information societies, the United Nations Commission for Science and Technology for Development (UNCSTD) for instance, includes experience, skills, and knowledge as critical components in the development of information societies aside from infrastructure. The University Grants Commission also instituted several schemes, such as the setting up of Network Resource Centres in higher education institutes to encourage universities, colleges, and other learning institutes to promote better incorporation of ICT in curricula to prepare the next generation of citizens for better adaptation in IT environments. State governments have also come forward to inculcate ICT knowledge and skills among students. The Government of West Bengal has initiated a number of projects for computer skill development among students of school and college levels, as part of their vocational education curriculum, along with a broad-based computer awareness and training programme for disadvantaged groups (SC,ST, OBCs, minorities) as part of their social welfare objectives.

Most recently, the National Mission on Education through Information and Communication Technology (NME-ICT) seeks to holistically change the educational environment of the country by an aggressive campaign to introduce ICT-enabled

education in India, by assuring network access to remote corners, development of quality e-content, as well as empowering student-community by providing low-cost tablet PCs, named Akash. This project is one of the most prestigious projects undertaken by MHRD, in collaboration with different IITs, particularly IIT Mumbai, and the telecommunication major, Bharat Sanchar Nigam Limited (BSNL). NME-ICT is not oriented towards school and college/university-level education, but also ambitiously aims at providing more than 50 crore working population with a one-stop solution for all their learning-needs. One of the prime objectives of this mission is effective utilization of intellectual resources, minimizing wastage of time in scouting for opportunities or desired items of knowledge appropriate to the requirement. Addressing the NME-ICT South Zone meeting on December 23rd, 2011 through Amrita University's award winning e-learning platform A- VIEW (Amrita Virtual Interactive E-Learning World) from MHRD's New Delhi office, MHRD Additional Secretary, Shri N.K.Sinha, in his Key-note address stated the government of India's objectives of this flagship programme and emphasized that quality content, high-speed connectivity and proper devices are vital to the success of this mission. He highlighted that the support of all educational institutions in the country is necessary to generate quality content. Now learners can avail content, free of cost from Sakshat website, www.sakshat.ac.in. Broadband connectivity is being ensured in all institutions under the NME-ICT mission. At present, around 250 Universities have been using 1 Gbps connectivity on optical fibre. Govt. of India has been providing 75 per cent of the total cost to the educational institution to set up connectivity. Hence they only have to invest 25 per cent. He added that the MHRD has ordered BSNL (Bharat Sanchar Nigam Ltd) to deliver Akash tablet while providing connectivity also. Stressing on the need to complete LAN connectivity work, he pointed out that unless institutions across the country wake up to the necessity of ICT, it would be difficult to allocate funds for them under the 12th Plan period. The point that is to be noted in this connection is that the government is taking major initiatives in the implementation of ICT, yet it still recognises the fact that there are still some innate challenges that calls for immediate attention and action.

Check Your Progress -1

Note : (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 The joint venture of MHRD, India in collaboration with the department of electronics known as "CLASS" stands for:

A. Computer Literacy and Social Sciences

B. Campaign Literacy and Studies in Sciences

C. Computer Literacy and Studies in Schools

D. Computer Literacy and Studies in Sciences.

Q2 List various aims of integrating ICT in school education in India.

….....

….....

….....

10.5 CHALLENGES IN INTEGRATING ICT IN SCHOOL EDUCATION

However, an overview of the ICT policy initiatives of the Government of India as well as state governments, will reveal that though there have been considerable progress in incorporation of ICT tools in education programmes, there is still a huge abyss between the initial projected progress and hard reality. The policy processes are sometimes too complex and fantastic to be implemented in the existing framework. Often there is a lacuna between the development rhetoric and its translation into practice. The essentially theoretical approach to implementation of this progressive strategy, without taking into account several practical parameters, is the basic error that hinders successful action. This is complemented by the grossly ambiguous and flawed computing in formulation of educational policy and discourse, simply because of a third, very important parameter – the absence of a clear direction and purpose that contributes to the undermining of the effectiveness of all policies dedicated to educational reform and development. The policies should ideally reflect

the best interests of all the stakeholders of education such as learners, teachers, educational administrators, policy makers and the multi-cultural community at large, so that all are aware of the issues concerned and are willing to roll into motion the drivers of the mechanism that systematizes ICT enabled education. Beside these foundational-level bottlenecks, other challenges that are encountered in achieving optimised ICT environment in educational institutions are discussed briefly:

A. Infrastructure-Related

B. Teacher-Related

C. Capacity-Building Related

D. Technical-Support Related

E. Language and Content-Related

F. Sustainability Related

G. Equality-Related

A. Infrastructure-Related Challenges

A pre-requisite for spread and development of ICT tools in the country is a steady telecommunication network in the country. However, there are a number of other site-specific reasons, besides the over-arching national lacuna that impedes optimization of ICT resources in Indian classrooms. A number of surveys conducted on utilisation of educational radio and television have already thrown into relief some intrinsic infrastructure-related shortcomings such as small-size classrooms, non-availability of continuous electricity, non-availability of television sets, or sometimes even technicians for maintenance. As far as ICT resources are concerned, it is not always non-availability of hardware or software or proper e-content; it may also be poor organisations of resources, sub-standard quality of hardware, inappropriate software or insufficient time and curricular scope to incorporate ICT in the knowledge- dissemination framework.

B. Teacher-Related Challenges

For successful functioning of ICT in educational scenario, teachers need to accept the major challenge of re-thinking and re-framing their roles and competencies from that of knowledge-generators to knowledge –facilitators, a step that essentially may call for a re-appraisal of the traditional role of teachers in India, where teachers are 'gurus', at par with the divine agencies, and beyond questioning. Beside an ethical/ spiritual revamping of their roles, on a more pragmatic level, teachers should be competent enough to employ particular applications and be proficient with computers, be confident to integrate ICT into existing curricula, and also essay modifications of traditional educational theories and practices to enable futuristic demands of the emerging global market, that is completely information technology-oriented. A major area of concern is the mindset of certain teachers that ICT implementation may reduce or altogether eliminate the role of teacher- educators in the classrooms by substitution through computers, thereby creating a resistance to the digital revolution in educational technology. However, all these can be taken care of by underpinning the necessity of ICT in educational theories, and holistic training schedules for teachers to equip them and purge the irrational fear and apathy towards technology tools. If mobile phones, thought to exclusively an elitist possession, can come up as a pan-Indian life-tool, then, with proper strategising and sincere policy-implementation, teachers can be convinced to evince keen understanding and positive appreciation of their changed roles.

C. Capacity-Building Related Challenges

Training teacher-educators for ICT intervention in classrooms needs to recognise a two-pronged imperative, namely pre- service training and in-service orientation and training. The need of the hour is to integrate training for ICT use into pedagogical training, and not simply training them to use ICT tools. Setting up and running a computer or printer is not enough for teachers to be able to initiate, motivate and prepare students for the future. Instead, teachers should be sensitised to their own responsibilities and inspired to go for skills upgradation as part of capacity-building initiative.

D. Technology Support Related Challenges

A major obstacle that often poses insurmountable and sudden challenges to the teacher is the lack of proper technical support facilities in educational institutions. Since, teacher-educators are vested with the responsibility of knowledge- dissemination in ICT-enabled teaching-learning, the task of how such technology is deployed, used, how different equipments are to be installed, operated and maintained (including software), network administration and network security need to be deputed to sound professionally skilled technical group/technicians. In fact, teachers often suffer from a fear of equipment break-down or software mal-functioning that deters them from using ICT in classrooms, and often causes inferiority and insecurity issues among teacher-educators.

E. Language and Content-Related Challenges

According to the 2001 Census report, around 12% people in India speak in English. After a decade or so, there is no reason to expect any exponential improvement, even though the telecom-revolution in the form of mobile technology has successfully pioneered SMS-communication, and may have marginally increased the multi-cultural Indian citizens' propensity for English usage. It must be remembered that all said and done, the average Indian student is one who receives training in educational institutions in his/her native language from teachers who too are more comfortable in knowledge-dissemination in the vernacular medium. In stark contrast, English is the dominant language of the internet as well as the major software produced world-wide. Most of the web-based resources are in English. In this regard, it is very important to focus on the need for content-development in regional languages, as well as English that is comprehensible to most Indian students, and not just the urban, English-medium education-receptors/students. There is a pressing need to develop original educational content in the form of radio/television programmes, interactive multimedia learning materials on CD-ROM or DVDs, Web content etc. Naturally, this will enlist the support of a large number of IT-efficient and vernacular-proficient personnel as well, thereby paving the way for the creation of a large job-pool for the youth of the country in the form of instruction designers, script-writers/content-writers, audio and video production specialists, programmers, multimedia course specialists, web developers, as well as technical support specialists.

In fact, ICT development in curricular level will create a sizeable opportunity for all these jobs not just in IT- industry but also in academia.

F. Sustainability Related Challenges

In order to ensure that like many government projects that start with a bang and end with a whimper, chiefly due to paucity of funds and lack of consistent government initiatives, the ICT projects need to be linked to a self-supportive mechanism, whereby the beneficiary institution is empowered through different (indigenous/ outside) channels to ensure pursuance of the project with the help of other stake-holders, in collaboration/joint venture, so that even after the initiating agency retracts, the programmes do not face closure/cessation. Multiple financing channels should be worked out for contingency support. An important aspect in this regard is the sustained interests of the stake-holders as well, that goes beyond finances, because in a country such as India, drop-out rates in education are alarming. A sense of alignment with the project needs to be fostered, but only after the stake-holders, students, guardians, teachers, local benefactors, funding agencies, political parties – all are convinced and motivated about the virtues of the issue. Again, in India, policy decisions are also influenced by change of political leadership, and a keen understanding about the processes involved, the corresponding requirements, and necessary harmonization with strategies – finances – implementation need to be ensured. Finally, in an economically-challenged scenario, cost-effectiveness and aappropriate technology are two important parameters to be kept in mind. Since, technology changes rapidly, and is hardly cost-friendly, it may so happen that by the time a particular strategy has been implemented, it has already started facing obsolescence in the wider scenario. However, instead of instituting too many rapid-fire changes to keep the project trendy, a deeper introspective study needs to be made as regards the broad-based objectives of the project of ICT inclusion in educational curricula.

10.6 HOW TO OVERCOME CHALLENGES IN INTEGRATING ICT IN SCHOOL EDUCATION?

Having overviewed the barriers and difficulties of ICT integration presented above, we will discuss the main factors that have to be taken into account seeking to overcome the barriers and difficulties:

- **Political Decisions**

Using Information and Communication Technologies in the process of teaching/ learning, i.e., in class, their integration into the present curriculum aiming at improvement of teaching/learning is the most difficult process. This attempt to integrate Information and Communication Technologies can be fruitless and inefficient unless the Ministry of Education and Science plans and provides schools with proper resources.

- **School Management**

Schools can play a very important role in integrating ICT into the system of education. It is worth mentioning that not only ministries should tell how the process of integration should be organized, but also schools could give feedback on difficulties they are facing in integrating ICT into curriculum and suggest what could be done differently.

- **Teacher as Learner**

Teachers have to experience learner position. In the learner position, teacher models a positive situation for learners and shows learners a different perspective, which makes the perception of new subjects easier. Teacher has to feel free and without any restrictions in the teaching environment. Only these feelings will foster the teacher to learn and develop further.

- **Barriers as Opportunities**

The emerged difficulties should be viewed as opportunities to develop. It should not decrease motivation but should be transformed into the constructive process of teaching/learning, which could support ICT integration in a more efficient way.

- **Peer Support**

Reliable colleagues can become internal "technology" teachers who could teach in small and convenient groups. Teachers can be provided help by sharing best practices of the same school teachers or analysing the benchmarking projects.

- **Time Issue**

If the school intends to achieve good results in the area of ICT integration, then at least one week a year should be devoted to teacher activities outside the class. During these events teachers should be acquainted with innovations in Information and Communication Technology area, and should be explained in detail how to use these innovations and integrate them into the process of teaching/learning.

10.7 LET US SUM UP

Lack of resources within the educational sector is a hindrance in the implementation of ICT in developing countries. Because of limited resources then there will be lack of sufficient computer experience for the students and teachers. The school needs to be provided with adequate facilities and resources for effective implementation of ICT. Effective implementation of ICT largely depends on the teachers and the school administration. The government can help by providing in-service training to the ICT teachers.

It is crucial to involve those who have stake in the outcomes, including teachers, parents and students so as to assist in the creation of the vision by contributing their knowledge and skills. The parents are already paying for the ICT fee which is included in the fees of the students. Had it not been for the commitment shown by the parents most of the computers in the schools would have long stopped functioning as a result of poor maintenance by government. In a number of cases, the teachers that are employed by the schools are also paid by the parents through school fees. Responsible authorities have to try and overcome these barriers so that the students can be benefitted.

10.8 LESSON END EXERCISE

Q1. Explain the history of integration of ICT in Education in India.

Q2. Discuss different challenges in integrating ICT in education in India.

Q3. Enlist various factors that should be taken care of, while overcoming the different challenges in integrating ICT in Education in India.

10.9 SUGGESTED FURTHER READINGS

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10.10 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress-1

1 C

2 Aims of Integrating ICT in School Education in India are:

- ❖ To improve education system of the nation.
- ❖ To transform the nature and quality of education as a whole.
- ❖ To enhance the quality of education by facilitating new forms of interaction between students, teachers, education employees and the community.
- ❖ To acts as and provides students and teachers with new tools that enable improved learning and teaching and adds to skill formation.
- ❖ To improves the learning process through the provision of more interactive educational materials that increase learner motivation and facilitate the easy acquisition of basic skills.
- ❖ To make education more accessible for all, bringing education to the doorstep of children living in remote rural locations by means of enabling distance learning.

- ❖ To provide access to a vast treasure of educational resources and content for improving literacy.
- ❖ To integrate technology with traditional educational activities although it can never replace the conventional teacher-student relationship that is so crucial to the development process.
- ❖ To offers more challenging and engaging learning environment for students of all ages.
- ❖ To enable a knowledge network for students.
- ❖ To provide greater flexibility and individualized learning facilities to learners.
- ❖ To enhance the overall teaching-learning process.
- ❖ To avail high speed delivery of uniform quality content at reduced cost bringing the cost of education from very high to very low.

PROJECT BASED LEARNING (PBL)

LESSON NO 11 **UNIT-IV**

Structure

11.1 INTRODUCTION

The project-based learning belongs among method, which can to develop pupils thinking, to create original solutions, to develop cooperative work, to find available literary resources, to present finding information and to evaluate own findings. As it is seen, this method has got positive influence on the pupils or students, but it must be used during teaching. There is necessary to educate future teachers, because without quality base, we cannot await, using of project-based learning on the elementary or high schools. Project-based Learning (PBL) is a method of teaching that presents students with a problem or challenge to solve, requires them to gather information from various resources, and asks them to come up with an original solution that ends in a product or performance. Projects are great learning tools because they challenge students to work together, think in new ways, use a variety of linguistic, content, and social skills, and incorporate creativity. PBL is an excellent approach to providing multiple options for students with different learning preferences and linguistic levels. Projects can engage students in a way that other types of classroom activities generally do not, which leads to better managed classes and more effective learning. Projects should be tied to the curriculum and allow students to apply their knowledge in ways that lead to deep, meaningful learning and real communication. Often projects are long-term endeavors that last weeks or months, but this is not essential. Although short-term projects do not have all the benefits of longer, more involved projects, they can also be very effective. If you have a very full curriculum or are new to Project-based Learning, consider starting out with a shorter, simpler project. Projects are appropriate for all ages and linguistic levels; it is up to the teacher to design a project that is age and level appropriate.

11.2 OBJECTIVES

After going through this lesson, you shall be able to:

- explain the concept of project based learning, its need and importance,
- describe the use of project based learning in teaching-learning process, and
- discuss about the role of teacher in Project Based Learning.

11.3 MEANING OF PROJECT

A project is an educational method where students working individually or in small groups, analyze and develop "real-life" problem or tackle a present day theme within a preset time limit, working independently and with the division of tasks clearly defined.

John Alford Stevenson, "A project is a problematic act carried to the completion in its natural setting".

Ballord, "A project is a bit of real life that has been imported into the school",

William Head Kilpatrick, "A project is a whole hearted purposeful activity proceeding in a social environment".

From these definitions it can be observed that

- A project is a task or an activity.
- It has some purpose.
- It is conducted in social and natural situation.

The project method is an educational enterprise in which children solve a practical problem over a period of several days or weeks. It may involve building a rocket, designing a playground, or publishing a class newspaper. The projects may be suggested by the teacher, but they are planned and executed as far as possible by the students themselves, individually or in groups. Project work focuses on applying, not imparting, specific knowledge or skills, and on improving student involvement and motivation in order to foster independent thinking, self-confidence, and social responsibility.

According to traditional historiography, the project idea is a genuine product of the American Progressive education movement. The idea was thought to have originally been introduced in 1908 as a new method of teaching agriculture, but educator William H. Kilpatrick elaborated the concept and popularized it worldwide in his famous article, "The Project Method" (1918).

The project method was first introduced into colleges and schools when graduating students had to apply on their own the skills and knowledge they had learned in the course of their studies to problems they had to solve as practicians of their trade. With some simplification, five phases in the history of the project method can be differentiated:

- 1590–1765: At the academies of architecture in Rome and Paris, advanced students work on a given problem, such as designing a monument, fountain, or palace.
- 1765–1880: The project becomes a regular teaching method; newly established schools of engineering in France, Germany, and Switzerland adopt the idea. In 1865, the project is introduced by William B. Rogers at the Massachusetts Institute of Technology in the United States.
- 1880–1918: Calvin M. Woodward adapts the project concept to schoolwork. At his Manual Training School students actually produce the projects they designed. Gradually the idea spreads from manual training (Charles R. Richards) to vocational education (David. S. Snedden, Rufus W. Stimson) and general science (John F. Woodhull).
- 1918–1965: Kilpatrick conceives the project broadly as "whole-hearted purposeful activity proceeding in a social environment." After being criticized by Boyd H. Bode, John Dewey, and other leading American Progressive educators, Kilpatrick's approach loses its attraction in the United States, yet receives general approval in Europe, India, and the Soviet Union.
- The 1970s: Kilpatrick's project method, now taken as the only adequate method of teaching in a democratic society, is rediscovered in Germany, the Netherlands, and other European countries. Under the influence of British primary school education, U.S. educators attempt to redefine the project, viewing it as an important supplement to the traditional teacher-oriented, subject-centered curriculum.

11.3.1 Characteristics of Project

The project has the following characteristics:

a) **Problematic:** Every project is intended to solve at least one problem which is perceived by the student(s). Becoming aware of the problem is the beginning of the formulation of the project.

b) **Objective:** The success of Project lies in the students understanding of its objectives. The objectives with which the students pursue the project are intimately associated with their real life situation and would be fulfilling some of their cherished desires.

c) **Activity:** After defining the objectives, it is your duty to create a learning environment. Students begin to learn through self-planning, group discussion and group activities.

d) **Reality:** It is necessary to create real life activities for effective learning.

e) **Liberty:** Learning takes place naturally. So, students perform activities freely.

f) **Utility:** The learned knowledge must serve the immediate needs of the students in their present life. It is necessary that the project must be useful to the present needs.

g) **Integration:** Since a project is based on the real life problems, real experiences for carrying out the project and no real experience involves the knowledge of only one subject. One has to combine the knowledge of many subjects appropriately for successful completion of the project. Integration of subjects learnt in the classroom is the basic requirement in a project work.

On the basis of these characteristics, it can be observed that project is the approach where a learner gets real knowledge after completing the project keeping its objectives in view. As it is based on the practical utility, so the learning would be more real and permanent. That is the involvement project based learning demands from the learner to get more authentic knowledge and information.

Project-Based Learning (PBL) is an innovative, systematic teaching method that promotes student engagement through deep investigations of complex questions. It is based on the phenomena of learning by doing.PBL focuses on imparting specific knowledge and skills while inspiring students to question actively, think critically, and draw connections between their studies and the real world.

Check Your Progress-1

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1. Project-based learning is characterized by _____.

a) an emphasis on investigation of real-life situations

b) a highly structured learning environment

c) an emphasis on lifelong learning

d) a competitive task structure

Q2 Who stated that "A project is a whole heacted purposeful activity proceeding in a social environment."

a) Stevenson

b) Kitpatrick

c) Woodward

d) Rogers

Q3 Project based learning is based on phenomena of _____.

11.3.2 Types of Project

1) Projector Type
2) Consumer Type
3) Problem Type
4) Drill Type

Projector Type: Projects where students get an opportunity to build or create something like building a house or a garden, execute a model of a textile factory are called projector type.

Consumer Type: Projects in which the students set and enjoy the direct experience with their future expected consumers. For example, Projects related with home/ house visit to assess the elderly in a community.

Problem Type: Projects where a solution to a problem is found out or arrived at.

Drill Type: The drill type projects involve an activity that aims at acquiring greater skill. For example, a student is given a project in which he or she is expected to develop in developing competency to carry out an experiment or a procedure.

11.4 MEANING OF PROJECT BASED LEARNING (PBL)

It is a student-centered pedagogy that involves a dynamic classroom approach in which it is believed that students acquire a deeper knowledge through active exploration of real-world challenges and problems. Students learn about a subject by working for an extended period of time to investigate and respond to a complex question, challenge, or problem. It is a style of active learning and inquiry-based learning. PBL contrasts with paper-based, rote memorization, or teacher-led instruction that presents established facts or portrays a smooth path to knowledge by instead posing questions, problems or scenarios. "Project-based learning is a comprehensive perspective focused on teaching by engaging students in investigation. Within this framework, students pursue solutions to non trivial problems by asking and refining questions, debating ideas, making predictions, designing plans and/or experiments, collecting and analyzing data, drawing conclusions, communicating their ideas and findings to others, asking new questions, and creating artifacts." (Blumenfeld *et al*)

11.4.1 History of Project-Based Learning

First reference to project-based learning was mentioned in the work of Kilpatrick (1918), who believed that using literacy in meaningful contexts provided a means for building background knowledge and for achieving personal growth. He suggested that projects be interdisciplinary math, science, social studies to provide learners with a rich array of concepts and ideas. He intended that topics come from students' interests, maintaining that group projects, proposed, planned, executed, and evaluated by students, would help learners develop an understanding of their lives while

preparing to work within a democracy. Project-based learning also reflects a Vygotskian perspective. Vygotsky theorizes that learning occurs through social interaction that encourages individuals to deal with the kind cognitive challenges that are just slightly above their current levels of ability. He posits that concepts develop and understanding happens when individuals enter into discussion and meaningful interaction with more capable peers or teachers. These individuals can model problem solving, assist in finding solutions, monitor progress, and evaluate success.

11.4.2 Characteristics of Project-Based Learning

Kleijer, Kuiper, De Wit and Wouters-Koster mentioned four major characteristics of project learning:

- Self-responsibility for thinking and learning
- Awareness of social responsibility
- Thinking and acting from the scientific perspective but in a practical application
- Relating both group process and product with professional practice.

11.5 WHY PROJECT BASED LEARNING?

Project Based Learning can be transformative for students. By presenting students with a mix of choice and responsibility, cognitive concepts and practical activities, within an environment of real-world authenticity, projects engage students in learning that is deep and long-lasting.

1) **Engaged hearts and minds:** Students actively engage with PBL projects which provide real-world relevance for learning. Students can solve problems that are important to them and their communities.

2) **Deeper learning:**PBL projects lead to deeper understanding and greater retention of content knowledge. Students are better able to apply what they know to new situations.

3) **Exposure to adults and careers:** Through PBL, students interact with adults, businesses and organizations, and their community, and can develop career interests.

4) **A sense of purpose:** A great project can be transformative for students. Seeing a real-world impact gives them a sense of agency and purpose.

5) **Workplace skills:** Beyond basic knowledge, students learn to take initiative and responsibility, solve problems, and communicate ideas.

6) **Rewarding teacher relationships:** Teachers work closely with active, engaged students doing meaningful work, and share in the rediscovered joy of learning.

7) **Creativity and technology:** Students enjoy using a spectrum of technology tools from research and collaboration through product creation and presentation.

11.6 STEPS IN PROJECT-BASED LEARNING

Whether students work individually, in pairs, or in groups, having them design something from scratch taps their creative abilities. When using the project-based learning strategy, it is almost guaranteed that the endeavor will be interdisciplinary. The teacher's role is to serve as coach, guiding students to use a variety of resources, employ a strategy that is fun and motivating, and uncover content with depth and breadth.

Project-based learning in the most general way can be breaking it down into the following nine steps

1. The teacher **sets the stage for students with real-life samples** of the projects they will be doing.

2. Students **take on the role of project designers**, possibly establishing a forum for display or competition.

3. Students **discuss and accumulate** the background information needed for their project.

4. The teacher-coach and students **negotiate the criteria** for evaluating the projects.

5. Students **accumulate the materials** necessary for the project.

6. Students **create their projects**.

7. Students **prepare to present their projects.**

8. Students **present their projects.**

9. Students **reflect on the process and evaluate the projects** based on the criteria.

11.7 DIMENSIONS OF PROJECT BASED LEARNING

Project based learning includes seven key dimensions:

- Core curriculum,
- Real-world connection
- Extended time frame
- Student decision making
- Collaboration
- Assessment
- Multimedia

a) Core curriculum: At the foundation of any unit, this sets clear learning goals drawn from whatever curriculum or set of standards is in use. Core emphasizes that project-based multimedia learning should address the basic knowledge and skills all students are expected to acquire. These projects lend themselves well to multidisciplinary or cross multidisciplinary or cross curricular approaches.

b) Real-world connection: Project-based multimedia learning strives to be real learning seeks to connect the world to students' work. Types of activities, the types of products, or in other ways perceive what is real about the project.

c) Extended time frame: Good project is not a one-shot lesson. It can be extended over a significant period of time. It may be days, weeks, or months.It

may also vary with the age of the students and the nature of the project. Students experience a succession of challenges that culminates in a substantial final product. They can derive pride and a clear sense of accomplishment.

d) **Student decision making:** In Project-based multimedia learning, students have an opinion. They divide their decisions into "teacher's" and "students'" which are based on a clear rationale. A teacher might limit students to a single authoring program to minimize complications. The teacher can allow students to determine what substantive content would be included in their projects. Students can make decisions about the form and content of their final products, as well as the process for producing them.

e) **Collaboration:** Working together jointly to accomplish a common intellectual purpose. Students may work in pairs or in teams. Whole-class collaborations are also possible. The goal is for each student involved to make a separate contribution to the final work and for the whole to be greater than the sum of the parts.

f) **Assessment:** It helps in developing expectations to do better. It also guides the students in improving the media products and then directs them to compile and disseminate evidence of learning as per their needs.

g) **Multimedia:** Students do not learn simply by "using" multimedia produced by others students learn by creating it themselves. They not only gather written notes, but also create pictures, video clips, recordings, and other media objects that will later serve as the raw material for their final product.

11.8 CHALLENGES FACED BY THE TEACHERS

Teachers who bring project-based learning into the classroom may have to adopt new instructional strategies to achieve success. Having the teacher take the role of guide or facilitator is not the way that most educators were taught, nor even the way they were taught to teach. Direct-instruction methods that rely on textbooks, lectures, and traditional assessments do not work well in the more open-ended, interdisciplinary world of project-based learning. Rather, teachers do more coaching and modeling and less "telling." They need to be comfortable with "wrong turns" that students

may make in route to completing a project (Intel, 2003). Teachers may find themselves learning alongside their students as projects unfold.

Specific challenges faced by teachers include:

- Recognizing situations that make for good projects
- Structuring problems as learning opportunities
- Collaborating with colleagues to develop interdisciplinary projects
- Managing the learning process
- Integrating technologies where appropriate
- Developing authentic assessments

Indeed, teachers may have to be willing to take risks to overcome initial challenges. A supportive administration can help by implementing more flexible schedules, such as block schedules or team planning time, and providing teachers with professional development opportunities.

Check Your Progress-2

Note: (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 After students have completed and presented their solutions in PBL, the teacher should _____.

a) Review what they have learned and move on to the next unit

b) Ask groups to examine their own work and learning

c) Assess students' mastery of the objectives

d) Have students rate the contributions of each member of their group

Q2 Project learning is a blend of Core curriculum, real world connection, frames, collaboration and_____.

Q3	Which one is not a type of project?	
	a)	Project
	b)	Consumer
	c)	Drill
	d)	Trial

11.9 ADVANTAGES OF PBL

The core idea of project-based learning is that real-world problems capture students' interest and provoke serious thinking as the students acquire and apply new knowledge in a problem-solving context. Typical projects present a problem to solve, or a phenomenon to investigate. PBL replaces other traditional models of instruction such as lecture, textbook-workbook driven activities and inquiry as the preferred delivery method for key topics in the curriculum. It is an instructional framework which allows teachers to facilitate and assess deeper understanding rather than stand and deliver factual information. PBL intentionally develops students' problem solving and creative making of products to communicate deeper understanding of key concepts and mastery of 21st Century essential learning s such as critical thinking.In this context, PBLs are units of self-directed learning from students' doing or making throughout the unit. PBL is not just an activity that is stuck on the end of a lesson.

Project-based learning has the following advantages :

- PBL is based on laws of learning leading to best conditions of learning.
- It develops the power of thinking ability to purpose, make plan to accomplish and judge whether it is a success or a failure.
- It is a democratic way of learning.
- Responsibility and self-reliance are required by the students.
- There is real economy.
- It develops critical thinking, problem solving, collaboration and other form of communication, often known as "21st Century Skills".

- It gives freedom and motivation to students.
- Students learn social value and social adjustment. It gives a sense of reality and a sense of accomplishment to students.
- Intrinsic standards of evaluation is set up in the student, thus they evaluate their own work.
- It helps both the teacher and the students to grow, by experience, activity and completion of a task.

11.10 DISADVANTAGES OF PBL

- Much of the learning becomes haphazard and incidental.
- There is less opportunity for experiencing the ability of others.
- Sometimes it is thought and accepted that all the expressed interests of students are of equal values.
- The teacher finds it difficult to direct the project in such a way that proper development of different subject takes place.
- Usual teaching becomes irregular and disorganized.
- In a group project some students are inclined to take all responsibility upon them while others remain at the background.
- It leads to less academic achievement and incomplete mastery in other areas.
- It leads to upset in timetable and inability to cover the curriculum in a given time.
- A new teacher finds this difficult.
- The project can become too ambiguous to students.

Check Your Progress - 3

Note : (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 Which is not the advantage of Project based learning?

a) develops power of thinking ability

b) democratic way of learning

c) gives freedom and motivation

d) less opportunity for experiencing ability

Q2 Which is not the disadvantage of Project based learning?

a) teaching becomes irregular and disorganised

b) new teacher finds this difficult

c) leads to less academic achievement

d) helps both the teacher and the student to grow

11.11 LET US SUM UP

Projects are great learning tools because they challenge students to work together, think in new ways, use a variety of linguistic content, and social skills, and incorporate creativity.

- The projects may be suggested by the teacher, but they are planned and executed as far as possible by the students themselves, individually or in groups.
- The project method was first introduced into colleges and schools when graduating students had to apply on their own the skills and knowledge they had learned in the course of their studies to problems they had to solve as practicians of their trade.

- It is a student-centered pedagogy that involves a dynamic classroom approach in which it is believed that students acquire a deeper knowledge through active exploration of real-world challenges and problems.
- Project based learning can be transformative for the learners by engaging their hearts and minds, providing deeper learning, giving exposures to adults and careers, rewarding teacher relationships and linking creativity to technology.
- The teacher's role is to serve as coach, guiding students to use a variety of resources, employ a strategy that is fun and motivating, and uncover content with depth and breadth.
- A supportive administration can help by implementing more flexible schedules, such as block schedules or team planning time, and providing teachers with professional development opportunities.
- PBL replaces other traditional models of instruction such as lecture, textbook-workbook driven activities and inquiry as the preferred delivery method for key topics in the curriculum.

11.12 LESSON END EXERCISE

1. What are the benefits of Project based Learning?
2. Describe the challenges faced by the teacher. How his role in project based learning is important?
3. Explain the advantages and disadvantages of Project based learning.

11.13 SUGGESTED FURTHER READINGS

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11.14 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress - 1

1. a
2. b
3. learning by doing

Check Your Progress - 2

1. c
2. Assessment
3. d

Check Your Progress - 3

1. d
2. d

COOPERATIVE AND COLLABORATIVE LEARNING

LESSON NO 12 **UNIT-IV**

Structure

12.1 INTRODUCTION

At every stage, teachers try to discover a new way to teach the learners. Various activities and tasks have been figured out and only one way that is cooperative learning has come out to be the best teaching strategy for all age group. As the name suggests, it stands for a learning process or strategy where students form a learning group and learn by themselves in a cooperative way. Cooperative learning is a student-centered, instructor-facilitated instructional approach.Research studies also show that the cooperative learning model was developed to achieve at least three important instructional goals: academic success, acceptance of diversity and collective skill development. It is a small group approach that integrates egalitarian processes, individual answerability, equal opportunity and group rewards. It can help the students to enhance their knowledge to a great extent in the classroom. It has been found to be an effective teaching strategy at all levels, from pre-school to higher education.

12.2 OBJECTIVES

After going through this lesson, you shall be able to:

- explain the concept of Cooperative Learning and Collaborative Learning
- reproduce any one definition of Cooperative and Collaborative Learning
- describe types of Cooperative Learning
- discuss the role of teacher in Cooperative Learning
- discuss advantages and limitations of Cooperative Learning

- describe need of Collaborative Learning
- differentiate between Collaborative Learning and Cooperative Learning
- state advantages and disadvantages of Collaborative Learning

12.3 COOPERATIVE LEARNING

Cooperative learning stands for a learning process in which students are provided with opportunities to learn by themselves in a cooperative group. They share each and every information among themselves and help each other for having required knowledge, understanding and application of one or the other aspects of the content material. Teachers are regarded as the repositories of subject knowledge and their role is simply to pour into the open, empty and willing minds of students

Definitions

Cooperative learning is "a process by which students work together in groups to master material initially presented by the teacher."
- Salvin

Cooperative learning is "the instructional use of small groups so that students can work together to maximize their own and each other's learning. Cooperative learning produces higher achievement, more positive relationships."

- Johnson, Johnson and Smith

Cooperative learning may be defined as teaching-learning strategy in which the students of a class engage themselves in diversified learning activities in a cooperative and non-cooperative environment by forming a small group of students having different levels of ability for better understanding of a subject.

12.3.1 Concept of Cooperative Learning

In 1991, Johnson and Smith introduced the concept of cooperative learning. In cooperative learning, classroom teaching is supported by small group practice based on the following social learning principles:

1. Learning by Practice

2. Learning by Imitation
3. Learning by Doing

Cooperative learning is a process in which students work in groups and put efforts to complete the task collectively. With the cooperation of each other, they perceive the task, interact with one another and follow the instruction provided by the teacher. It is a strategy where students' participation in learning activities promotes positive interaction as they share each and every information among themselves and help each other for having required knowledge and understanding the content material.

12.3.2 Features of Cooperative Learning

On the basis of the meaning, salient features of cooperative learning can be outlined as below:

1. **Student centered:** Cooperative learning is a student or learner centered approach rather than content or teacher centered. It provides equal opportunity to each member of the group to learn by themselves.
2. **Small teams:** Number of teams is formed consisting of a small number of students having different levels of ability to understand the subject and for having required knowledge.
3. **Social interaction:** It focuses an interactive teaching-learning environment instead of mere lecturing and demonstration. Learner is provided with more responsibilities which reduces the efforts putting on by the teachers.
4. **Cooperative spirit:** Students must be provided with an opportunity to learn and work cooperatively in order to develop them into a cooperative and responsible social being. A cooperative environment should be given to them as students learn better in a non-competitive and stress free environment
5. **Group responsibility:** It is an approach where group efforts and cooperation have given more importance than individual efforts. It is the responsibility of the whole group to be answerable for their task as with the help of each other they can perform better and understand the application of their content material.

6. **Reward system:** According to Slavin (1983), incentives or rewards have an important role in the success of cooperative learning. There are three general types of reward structures:

   a) Individual rewards for individual achievement

   b) Group rewards for group achievement

   c) Group rewards for individual achievement: it is an interdependent and the most effective reward structure where individual's success depends on the success of other group members.

7. **Successful academic learning:** It lays emphasis on academic learning success for each and every individual of the group and it is the feature which segregates cooperative learning groups from other group tasks.

12.3.3 Changing Scenario of Teaching-Learning Process

A great necessity has always been felt to change and improve the preparation of students for productive functioning in the frequently changing and highly demanding environment. In today's world, new challenges and increased complexities demand a new education system. Considering all the complexities of the education system, a new approach and technology emerged as a new leading system to give an innovative way to teaching learning process. In the cooperative paradigm, teaching is based on theory and research having clear application to instruction. Knowledge is actively constructed, learned, transformed and protracted by students, in complete cooperation among themselves rather than steep competition. Teachers work as facilitator and his role is to develop student's competencies and capabilities whereas in traditional framework teachers' knowledge is transferred to passive learners.

Table -1

Contrasting Old and New Paradigms of Teaching

Variants	Old Paradigms of Teaching	New Paradigms of Teaching
Knowledge	Transferred from Faculty to students	Jointly constructed by students and faculty
Students	Passive vessel to be filled by faculty's knowledge	Active constructor, discoverer, transformer of own knowledge
Faculty Purpose	Classify and sort students into categories	Develop students competencies and talents
Relationships	Impersonal relationships among students and between faculty and students	Personal transaction among students and between faculty and students
Content	Competitive/ Individualistic	Cooperative learning in classroom and cooperative teams among faculty
Assumption	Any expert can be teacher without training	Teaching is complex and requires considerable teacher training and continuous refinement of skills and procedures.

Source: Smith, K. and Waller, A. "Afterword: New paradigms of college teaching." In W. Campbell and K. Smith (eds.), New Paradigms for College Teaching, Edina, MN: Interaction Book Co., 1997.

The purpose of the education is not to serve information in the hands of the students but to engage them in mindful and useful tasks. Student centered activities should be encouraged at all levels of education by adopting cooperative approach which will help the students in learning and make it enjoyable experience for the students. To facilitate this process, opportunities to discover new ideas should be given to the students so that relevant and meaningful information can be sought.

12.3.4 How to Proceed with Cooperative Learning

To substitute the traditional learning into a cooperative learning set-up is not an easy task. One may have to face obstruction and struggle from the associated teachers, students, authorities and parents in doing so. For this purpose, one must learn the art

and skill of using cooperative learning as an advantageous strategy of teaching-learning. After then he must get his students, authorities and parents of the students persuaded about the effectiveness of using this noble practice. To employ cooperative learning effectively, proper designing and implementation need to be kept in view by following five steps mentioned below:

1. **Pre-Instructional Planning:** Prior planning helps to establish the specific cooperative learning technique to be used and lays the foundation for effective group work. Plan out how groups will be formed and structure how the members will interact with each other.
2. **Introduce the Activity to the Students:** Explain the academic task to the students and what the criteria are for success. Then structure the cooperative aspects of their work with special attention to the components of positive interdependence and individual accountability. Set up time limits and allow for clarifying questions.
3. **Monitor and Intervene:** This is where you let the groups run while you circulate through the room to collect observation data, see whether they understand the assignment, give immediate feedback and praise for working together. If a group is having problems, you can intervene to help them get on the right track.
4. **Assessment:** Some informal assessment is already done while you are monitoring the groups during the exercise. However, once the group finishes their project, work should be assessed by both instructor and group.
5. **Process:** Group processing involves asking the groups to rate their own performance and set goals for themselves to improve their cooperative work.

12.3.5 Essential Elements of Cooperative Learning

Johnson and Smith have suggested the following elements of cooperative learning:-

1. **A clear set of specific student learning outcome objective:** Cooperative learning and cooperative learning groups are means to an

end rather than ends in themselves. Therefore, the teachers should plan by describing precisely what students are expected to learn and be able to do on their own well beyond the end of the group task and curriculum unit. Regardless of whether these outcomes emphasize academic content, cognitive processing abilities, or skills, the teacher should describe in very unambiguous language the specific knowledge and abilities students are to acquire and demonstrate on their own.

2. **All students in the group "buy into" the targeted outcomes:** It is not sufficient for teachers to select outcome objectives. The students must perceive these objectives as their own. They must come to comprehend and accept that everyone in the group needs to master the common set of information. Where groups select their own objectives, all members of each group must accept their academic outcomes as ones they all must achieve.

3. **Clear and complete set of task-completion directions or instructions:** Teachers should state directions or instructions that describe in clear, precise terms exactly what students are to do, in what order, with what materials, and when appropriate, what students are to generate as evidence of their mastery of targeted content and skills. These directions are given to students before they engage in their group learning efforts.

4. **Heterogeneous groups:** Teachers should organize three, four or five members so that students are mixed as heterogeneously as possible, first according to academic abilities, and then on the basis of ethnic background, race and gender. Students should not be allowed to form their groups based on friendships or cliques. When groups are maximally heterogeneous and the other essential elements are met, students tend to interact and achieve in ways and at levels that are rarely found in other instructional strategies. They also tend to become tolerant of diverse viewpoints to consider other's thoughts and feelings in depth, and seek more support and classification of other's position.

5. **Equal opportunity for success:** Every student must believe that he or she has an equal chance of learning that content and abilities, and earning this group rewards for academic success, regardless of the group he or she is in. By being placed in a particular group the students must not feel penalized academically.

6. **Positive interdependence:** Teachers must structure learning tasks so that students come to believe that they sink or swim together that is, their access to rewards is as a member of an academic team wherein all members or no member receive a reward. Essentially, tasks are structured so that students must depend on one another for their personal, team mates and group's success in completing the assignment tasks and mastering the targeted content and skills.

7. **Face-to-face interaction:** Students should arrange themselves so that they are positioned and postured to face each other for direct eye-to-eye contact and face-to-face academic conversations.

8. **Positive social interaction behaviours and attitudes:** Students placed in groups and expected to use appropriate social and group skills does not mean that students will automatically use these skills. To work together as a group, they should engage in such interactive abilities as leadership, trust-building, conflict management, constructive criticism, encouragement, compromise, negotiation and clarifying. Teachers should describe the expected social interaction behavior and attitudes of students and assign specific roles to particular students to ensure that they consciously work on these behaviours in their groups.

9. **Access to must-learn information:** Teachers must structure the tasks so that students have access to and comprehend the specific information that they must learn. The content focus of learning tasks must be aligned directly with the specific outcome objectives and the test items that will be used to measure their academic achievement.

10. **Individual accountability:** The reason why teachers put students in cooperative learning groups is that all students can achieve higher

academic success individually than when they were used to study alone. Consequently, each must be held individually responsible and accountable for doing his or her share of the work and for learning what has been targeted to be learned. Therefore, each student must be formally and individually tested to determine the extent to which he or she has mastered and retained the targeted academic content and abilities.

11. **Opportunities to complete required information-processing tasks:** In order to be successful, each student must complete a number of internal information-processing tasks aligned with targeted objectives, such as comprehending, translating, making connections, assigning meanings, organizing the data and assessing the relevance and uses of the information they study. Assigned group tasks direct students to complete the relevant internal processing tasks they need to complete.

12. **Public recognition and rewards for group academic success:** The members of groups who meet or surpass high levels of academic achievement receive ample rewards within formal public settings. Specific awards must be something valued by the students.

13. **Post-group reflections on within group behaviours:** Students spend time after the group tasks have been completed to systematically reflect upon how they worked together as a team in such areas: (i) how well did they achieve their group goals? (ii) how did they help each other comprehend the content, resources and task procedures? (iii) how did they use positive behaviours and attitudes to enable each individual and the entire group as a group to be successful? and (iv) what do they need to do next time to make their groups even more successful?

Each of the preceding elements does not have to be used every time the teacher assigns students to work in groups. Unless these elements are used frequently and correctly, teachers should expect many positive long term results of cooperative learning that can be achieved.

Check Your Progress-1

Note: a) Answer the questions given below:

b) Compare your answers with those given at the end of the lesson

Q1. Classroom teaching is not supported by various learning principles:

a) Learning by practice

b) Learning by playing

c) Learning by Imitation

d) Learning by Doing

Q2. Which of the following is not an outcome of cooperative learning?

a) Academic achievement

b) Individualistic self-reliance

c) Social skills

d) Acceptance of diversity

Q3. One reason that cooperative learning is important is that _____.

a) It allows students more control over time

b) It is congruent with democratic values

c) It reduces the need for teachers to manage student behavior

d) It allows individuals to set their own learning goals

12.3.6 Types of Cooperative Learning

There are three main types of cooperative learning groups: informal learning groups, formal cooperative groups and cooperative base groups.

Informal Learning Groups

These groups are short and unstructured. They typically involve activities where students discuss a problem or concept together for a particular period. It is most convenient to use informal learning groups for quick activities such as brainstorming, quick problem solving, summarizing,

or review. It brings change in the format of lecture method by giving students opportunity to think and to discuss a concept with a peer.

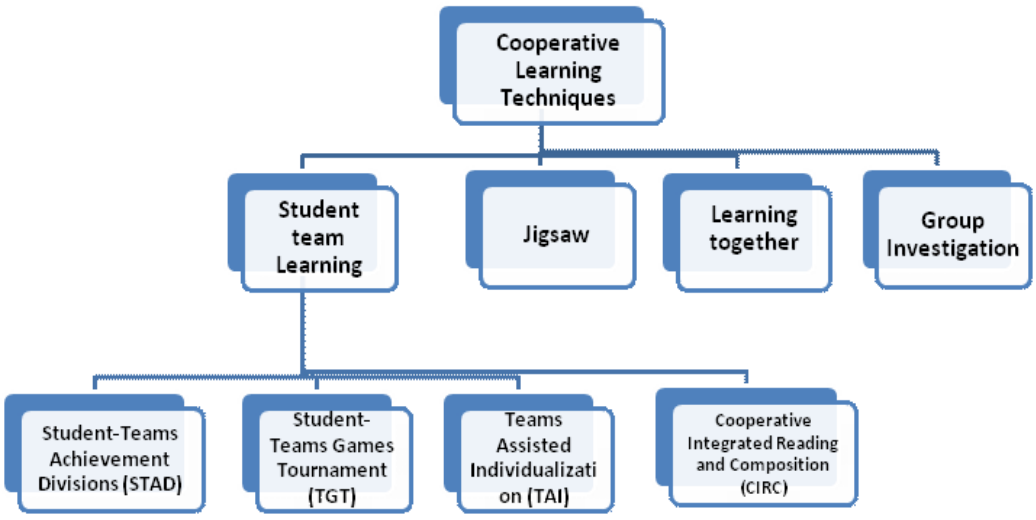
Formal Learning Groups

Formal learning groups are assigned a task and work together until it is complete. There is a clear structure to these groups set by the teacher that includes task and behaviour expectations. Formal learning groups can be heterogeneous or homogeneous, depending on the assignment. They work together for several weeks to achieve shared learning goals and jointly complete specific task and assignment.

Cooperative Base Groups

These groups are different from the previous two in that they are long term support groups. Base groups should last for a minimum of a semester but can be anywhere up to several years. Since they are long term commitments, typically these groups become more than just academic problem solving groups. Members in base groups work as a support system for each other, build relationships and trust during the cooperative learning process.

12.3.7 Techniques of Cooperative Learning



A. Student Team Learning

The objective of student team learning is to provide special relevance to the use of group objectives. In student team learning, students complete their tasks and learn something as a team. The success of the team can only be truly attained if proper team rewards are given for achieving a designated standard, individual responsibility leads all the members to fulfill their duties and teams' success depends on the individual learning of all the team members, equal opportunities for improving one's past performance and to do best in every situation and contribution of every team member is equally valued. Within such procedures we can distinguish four methods of student-team learning:

1. **Student-Team Achievement Divisions (STAD):-**It is a collaborative learning strategy in which small groups of learners with different levels of ability work together to accomplish a shared learning goal. It was developed by Robert Slavin and his associates at Johns Hopkins University.Students are assigned to four or five member learning teams that are mixed in performance level, sexual characteristics and ethnicity. It has five components:

a) **Class presentation:**In STAD, the material introduces first in the classroom presentation. This is a direct instruction as is often done or lesson discussion led by the teacher. In this way, the students will realize that they should be really paying full attention to help them in working the quizzes.

b) **Teams:**The students are assigned to four or five member learning teams that are mixed in heterogeneous teams. The team representing all parts of the class regarding academic performance, gender, race, and ethnicity. The main function of the team is to ensure that all team members actually learn to prepare its members to be able to properly quiz.

c) **Quiz:** The students will work on individual quiz and assess students achievement on the material presented in the class and practiced in

the teams. The members of team were not allowed to help each other in a quiz.

d) **Score individual progress:** The idea behind the individual progress score is to give each student performance goals that will be achieved if they work harder and deliver better performance than before. Each student can contribute to his team maximum points in this scoring system, but no students were able to do it without giving their best effort.

e) **Recognition team:** The team will get a certificate or other form of reward if their average score reaches a certain criteria. Team scores students can also be used to determine the twenty percent of their ratings.

2. **Student-Team Games Tournament (TGT):**In this method, same presentations and team work is used as in STAD, but with weekly tournaments where students compete with members of other teams to contribute points to their team scores. The winner at each tournament table brings the same number of points to his or her team, regardless of which the table it is.

3. **Team Assisted Individualization (TAI):** Team Assisted Individualization (TAI) combines cooperative learning with individualized instruction. It shares with STAD and TGT the use of four-member mixed ability learning teams and rewards for high performing games. TAI is specifically designed to teach mathematics or students in Grades 3-6. In TAI, student enters in an individualized sequence according to a placement test and then precedes at his/her rates. In general, team members work on different units. Team-mates check each other's work against answer-sheets and help one another to address their problems. Final unit tests are, however, taken without team-mates' help and are scored by student monitors. Each week, teachers total the number of units completed by all team members

and give certificates or other team rewards to teams which exceed a criterion score based on the number of final tests passed.

4. **Cooperative Integrated Reading and Composition (CIRC):** In CIRC, groups are made of heterogeneous type. It is a comprehensive programme for teaching reading and writing in the upper elementary grades from 3 to 5 (Stevens et.al. 1987). Students are assigned to teams composed of pairs of students from two different groups. As students are with different capabilities, they cooperate with each other in reading, summarizing, practicing spellings and vocabulary to each other. Students follow a sequence of teacher instruction, team practice, team pre-assessment and quiz. Certificates are given to teams based on the average performance of all team members on all reading and writing activities.

B. Jigsaw: In the originally designed Jigsaw method, (Aronson et.al. 1978), students are assigned to 6 member teams to work on academic material, broken down into sections, each team member reading his or her assigned section. Members of different teams who have studied the same sections meet in expert groups to discuss their sections. Slavin (1986) developed a modification of Jigsaw and incorporated it in the student team learning programme. In this method, classed Jigsaw-II, students work in 4 or 5 member teams as in TGT and STAD. Instead of each student being assigned a unique section, all students read a common narrative such as a book chapter but each student receives a topic on which to become an expert. Students with the same topics meet with member of other groups who are expert in the same part to teach their teammates what they have learned.

C. Learning Together: Learning together model was developed by Johnson and Johnson in 1985, it involves 4 to 5 students from heterogeneous groups working on same assignments. The groups complete a single assignment and rewards have been provided on the basis of the group product as to emphasize team building activities is the main purpose of this method.

D. Group Investigation: In its organizational plan, students work in small groups using cooperative inquiry, group discussion and cooperative planning projects. Students form their own group consisting of 2 to 6 members. After choosing sub-topics from a unit, the groups further break the sub-topics into individual tasks and carry out necessary activities to prepare group reports. Each group then makes a presentation to discuss its findings to the whole class.

12.3.8 Role of the Teacher in Cooperative Learning

A teacher who uses cooperative learning assumes a number of responsibilities including the following:

- Planning lessons, activities and evaluation techniques
- Creating groups of students
- Physical settlement of the students
- Presenting and clarifying the task to the students
- Observing group activities and intervening when necessary
- Assisting students with social skills
- Evaluating students

12.3.9 Advantages of Cooperative Learning

1) **Higher Level Thinking skills**: Cooperative learning helps in developing higher order thinking skills, critical thinking and communication skills to recognize what gaps exist in their team and how those gaps can be filled.

2) **Individuals' Responsibility**: Participation of each individual is equally accountable so that best possible grades can be achieved. Cooperative learning makes it possible to quickly identify and work with the students who always rebel such kind of system and refuse to participate in it.

3) **Boosts Self-esteem:** Cooperative learning helps the learners who always feel left out and provide them opportunity to shine in a better way. Each strength and weakness must be considered to maintain classroom equality that individualized learning does not provide always. The end result is that students feel more accepted, develop leadership tendencies and even work on their problem solving skills.

4) **Learner-centered:** Cooperative learning makes the teaching-learning process learner-centered rather than teacher or content centered. It helps the students to get along with the people of diverse opinion, background, socio-economic status, religion, caste etc. which is helpful to them to adjust in a democratic society.

5) **Positive Attitude:** Cooperative learning helps in developing healthy interaction among the students as well as between the teacher and students. Students develop a healthy and positive attitude towards each other as well as to their teachers who are always ready for helping them in their learning tasks.

6) **Deeper Understanding:** In self-learning, students got opportunity for deeper understanding and insight of the subject-matter as a result of discussing and teaching the material learned by them to their peers.

7) **Improving classroom results:** Cooperative learning helps in improving classroom results by making the students more involved, motivated and will to learn and achieve the learning targets more and more by providing an anxiety free non-competitive stimulating environment.

8) **Improving Learning Environment:** Cooperative Learning helps in improving the learning environment by rescheduling the roles of teachers as well as learners. Here teacher acts as a facilitator to help the learners in the task of learning totally planned and implemented by them.

9) **Art of cooperation:** In cooperative learning students get a healthy positive atmosphere for modeling and practicing cooperation and

consequently the art of getting and giving proper cooperation can be properly learnt through the practice of cooperative learning.

12.3.10 Limitations of Cooperative Learning

1) **Creates Grading System:** Cooperative learning creates grading system which could be considered unfair. In it, all the students of the group do not participate. Generally, some students dominate the group. In most of the cooperative programs, grades are assigned to the whole group but only the best person in the group tries to lead the group with better understanding of the task. A low grade seems very unfair and could create resentment that stops further learning.

2) **New system of socialization structure:**In cooperative learning, students easily come to know about the abilities of each other. The better students will scramble to be in each other's groups to avoid grading issues, which creates a divide in the group. This may encourage students to not to try for learning in future.

3) **Lack of training and self-confidence**: Teachers themselves have not been taught through cooperative learning technique at their school, college or university level. They have also not been exposed to its orientation and training through in-service programmes due to which teachers lack self-confidence for trying methods and innovative practices. They fear that it may expose them to potentially different situations. As a result, most of the teachers do not know how or where to start using cooperative learning techniques in their classrooms.

4) **Non-availability of curricular material:** Teachers feel that the required teaching learning as well as curricular material for the successful use of cooperative learning is not available to them. They themselves have no knowledge, abilities and skills to develop worksheets, project descriptions and other set of handouts helpful as support or base material for cooperative learning. Moreover, textbooks are also not written in view of the requirements of cooperative learning. In such situations, teachers are reluctant to switch over to cooperative learning.

5) **Unfamiliarity to innovative assessment:** The use of cooperative learning requires an altogether different assessment technique in terms of assigning grades to groups on one hand and evaluating individual's role and efforts on the other. Unfamiliarity of teachers to such innovative assessment techniques persuades them to oppose cooperative learning on the assumption that the students will fail in the absence of the assessment of individual accountability of the learners.

6) **Liking for Lecture Method:** Generally, students feel that lecture method is a proper method of teaching and they can learn easily through its use by remaining passive in the teaching-learning process. Hence, they resent any type of responsibility handed over to them in terms of interactive and cooperative learning.

7) **Non-cooperation**: It becomes difficult for the pupils to feel their utmost individual responsibilities for the greater cause of group work and cooperative learning. They feel that their peers may not cooperate or play the role of a shirker.

8) **Uncomfortable in making attempts:**In cooperative learning, students feel uncomfortable in making their own attempts for the acquisition of information and skills and therefore oppose the introduction of cooperative learning.

9) **Fear of hampering development:** Parents feel that cooperative learning system will hamper the development of their children and they will become unfit for competing in the world of cut-throat competition and rapid advancement.

10) **Wastage of time:** Parents of the bright and upper grade students fear that their children will be used as tutors or will be wasting their time and energy in carrying the load of their team mates in the name of cooperative learning.

In this way, we may notice a number of hurdles, fears and resentments standing in the way of introducing cooperative learning in our education system. However, as may be analyzed and concluded easily, all these fears and

resentments are absolutely erroneous and baseless. So cooperative learning should be used to promote the academic and social development of students.

12.4 COLLABORATIVE LEARNING

The concept of collaborative learning involves grouping and pairing of learners to achieve a learning goal. The term "collaborative learning" refers to an instruction method in which learners work together in small groups toward a common goal. Learning depends upon the learners for one another's learning as well as their own in collaborative learning. Thus, the success of one learner helps other students to be successful.

Proponents of collaborative learning assert that the active exchange of ideas not only increases interest among the participants but also promotes critical thinking. In collaborative learning, group of learners work together to solve a problem, complete a task, or create a product. It is based on the view that learning is a naturally social act. Learning takes place through active involvement among peers, either face-to-face or online. In collaborative learning, learners have the opportunity to communicate with peers, present and pre-serve ideas, exchange of various beliefs, inquiring about other conceptual frameworks.

12.4.1 Theoretical Background

Collaborative learning is embedded in Lev Vygotsky's concept of learning i.e. zone of proximal development. There are tasks that learners can and cannot perform and between these two aspects there is the zone of proximal development, it is the situation where a learner can learn but with the help of guidance. The zone of proximal development gives direction about the skills a learner has that are in the process of maturation. In Vygotsky's opinion of zone of proximal development, he highlighted the importance of learning which occurs through communication and interactions with other members of the group rather than working independently. This has made way for the ideas of group learning; one of them is collaborative learning.

Gerlach, "Collaborative learning is based on the idea that learning is a naturally social act in which the participants talk among themselves. It is through the talk that learning occurs."

12.4.2 Basic Assumptions of Collaborative Learning

1) **Assimilation of the information:** In collaborative learning, students assimilate the information and try to relate this new knowledge to a framework of prior knowledge. Learning is an active process where students share their knowledge and information with their peers to make it more lively and innovative.

2) **Challenge for the students:** Learning is a challenging task which requires learners to be actively engaged with his peers to complete the task and achieve the designated goals. It is the process to synthesize information rather than merely memorizing and rehearse it.

3) **Varied Backgrounds:** Collaborative groups involve people belonging to various backgrounds which give a chance to learners to get benefit from the diversified viewpoints.

4) **Social Environment:** Learning is a naturally social act which flourishes in a social environment where healthy conversation between learners takes place. During this intellectual exercise, the learner creates an outline and adds meaning to the communication.

5) **Opportunity to converse:** In collaborative learning, learners are required to express and present their ideas and in doing so, the learners begin to generate their own unique conceptual frameworks and not solely depend on textual framework. Thus, collaborative learning provides the opportunity to converse with peers, present and protect ideas, exchange various beliefs, ask about other conceptual frameworks and to be actively engage in the task.

On the basis of the assumptions, it can be concluded that collaborative learning is a mixture of information students already have and how they can add more information and knowledge with the help of their peers. It provides the opportunity to the learners to take initiatives in all the tasks and to share their outputs with other members of the group.

12.4.3 Characteristics of Collaborative Learning

1) **Enhances Learning**: Collaborative learning helps the learners in gaining rich insights by exchanging views, ideas and beliefs with other members. This kind of sharing nature helps in enhancing learning of the learners.

2) **Encourages Ownership of Ideas**: Interaction and communication is the main aspect of collaborative learning. Each individual gets opportunity to discuss about his ideas which gives him wings to think deeply and encourages him to give a shape to that idea.

3) **Develops Reading/Writing Skills**: Through communication the learners used to interact with other members of the group. Mode of communication can be written or oral which helps in developing reading and writing skills in the learners as they try to understand the concept through both ways.

4) **Enhances Teaching Curriculum:** Collaborative learning also provides stimulating and innovative forum for teaching traditional subjects. It becomes easy to discuss traditional subjects and topics through discussion by making small groups.

5) **Expands Teaching and Learning Horizons** - Collaborative projects take learners beyond the classroom to draw on family and community resources for information, making them more aware of their social and physical surroundings.

12.4.4 Need of Collaborative Learning

Collaborative learning is that approach in which students work in a group with the collaboration of each other. One of the main reasons to choose collaborative learning is that it serves as a good practice in educational activities. Need of collaborative learning is further elaborated:

1) **Encourages contact between students and faculty:** Collaborative learning gives a chance to the students and faculty to build an interaction among them. Students feel free to ask and discuss anything with the faculty and faculty also encourages the students to perform well in the task.

2) **Develops cooperation among students:** Learning is enhanced when it is more like a team effort than a solo race. Good learning is collaborative and social, not competitive and isolated. Working with others often increases involvement in learning. Sharing one's ideas and responding to others' improves thinking and deepens understanding.

3) **Encourages active learning:** Collaborative learning can facilitate active learning even more effectively with the use of the right method and approach. Building interactive and collaborative classrooms need not to be confined to the classroom but rather can be extended beyond the classroom to get students engaged actively in a task.

4) **Gives prompt feedback:** Feedback is really an important factor in collaborative learning. Prompt feedback encourages students to stay engaged in the learning process.Timely feedback allows students to act on the information to improve their learning. This provides students with frequent opportunities to demonstrate their knowledge and abilities in order to give an outlet to provide suggestions for improvement.

5) **Communicates high expectations:** While working in collaboration, students share same goals and purpose and having same goals provide them opportunity to set high expectations for the group. These expectations and the motivation to achieve them help in enhancing learning.

6) **Respects diverse talents and ways of learning:** In a collaborative learning group, people with diverse talents show their abilities and skills to complete a task. Every individual is capable enough to perform the best and every other member shows respect to diverse talents of the group.

12.4.5 Benefits of Collaborative Learning:

1) **Celebration of diversity:** Students learn to work with all types of people. During interactions, they find many opportunities to reflect upon and reply to the diverse responses fellow learners bring to the questions raised. Groups also allow students to add their perspectives to an issue based on their cultural differences. This exchange inexorably helps students to better understand other cultures and points of view.

2) **Acknowledgment of individual differences:** When questions are raised, different students will have a variety of responses. Each of these can help the group creating a product that reflects a wide range of perspectives and is thus more broad and comprehensive.

3) **Interpersonal development:** Students learn to relate to their peers and other learners as they work together in group. This can be especially helpful for students who have difficulty with social skills. They can benefit from planned interactions with others.

4) **Actively involving students in learning:** Each member has opportunities to contribute in their groups. Students are apt to take more ownership of their material and to think critically about related issues when they work as a team.

5) **More opportunities for personal feedback:** As there are more exchanges among students in groups, students receive more personal feedback about their ideas and responses. This feedback is often not possible in large-group instruction, in which one or two students exchange ideas and the rest of the class listens.

12.4.6 Difference between Cooperative and Collaborative Learning

The terms collaborative learning and cooperative learning are often used interchangeably when it comes to students working together. There are still some key differences; with collaborative learning, students make individual progress in tandem with others. Co-operative learning involves more inherent interdependence, promoting greater accountability.

While the purpose of learning methods is the same, to provide students with opportunities to engage with each other in thoughtful learning.

Content	Cooperative Learning	Collaborative Learning
Structure	It is a teacher structured learning where teacher assigns task and roles to the learners.	Students organize their efforts and activities. This learning is basically group structured.
Learning Material	Teacher helps the learners in finding material and provides them needed information as and when required.	Students work independently and search the material they need themselves. Teacher works as a facilitator.
Observation	Activity is monitored by the teacher. Teacher guides, listens and intervenes where necessary.	Activity is not monitored by the teacher. Students involved in the group assess and observe each other.
Assessment	Teacher assesses the performance of the students. They submit their work at the end of lesson for assessment.	Students assess their own and group performance.
Success	Efforts of every group member are recognized. Success of the group depends upon the efforts of every group member.	As every individual leads the group so the success of the group is depends on the individual strengths.

12.4.7 Advantages of Collaborative Learning

1) It has been shown to have a positive effect on student learning when compared to individual or competitive conditions.
2) It has the potential to produce a level of engagement that other forms of learning cannot.
3) Students may explain things better to another student than a teacher to a class. Students learn how to teach one another and explain material in their own words.
4) Questions are more likely to be asked and answered in a group setting.
5) Positive interdependency is achieved as individuals feel that they cannot succeed unless everyone in their group succeeds.

6) Fosters positive attitude in the students such as collaboration and tolerance.

7) Interpersonal and collaboration skills can be learned in a cooperative learning activity.

8) Higher ability students are in a position to be experts, leaders, models and teachers; lower ability students get the benefits of having higher ability students in their group.

12.4.8 Disadvantages of Collaborative Learning

1) A burden is making the students responsible for each other's learning apart from themselves

2) The goal of framework is for students to become independent and able to think by themselves, without the help of others

3) It is difficult for the teacher to be sure that the groups are discussing the academic content rather than something else.

4) Higher ability students may not experience the stimulation or challenge that they would with other higher ability students.

5) Lower ability students may feel continuously in need of help rather than experiencing the role of leader or expert relative to the others in their group.

Check Your Progress - 2

Note : (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 What kind of role students play in collaborative learning?

a) Active

b) Passive

c) Competitive

d) Lazy

Q2 Which one is not the characteristic of collaborative learning?

a) Enhances learning

b) face to face interaction

c) Develops Reading/ Writing Skills

d) enhances teaching curriculum

Q3 What are the benefits of collaborative learning?

a) Celebration of diversity

b) Interpersonal development

c) Active involvement of students

d) All of the above

12.5 LET US SUM UP

Cooperative learning stands for a learning process in which the students of a class engage themselves in a variety of useful learning activities in a cooperative non-competitive environment. The basic assumptions and features associated with it may be outlined as (i) making teaching-learning process as learner centered (ii) engaging in learning collectively (iii) redefining the role of teacher (iv) shifting the responsibility of the students (v) helping the students to learn in a healthy and meaningful environment (vi) evaluation of group performance (vii) helpful in developing social virtues. It may prove fruitful and advantageous on account of a number of educational, psychological and social benefits derived through its use. In educational benefits, making the teaching-learning process learner centered, seeking active participation and involvement of the students may be included. In psychological context, we may specifically mention the anxiety free inspiring and stimulating environment of learning created through cooperative learning may help in developing a positive attitude towards classmates and teachers. We may face a tough resistance from the teaching community itself. All the fears and resentments are absolutely erroneous and baseless. Thus, there is a great need of the attempts for doing away with such fear and resentment by removing the ignorance regarding philosophy,

methodology and fruitful results of cooperative learning. Collaborative learning should not be confused with co-operative learning. In co-operative learning the teacher remains in control and the students, although in a group, are pursuing their individual goals. In collaborative learning the teacher is a facilitator and an equal participant in the learning process and the participants have a shared goal. To provide an effective learning experience, good design of collaborative learning environments is essential. The contribution of all participants should be required to complete the task. Teachers should be trained in designing collaborative learning environments and students should receive training of what to expect in a collaborative learning environment.

12.6 LESSON END EXERCISE

1. Throw light on the features of cooperative learning.
2. What are the advantages and disadvantages of cooperative learning?
3. Explain the tools and techniques that are useful in cooperative learning.
4. What is the need of Collaborative learning in today's scenario?
5. Describe the advantages of Collaborative learning.
6. Differentiate between Cooperative and Collaborative learning.

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12.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress - 1

1. b
2. a
3. d

Check Your Progress - 2

1. a
2. b
3. d

COMPUTER ASSISTED LEARNING AND COMPUTER MANAGED LEARNING

LESSON NO 13 **UNIT-IV**

Structure

13.1 INTRODUCTION

A revolutionary change in information technology has resulted in the production of innovation to streamline and improved students' learning. The greatest contribution of technology is the development of computer and its use in all walks of life. Computer is the finest and most important gift of science and technology to the mankind. It has done miracles in almost all walks of life. There are no aspects of our life that remain untouched by the use and application of computers. Computers are fundamental for the rapid flow of information and are responsible in bringing revolution in the field of education. Use of computers in teaching-learning process has stepped many stages of its evolution like data processing, productionand manipulating, storing and distributing processes. Computers play an influential role in accomplishing many pedagogical functions such as evaluating knowledge and giving feedback, observing activities and performances of the students. Computers motivate the students and help them in active participation, consider individual differences, regulate education level according to existing knowledge and progress of the students and present the learning instructions by using various features of the system. Computers can turn out being a brilliant aid in teaching and making the process of learning interactive

and interesting. It helps the students in finding and getting any kind of information and knowledge and that term is known as Computer Assisted Learning.

13.2 OBJECTIVES

After going through this lesson, you shall be able to:

- explain the meaning of Computer Assisted Learning, Computer Managed Learning and Teaching Machines,
- explain different modes and techniques of CAL and CML,
- discuss the uses of CAL,CML and Teaching Machines,
- explain the role of teacher in CAL, CML and Teaching Machines,
- understand teaching-learning through CAL, CML and Teaching Machine,
- discuss advantages of CAL, CML and Teaching Machine, and
- discuss the uses of CAL, CML in Education

13.3 COMPUTER ASSISTED LEARNING (CAL)

It is an instructional technique in which the computer must actually instruct the student. It is based on two way interaction of a learner and a computer with the objective of human learning and retention. Computer assisted learning is the future, and that future is now. Computer Assisted Learning describes an educational environment where a computer program, or an application, is used to assist the user in learning a particular subject. The vital issue is the word assist which means that the program is not alone in this aim and that there are other methods involved. CAL refers to an overall integrative approach of instructional methods and is actually part of the bigger picture. When used in this context CAL describes an integrated approach to teaching a subject in which learning technology forms a part and which only comes about after re-assessment of the current teaching methods.

Computer Assisted Learning is diverse and rapidly expanding spectrum of computer technologies that assist the teaching-learning process. A self-learning technique which involves interaction of the student with programmed instructional materials. CAL is

an interactive instructional technique, whereby a computer is used to present the instructional material and monitor the learning that takes place.

Computer Assisted Learning uses a combination of text, graphics, sound and video in enhancing the learning process. The computer has many purposes in the classroom, and it can be utilized to help a student in all areas of the curriculum. CAL refers to the use of the computer as a tool to facilitate and improve instruction. CAL programs use tutorials, drill and practice, simulation and problem solving approaches to present topics, and they test the students' understanding.

Definitions

CAL has often been used to describe the development and application of educational technology for a variety of circumstances. From the mid-1980s until the early 1990s the term CAL was often used to refer to the development of either a single computer program or a series of programs which replaced the more traditional methods of instruction, in particular the lecture.

Munden, "Computer Assisted Learning is an educational medium in which instructional content or activities are delivered by a computer. Students learn by interaction with the computer and appropriate feedback is provided".

Mifflin. A, "Computer Assisted Learning is defined as learning through computers with subject wise learning packages/materials."

13.3.1 History of Computer Assisted Learning

Computer Assisted Learning is not a new phenomenon. Computer Assisted Learning can be defined as a computer program developed specifically for educational purposes. The technique used throughout the world in a variety of contexts, from Primary school to University. In the 1980s, the first computer assisted learning became available to University students. The CAL Idea is highly dependent to the following educational events:

• Education Commission (1964-66), called Kothari Commission: Introduction of Vocational Courses.

• National Policy of Education (1968): Introduction of Correspondence Courses.

• Edger Dale: Cone of Learning, Cone of Experience (Audio-Visual Methods in Teaching, 3rd ed. New York, 1969).

• Jacques Delors: The Four Pillars of Education, 1996(Learning to be, Learning to Do, Learning to Know, Learning to Live Together)

13.3.2 Basic Assumptions of Computer Assisted Learning

The computer assisted learning rests on the following basic assumptions:

1. **Instruction for a number of learners at a time:** CAL can serve at a time thousands of learners in an individualized way. What an individual needs according to his ability and interest in a particular subject or topic, and accordingly he can get the instructional material and help from the computer. Moreover, it is the best programmed instruction available to him in such a nice individualized way. Hence, the first assumption of CAL lies in its capacity of providing quality and quantity auto-instruction to a sufficiently larger number of the individual learners at a time.

2. **Automatic recording of the learners' performance:** How does an individual learner react to the presented instructional material? What are his querries and difficulties? What is his performance in terms of learning outcomes? All such things can be successfully and accurately recorded by the computer device. It helps much in further planning the needed instruction to the individual learner for his proper advancement. This timely and proper auto-recording is the second assumption underlying CAL.

3. **Variety in the use of methods and techniques:** CAL assumes that every learner cannot be benefitted through a single method and all the subjects or topics in a subject cannot be handled through a common method or strategy. It believes that there should be a wide variety of methods and approaches and for imparting instruction in a particular subject or topic so that all the individual learners may be able to choose a particular method or approach according to their own interest, ability and nature of the instructional material.

13.3.3 Features of CAL

Computer programmers have been able to create computer-assisted-learning programs that have served to increase student learning by affecting cognitive processes and increasing motivation. Current research shows the mechanisms by which computer programs facilitate this learning are:

1. **Personalizing information:**It allows computer-assisted learning to increase learner interest in the given tasks (Padma and Ross, 1987) and increase the internal logic and organization of the material (Anderson, 1984; Ausubel, 1968; Mayer,1975).

2. **Animating objects on the screen**: The animation of objects involved in the explanation of a particular concept increases learning by decreasing the cognitive load on the learner's memory thereby allowing the learner to perform search and recognition processes and to make more informational relationships (Reiber, 1991).

3. **Providing practice activities that incorporate challenges and curiosity** Computer-assisted-learning increases motivation by providing a context for the learner that is challenging and stimulates curiosity (Malone, 1982). Activities that are intrinsically motivating also carry other significant advantages such as personal satisfaction, challenge, relevance, and promotion of a positive perspective on lifelong learning (Keller and Suzuki, 1988; Kinzie, 1990).

4. **Providing a fantasy context**: A fantasy context increases learning by facilitating engagement (Parker and Lepper, 1992; Malone, 1982). Fein (1981) and Signer (1987) have also found, apart from using computer programs, the involvement in fantasy is often highly intrinsically motivating.

5. **Providing a learner with choice over his/her own learning:**Providing students with choice over their own learning provides leaner-controlled instruction, which contributes to motivation. Increased motivation in turn increases student learning (Kinzie, Sullivan and Berdel, 1988).

Check Your Progress-1

Note: a) Answer the questions given below

b) Compare your answers with those given at the end of the lesson

Q1. Computer Assisted Learning does not facilitate:

a) Animation

b) Personalization

c) Incorporation

d) Attitude and beliefs

Q2 Which one is not the four pillars of education?

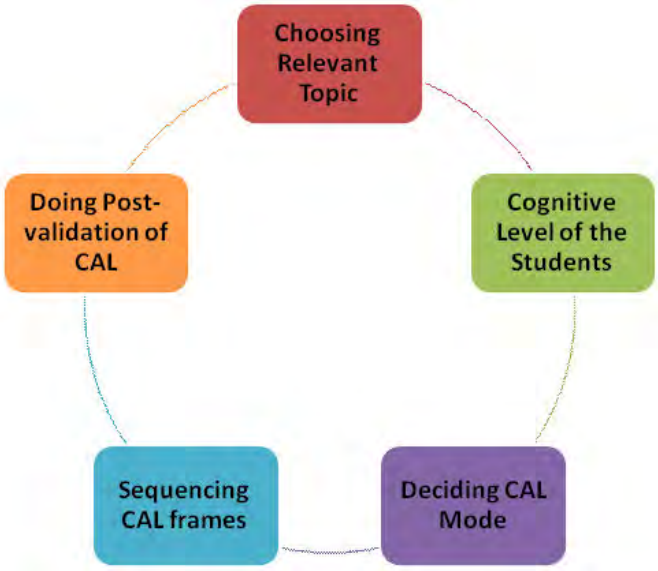
a) Learning to be

b) Learning to do

c) Learning by errors

d) Learning to know

13.3.4 Process of Computer Assisted Learning (CAL)



1. **Choosing relevant topic:** Computer assisted learning is that approach of getting instructions where a learner can get maximum information for better learning. A teacher needs to choose relevant and appropriate topic for which he wants to share information with the students. Computer follows the instructions given to it, so it is very important for the teacher to be very clear and specific about the topic, so he can provide the useful and fruitful information.

2. **Cognitive level of the students:** Before asking students for computer assisted learning it is necessary to decide the cognitive level of the students, aimed by the module presented to them, knowledge, understanding or problem solving abilities of the students.

3. **Deciding CAL Mode:** Computer assisted learning follows various modes and techniques, after deciding cognitive level of the students, appropriate mode is to be selected and assigned to the students according to their abilities and skills.

4. **Sequencing CAL Frames:** It is the time to develop CAL sequence in the form of frames. There are three types of frames to decide the CAL performance and learning. Introductory frames gives direction to the learners. Learning frame presents the matter to be learnt. Testing frames gives the learner appropriate feedback.

5. **Doing Post-validation CAL:** After sequencing convert the CAL module to the computer program and now it is the time to do post-validation and make corrections if needed. After completing this procedure, teacher can release the CAL program for the students.

13.3.5 Modes of Computer Assisted Learning

According to the need and context of the classroom computer can be used in different modes. In the teacher centered classroom, instruction is structured and the learning is frame based. In this mode, instructional material or programme is presented to the student frame by frame in a relatively fixed sequence without any remedial exercise. But with the developments in the computer technology a teacher can present his

teaching in the classroom in a number of flexible ways for meaningful learning to take place. The different modes of CAL programmes are as follows. –

Drill and Practice Session: Drill and practice provide opportunities to the students to repeatedly practice the skills that have previously been presented and that further practice is necessary for mastery and used to provide repetitive exercise for rote skills that have been taught some other way. This is the question-answer type program where the computer generates large numbers of exercises, evaluates responses, gives immediate feedback as to the correctness of the responses and sometimes hints on how to obtain the correct answers if the responses are incorrect. It is an important learning technique for building basic knowledge and basic intellectual skills, such as number manipulation, vocabulary, spelling, sentence construction etc. Properly written drill and practice programs help students commit to memory facts, rules and principles without which a deeper study of a subject is difficult. Drill and practice software was the most prevalent type of computer application for many years, since teachers were not quite sure how else computers could be used. Drill and practice software also fit nicely into a behavioral approach to teaching and learning since it measured student performance. Most drill and practice programs also have a tracking device so that students (and teachers) are aware of their progress. In addition, many of the drill and practice programs have sounds and other motivating characteristics that encourage students and the students can progress at their own rate while using the software.

Tutorial Mode: Tutorial software presents concepts or skills and then gives students the opportunity to practice them as compared to drill and practice software which does not include a teaching component. In this type of program, information and explanatory material is presented in small segments followed by questions. If the students respond incorrectly, feedback according to the nature of their mistake is given. If the answer is correct, another segment of the explanatory material is generated. On the basis of responses made by the students, the program decides how rapidly material should be generated and how much should be covered. In this mode, computer is used to simulate the most visible part of the activity to transmit knowledge and check whether the knowledge has been correctly transmitted. Tutorials are often very interactive. Students do not just passively sit and read computer screens, some

tutorials capitalize on individualized instruction and adjust the pace and feedback based on the students' progress. Tutorial software is more associated with the cognitive theory, because new knowledge is presented in a systematic way.

Problem-solving: This type of computer assisted learning focuses on the process of finding an answer to a problem rather than the answer itself. The students are provided with programmes that can make them think about the ways and means of solving the problem systematically. With the concrete ways suggested in the programmes, the students can divide or analyze the problem into its small constituents and are able to devise systematic procedure for its solution. Problem solving software allows learners to see the results of their reactions to various events. Learners manipulate variables, and feedback is provided based on these manipulations. There is a lot of problem in using problem solving applications in the classroom, provided they match the curriculum. It is sometimes otherwise difficult to provide feedback based on individual choices students without the computer.

Simulation: A simulation is a representation or model of a real event, object, or phenomenon where learners can see the results of their actions. Sometimes, it is not practical or feasible to do the real thing, so a simulation is used to provide experiences that otherwise would be denied. The difference between simulation software and problem solving software is that simulation software deals with realistic situations. They are condensed learning exercises specifically designed to represent vital real life activities by providing learners with the essential elements of the real situation without its hazards, cost or time constraints. Simulations are frequently planned in the form of competitive games to increase motivation and interest. Simulations save money and time, reduce risks and work well in decision-making situations. One element to be aware of when using simulation and problem solving software is that sometimes tests do not reflect what students learn through their involvement with these packages. As we start to use software that addresses higher-order thinking skills, we also need to consider alternative forms of assessment that can help us to better evaluate what students know and understand.

Tool Software: Tool software is the most prevalent computer application used in education right now. It encompasses all software that can be used as a tool for student learning. The software itself is not the focus, but rather the student is using it to help

them express their thoughts and show their understanding. As a result, tool software is not tied to a specific grade or content area. Tool software helps students and teachers to manage information. The use of tool software in the curriculum is only as effective as the activity that the teacher develops. Word processors, desktop publishing packages, spreadsheets, data bases, graphics programs, telecommunications software, and multimedia software are samples of tool software. Tool software is cost effective because it can be purchased for a wide range of grade levels and content areas. Both students and teachers can use the software.

Discovery: In Discovery, inductive approach is followed. The problems are presented and the pupil solves problems through trial and error. It is just like laboratory learning. It aims at the deeper understanding of the results obtained from discovery. Hence, complex problems can be solved. Discovery approach provides a large database of information specific to a course or content area and challenges the learner to analyze, compare, infer and evaluate based on their explorations of the data.

13.3.6 Role of Teacher in CAL

The introduction of Computer Assisted Learning has created a fear in the teacher community that its use in teaching-learning process will take the place of the teacher from the teaching scene. As a matter of fact, CAL may become a powerful tool for the teacher in the instructional process. In CAL, the teacher has the chance to use new tools which will enhance individual satisfaction and increase efficiency. A teacher can play following roles to learners:

a) Content facilitators- to assist learners in understanding the course content.

b) Process facilitators- to facilitate online learning activities

c) Adviser- to provide individual counseling support to learners

d) Assessor- to provide grades and feedback on performance

e) Administer- manage learner records

f) Designer- to devise worthwhile learning tasks

In spite of playing all these roles, teacher performs many other actions which can be seen from the following points:

a) **Planning:** Teacher is designer and planner of all activities. He/She has to decide what to do, how to do and what should be the outcome of the process. The initial planning becomes the base of all the further activities.

b) **Evaluation:** It is an important part of CAL. The teacher decides: How to evaluate? When to evaluate? Interpretation of result. It is the teacher who knows all about this. He/She can plan and design perfectly the evaluation process.

c) **Selection of feedback techniques:** Feedback is necessary in CAL. There are various types of feedback techniques. Each has its own advantages and applications. The teacher decides which feedback technique is to be used. He/She can also design a comprehensive feedback technique.

d) **Selecting motivational techniques:** Motivation is required in the learning process. Lack of motivation makes the process boring and the students indifferent. Thus, proper motivational techniques should be used and this decision is taken by the teacher.

e) **Providing guidance:** The students may adopt wrong way in the CAL process. They can go in the wrong direction. It is the duty of the teacher to provide them proper guidance related to CAL system. The students keep on right track with timely and proper guidance.

f) **Providing human touch to system:** After all, computer is a machine. It makes the system mechanical. This can harm the students in many ways physically, as well as psychologically. The human touch is required in the system. This human touch is provided by the teacher.

g) **Developing instructional material:** What is to be brought to the students is a big issue. What type of content should be presented to the students? What should be the sequence of presentation of content? All these decisions are taken by the teacher.

h) **Selecting Method:** The methods and techniques to be used in the system is another factor which is decided by the teacher. The teacher knows what the

methods of teaching are and which one will suit to the students who are going to use CAL system.

Thus, we see that the teacher has to play a lot of duties in CAL. The machinery in CAL cannot replace the teacher. In fact, nothing can replace a teacher in the teaching learning process. Only the place may change. Sometimes, the teacher is in front and sometimes, the computer.

Check Your Progress-2

Note: a) Answer the questions given below

b) Compare your answers with those given at the end of the lesson

Q1 Different modes of computer assisted learning :

a) Tutorial mode

b) Problem Solving

c) Simulation

d) All of the above

Q2 Role of teacher in computer assisted learning is:

a) Facilitator

b) Advisor

c) Administrator

d) All of the above

13.3.7 Advantages of the CAL

1) CAL is individualized, that is each student is free to work at his own place, totally unaffected by the performance of any other students.

2) Information is presented in a structured form. It proves useful in the study of a subject where there is hierarchy of facts and rules.

3) CAL forces active participation on the part of the student, which contrasts with the more passive role in reading a book or attending a lecture.

4) CAL utilizes a reporting system that provides the student with a clear picture of his/her progress. Thus, students can identify the subject areas in which they have improved and in which they need improvement.

5) By enabling students to manipulate concepts directly and explore the results of such manipulation, it reduces the time taken to comprehend difficult concepts.

6) CAL offers a wide range of experiences that are otherwise not available to the student. It works as multimedia providing audio as well as visual inputs. It enables the student to understand concepts clearly with the use of stimulating techniques such as animation, blinking, graphical displays etc.

7) CAL provides a lot of drilling which can prove useful for low aptitude students.

8) CAL can enhance reasoning and decision-making abilities.

13.3.8 Disadvantages of CAL

1) A CAL package may be regarded simply as a novelty, rather than an integral part of the educational process.

2) Though simulation permits execution of experiments, activities and tasks but hands-on experience is missing. Moreover, CAL packages cannot develop manual skills such as handling an apparatus, working with a machine etc.

3) There are real costs associated with the development of CAL systems. It is expensive in terms of staff time to devise and programme effective CAL.

4) Content covered by a certain CAL package may become outdated. A very high cost is involved in the development of these packages. If the course is outdated, the resources involved in its development will be a waste.

5) CAL packages may not fulfill expectations of teachers. Objectives and methods decided by the CAL author and of a teacher may differ.

6) Motivating and training the teachers to make use of computers in education is a challenging task. They may have fear of this new device. They may be unwilling to spend extra time for preparation, selection and use of CAL packages. It may also be perceived as a threat to their job.

7) There are administrative problems associated with computer installation. The problems particularly related to the physical location of the computer resources, the cost of hardware maintenance and insurance and timetabling.

8) The rapid development of hardware makes it difficult to select a system before it becomes obsolete. If a new system is installed by a maximum number of institutions, they may not get courseware required for the system and courseware developed so far may become useless.

13.4 COMPUTER MANAGED LEARNING AND DEFINITIONS

Computers are certainly not new to the educational arena, but their effective use continues to interest educators. The utilization of computers in education is to store, sort, and display data. Computer is serving education from past years. The term teaching machines, computer assisted learning are dealing with technology in relation to education. Computer Managed Learning is also a part of this technology but it has nothing to do with computer assisted learning. Computer managed learning simply stands for the instruction managed with the help of computer technology. It directly calls for the services and applications of computers in the field of instruction. The Computer Managed Learning is an electronic management information system of a student learning. It is a significant application of computer technology for accountability and documentation of student progress by electronic filing, sorting, and reporting of his/her learning outcomes. However, in the language of computer technology, computer managed instructions may be defined as *a category of computer programme that may be used by educators and instructors to organize and manage data related to instruction for attaining the stipulated institutional objectives in a most effective way.*

Definitions of Computer Managed Learning (CML)

Gorth & Nassif (1984), "Computer-managed learning (CML) is the use of computer technology to collect, analyzes, and report information concerning the performance of students in an educational program".

Hartmann (1989), "CML as a record keeping system or information management system is a significant improvement over manually based operations".

13.4.1 Functions of Computer Managed Learning

Computers are able to perform the task of managing instructions with the help of a category of suitable software programme specifically designed for this purpose. Some of the functions performed with the help of such developed software related to the organization and management of instructions are described below:

1. **Diagnosis of Entry Behaviour of the Learners:** Computer programmes help in the early diagnosis of the strengths and weaknesses of the learners in terms of their previous knowledge and experiences related to a particular knowledge of and skill area, their interests, attitudes and aptitudes, the needs and motives as well as other personality traits for determining their potentiality for going ahead in the learning of a particular instructional course or achieving a set of instructional objectives.

2. **Setting of Instructional Objectives:** Computer software are available that can help in analyzing test data and the other database information about the characteristics of the learners in relation to the needs and purpose served by a particular type of instruction at one or the other stages at school, college or public education. It will help in formulating the goals and objectives for a particular course or piece of instruction.

3. **Generating Individualized Instructional Plans:** Depending upon the need, characteristics, nature and individuality of the learners, computer software are able to generate and organize individualized instructional plans for countless learners at one or the other times- average, gifted, slow or disabled learners.

4. **Generating Instructional Materials and Learning Experiences:** Suiting to the instructional plans and strategies computer software can generate appropriate instructional material and opportunities of interactive learning experiences to the learners of varying needs, interests and abilities. The material generated and developed for instructional purposes may be used on a computer based system or in other forms of instruction. Most of the developed instructional materials have been programmed in tutorial, drill

and practice as well as stimulation and gaming modes and thus occupy significant advantages over the traditional instructional material available.

5. **Availability of Instructional Material into Curriculum Units:** For the proper organization and management of the instructions, an inventory of the instructional resources available to the learners may be stored in the computer's data bank. The total resources may be divided into properly required units having clearly specified set of objectives. There shall be clear directions available for telling the learners what to do for achieving the stipulated objectives. It may ask them to read a book, work off self-administered paper and pencil exercises, conduct experiment with a science kit, attend group instructions or see a film and so on. It may also suggest the learners to take in the end, a unit test after completing the work. The computer after proper processing and satisfied with the progress of the learners, then may suggest him to proceed on to the next unit of the instruction.

6. **Monitoring of Progress:** The computer managed instructions prove very effective in monitoring the progress of each and every individual learners in a quite satisfactory way. What one has done, is doing or will be doing in future can be properly monitored with the help of the great capacity of computers in keeping track of the countless learners in the progress of their instructional outputs. They are able to register the low achievement of the learners, detect the deficiencies in learning along with the possible causes of and provide suggestions for overcoming the learning difficulties.

7. **Providing Remedial Instructions:** Computer software can very well manage any progress related to remedial instructions to the needy learners. On the basis of the learning difficulties diagnosed and the probable causes detected, the software now can suggest all the possible remedies helpful in the planning and organization of instructions. If the student is feeling difficulty in the work related to a prescribed unit he/she may be helped in learning the necessary pre-requisites for that unit so that he/she may no longer feel difficulty in learning that. However, it is a motivational problem; a suggestion may be forwarded to him/her to review the goals or help him/her see the relationship between the present unit and the achievement of those goals.

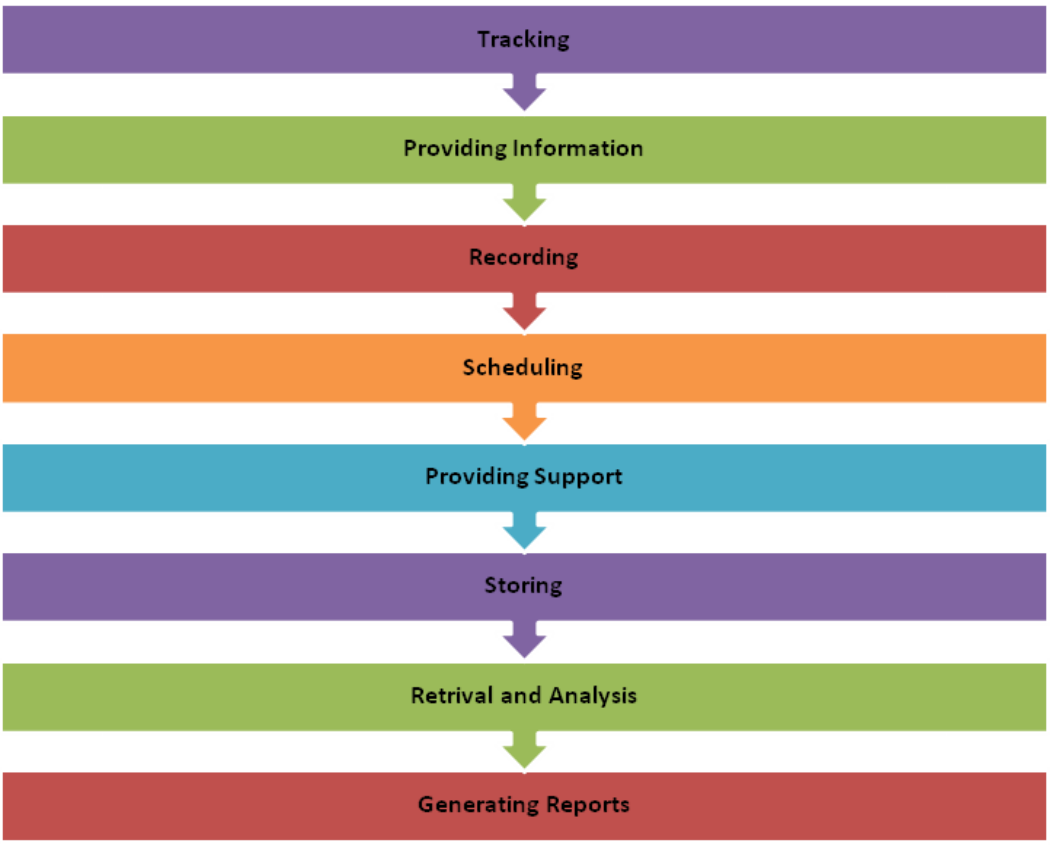
8. **Management of Information and record keeping:** Computer software may help in a big way for the collection, storage, classification and dissemination of information through a well-organized system of record keeping and its maintenance. Storage of information and record keeping are very much essential for the proper organization and management of instructions. The teachers and the learners may get a big help for their teaching and learning from the store houses of such information data related to their respective field of teaching-learning. All types of information and data related to the interests, abilities, educational and environmental backgrounds of the learners belonging to their past and present can be very well monitored and maintained through the help of a well maintained record of all the individual learners which may prove quite helpful in maintain an essential link between the classroom instructions and its administrative management.

9. **Organization of Testing and Evaluation Programmes:** Computer software may provide valuable services in the task of managing and organizing testing and evaluation programmes related to classroom instructions and educational progress of the students in a variety of ways. They are helpful in studying the behaviour of the students for getting them admitted to a course of academic or professional study. Computer managed testing can set unit wise questions distributed over a category of objectives belonging to different domains of learners' behaviour from its pooled question bank by carefully selecting test items according to their difficulty level, discriminating index, the content covered, the objectives tested etc. there is no problem of question leakage on the part of such testing. Moreover, a number of identical sets of question papers may be available for the proper administration and checking of malpractices during examinations. The chances of grammatical mistakes, language and printing errors also are minimized with these testing programmes. Scoring and interpretation also are quite objective and mechanical leaving almost no chance of traditional human errors.

10. **Generating all Types of Reports:** Computer software help the processes and outputs of the instructional programmes by generating all progress and information reports related to the tasks of instruction. If one need the report

related to the entry behaviour of the students, it is available on the computers' hard disk or files maintained for the purpose. One may have a printed copy of the same for planning the individualized instructions for your students. The data regarding the available instructional resources, aids and equipments, unit wise organization of the curriculum and the progress regarding the attainment of instructional objects are readily available to the learners and the teachers. The testing, evaluation and progress reports of the individual students and the group as a whole, generated through computers, can be sent to the parents for acquainting them with the progress of their children and seeking their help for their welfare. Such reports can also be used for the removal of their learning difficulties and for nurturing their talents and creativity.

13.4.2 Procedure of Using CML



13.4.3 Benefits of CML Systems

A) For Teachers:

1) CML system treats every student as an individual and helps teachers to follow suit.
2) Allows students to be extended or remediated as required.
3) Makes computer software accessible and relevant
4) Gives back huge amounts of time from testing and marking that is better spent on creative student learning
5) Provides previously unknown data on which to constantly refine and improve the teaching method

B) For School Principals and Management

1) Provides accurate measurement and analysis for informed decision making
2) Provides accountability and control
3) Traps, retains and shares valuable resources developed by teachers over time
4) Facilitates quality control of the teaching process
5) Allows for new goal setting in measurable education outcomes.

C) Uses for Government

1) Influences the productivity of teachers
2) Collects data on computer usage
3) Fully utilizes technology resources
4) Allows policy to be formed and funds allocated based on previously unobtainable data

13.4.4 Cautions while using Computer Managed Learning

Educators must be aware that the ease with which electronic data bases manages information poses the possible dangers of:

1) The volume of information can present problems for teachers, providing too much material to use in reasonable ways.
2) What kinds of controls exist to assure
3) The accuracy of the information
4) Increased impersonalization
5) Not enough well trained educators computer literate to assure proper use of systems
6) The system controlling the user
7) Too much emphasis on data not enough emphasis on instruction
8) System "over-kill"- system far too elaborate for the need.
9) Possibility that the maintenance of the system may take more time than the instructor realizes.

13.4.5 Difference between Computer Assisted Learning and Computer Managed Learning

1) CML does not refer to direct instruction; it is on the other hand the management of instructions.
2) The computer functions as a teacher in CAL format while it functions as a manager in CML format
3) CML is an instructional management application that utilizes the computer to direct the entire instructional process while CAL is instructional delivery system through the means of computers.
4) CML refers to directing the application of CAL while CAL is the actual operation of CAL.

5) CML has developed a step behind the developments in CAL. It is one of the most rapidly growing areas in computer-based education.

6) CML concerns with storage of data of individual while CAL concerns with creation of this data.

7) CML has the objectives of record-keeping, instructional decision making, report writing and satisfying academic, political and government requirements. CAL in contrary concerned with the objectives of making learning process individualized, effective and easy.

Check Your Progress - 3

Note : (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 Function of Computer Managed Learning is diagnosis of_____ of the learners.

Q2 Computer Managed Learning allows students to be _____or _____ as required.

Q3 Computer Managed Learning does not refer to direct_____.

13.5 TEACHING MACHINES

Programmed Instruction is one aspect of educational technology. The software approach of educational technology includes the instructional technology or programmed instruction. Educational technology is broadly classified into three forms:

1) Hardware approach

2) Software approach

3) System analysis

Educational technology is intended to make both learning and teaching processes effective as well as efficient. In view of the unprecedented explosion of knowledge in various disciplines and fields of education it is found necessary to make teaching

as well as learning less time consuming and less laborious. Educational technology does not mean only some machineries or equipment, but it consists of various means and methods as well. All the systematic approaches and techniques are put into educational practices as a part of educational technology in order to achieve instructional objectives with economy off time, money and efforts.

Teaching Machines are usually hardware being used along with software like programmed materials. They are operated on certain fundamental psychological principles and are considered superior by many educationists on account of their better techniques and methods. The teaching machine is defined as a carefully prepared programme housed in some apparatus and presented to learners with indications whether and when their responses are right or wrong. Teaching machines are called feedback devices as they supply knowledge of results when a student or a group of students are questioned on what they have learned.

13.5.1 Historical Background

About 1915, and for approximately the next fifteen years, Sidney L. Pressey developed and used machines for teaching and testing. In 1926-27, he produced the Drum Tutor, which underwent successive modification. It was a teaching and testing device that presented a question until the student responded correctly the number of times for which the machine was designed. The student selected his/her response from multiple-choice alternative by pressing one of four response keys. Thus, one of the first teaching machines was reported by Sidney L. Pressey of Ohio State in 1926.

In 1954, B.F. Skinner reintroduced the concept of teaching machines whereas Pressey first introduced the idea in 1926 for teaching and testing purpose. In one of his article, he gave one essential reason for introducing teaching machines and the reason was technological development in every sphere of human life. His assumption is that behaviour can be shaped by using continuous reinforcement which cannot be provided by human teacher.

13.5.2 Meaning of Teaching Machines

A piece of device designed to be operated by a student. He/She has to respond to a question either by writing or by pressing a button to indicate the correct answer. An

account is kept of the response made by student. There are many types and varieties of teaching machines, but all of them have the following characteristics:

1) These are used to present instructional material systematically.
2) Teaching machines provide the opportunities of respond overtly.
3) It provides the situation to check or confirm of his response. There is no scope to copy down the response.
4) Teaching machines can provide continuous reinforcement to the student.
5) These machines also prepare the record of students learning and responses.
6) Different types of instruction can be presented through teaching machines.

Edward I. Green has enumerated three characteristics:

1) The content can be presented systematically through teaching machines and feedback is given for the student responses.
2) Teaching machines can present the form of programmed instruction in which student cannot copy down the correct response. There is an interaction between student and teaching machine that result in new knowledge.
3) Teaching machines provide the opportunities to work through the programme according to his rate of learning. These provide the continuous reinforcement to the learners.

13.5.3 Principles incorporated for Learning by Teaching Machines

Skinner describes the teaching machine incorporating the following principles of learning;

- Practice of the correct responses,
- Knowledge of results and reinforcement of the right answer,
- Minimum delay of reinforcement,
- Successive small steps with hints (McKeachie, 1974)

13.5.4 Types and Functions of Teaching Machine

Teaching machines are normally divided into three categories.

- Adjunctive
- Linear
- Branching

(Mackenzie, Michael Eraut and H.C. Jones 1970)

1) Adjunctive: Developed by Pressey and his co-workers. It provides knowledge of results to students by answering multiple choice test questions. The term adjunctive is used because these machines are adjuncts to the main teaching-learning process. They only contain tests and they are used to test and revise material which the student has already encountered elsewhere.

2) Linear: This type of teaching machine model is mostly used for presenting the instructional material. Proper instructions are given for the effective use of teaching machine. It presents questions step by step in a predetermined sequence, get the student to answer each question in turn and gives him immediate knowledge of results.

3) Branching: It allows the student alternative routes through the material and uses his/her mistakes to determine his/her route, but it can only accept multiple choice button pressing responses. None of these machines has so far been shown to have any learning advantages in higher education over programmed texts, and they impose considerable restrictions on the persons writing the materials.

James W. Brown and others (1964) have given a comprehensive picture of different types of teaching machines.

1) **Linear constructed response programme:** It is perhaps the simplest teaching machine configuration since its function is only to present frames one at a time and prevent cheating. It is most appropriate when writing an answer is the desired skill and where self-checking can be effectively done

by the student. Research feature appear in some models to provide an item analysis of student responses to guide the programme, write as he/ she test his/her programme.

2) **Linear multiple choice device**: It too displays frames one at a time and prevents cheating, but because the response is made mechanically, various kinds of feedback information can be given to the students. Most importantly, the students' knowledge of the results of his choice is instantaneous and the judgment of the correctness of an answer is made not by the student but by the machine according to the programme in it. This machine is used where recognition is more important than recall.

3) **Adaptive Programme:** This is the programme which is modified on the basis of the responses given by the students. Such machines must necessarily be multiple choice devices because control of the student must be inside the machine. Thus far, the only way to achieve such control is through use of push buttons to reveal the students' discriminations for the learning tasks involved.

4) **Automated Instructions:** A highly complex machine built around a computer with capacity for retaining and responding to vast amounts and infinite varieties of data. Such a device conceived to be capable not only of accepting student responses in terms of multiple choice push buttons, but also accepting and responding appropriately to type written, handwritten and even spoken student responses and of adjusting its programme sequence accordingly.

13.5.5 Teaching Machines and Teacher

It is the fear in minds of people that teaching machine is going to replace the teacher. It is wrong to think so. Teaching machines serve the different functions which no teacher accomplish it. Teacher's functions cannot be rendered by any teaching machine. The following points clarify this issue:

1) The instructional material can only be developed by the teacher. No teaching machine can prepare instructions.

2) Teacher and taught interaction helps in developing cognitive, conative and affective aspects of a learner. No teaching machine can develop affective aspect of the learner.

3) Teacher can only provide the social motivation to the learner for developing attitudes and values, but a teaching machine can provide psychological motivation to the learner.

4) Teaching machines can create well defined and well-structured learning situation which cannot be generated by a teacher.

5) Teaching machines compensate the individual differences in learning process which can be compensated by a teacher.

6) The continuous reinforcement can only be provided by a teaching machine but can be given by a teacher.

It is evident from these arguments that teaching machines cannot replace the teacher. Both are complementary to one another.

13.5.6 Advantages of Teaching Machine

1) Teaching machines orient toward the automation of teaching-learning process.

2) Teaching machines function like tutorial instructions. These machines compensate the individual differences in the process of learning.

3) Teaching machines provide the well-defined and well-structured learning situation for desired behavioural change or modification.

4) Teaching machines provide the continuous reinforcement to the learner while he/she reads the material.

5) Teaching machines create the situation in which a student learns by doing.

6) A learner cannot copy down the correct response while the material is presented through teaching machines.

7) Teaching machines assist the teacher and make his/her task more simple.

8) Teaching machines are also used for testing the students' learning outcomes or their achievements.

13.5.7 Limitations of Teaching Machine

1) Teaching machines are costly, economic conditions of our country cannot afford to purchase teaching machines.

2) Teaching machines can be effectively used for presenting the programmed instructional material which his not available in our country. Programmers hae developed material by selected topics for their experimental purpose not school syllabus.

3) Teaching machines can't be used for developing attitudes and values among the learners. The cognitive objectives can be achieved by teaching material

4) Programmed text and scrambled text books are economical than teaching machines. Studies have found that both are equally effective from learning point of view.

5) Adjusting devices for compensating the individual difference can be presented through teaching machines. Programmed text can be used easily.

6) The bright students do not like to read through teaching machines, because they fed boring to them. They have also followed the same linear path.

Check Your Progress - 4

Note : (a) Answer the questions given below

(b) Compare your answers with those given at the end of the lesson

Q1 Which teaching machine gives immediate results of knowledge?

a) Linear

b) Adjunctive

c) Automated

d) Adaptive

Q2 James W. Brown and others (1964) have given different types of teaching machines which are

a) Linear multiple choice device

b) Adaptive Programme

c) Automated Instructions

d) All of the above

Q3 Teaching machines assist the _____and make his/her task more simple

a) teacher

b) student

c) administrators

d) none of the above

13.6 LET US SUM UP

Computer Assisted Learning has the potential to totally transform the education process and remarkably improve the efficiency of learning by providing great motivation to students. CAL gives them freedom to experiment with different options, instant feedback and answer to queries. This assistance from technology can help provide more bandwidth to teachers to work with students who need more of their time. The impediments associated with computer assisted learning are not related to the computer programs, but how to teach with them. The difficulty with CAL is chiefly the low-level pedagogic (methods and activities of teaching) strategies of teaching/learning with ICT systems. A thorough pedagogical review should be initiated to provide guidelines on the use of computer technology in classes. To overcome computer anxiety, the use of computers should be encouraged among students and teachers and practical computer skill classes should be infused in the educational curriculum.

Depending on the resources available, computer should be made mandatory in order to speed up the level of computer literacy among all students. In this way, computer and their applications may be utilized for arranging and managing all

the essential affairs related to the processes and products of classroom instructions. However, the field of CML cannot be limited to the boundary walls of the usual classroom and school students. CML may be credited now-a-days to have the capability of managing the entire spectrum of the teaching-learning or instructional process covering all the fields and areas of our education system. Teaching machines may be better, faster and more efficient than teachers, but they cannot replace them, not even the text books and the other textual materials. They may improve the classroom communication and the teaching-learning process. But they cannot be taken as perfect media or aids in education nor should be used for the types of learning for which they are best suited especially for rote memorization and drilling in language skills. The development of teaching machines is mainly based on the psychological principles of Skinner, Thorndike, Pressey and others.

Techniques and methods of reinforcement and feedback involved in the system may be introduced for effective learning.

Student's active participation is necessary and the device gives rewards to the student giving immediate answers.

13.7 LESSON END EXERCISE

1. What are the features of Computer Assisted Learning?
2. Explain the process of CAL.
3. Describe the role of teacher in CAL.
4. Explain various steps involved in Computer Managed Learning.
5. What precautions teacher must be kept in view while using CML?
6. Differentiate between CAL and CML.
7. Describe the functions of Teaching Machines.
8. What are the various types of Teaching Machines?
9. "No Teaching Machine can replace the teacher. Both are supplementary to one another". Justify it.

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13.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress - 1

1. c

2. d

Check Your Progress - 2

1. d

2. d

Check Your Progress - 3

1. entry behaviour

2. remediated

3. instruction

Check Your Progress - 4

1. a

2. d

3. a