COMPULSORY COURSE 04 (CC-04)
DESIGNING TEACHING STRATEGY

BLOCK 04
DESIGNING TEACHING STRATEGY

B.Ed. CC-04 : TECHNOLOGY OF TEACHING

Block 4

DESIGNING TEACHING STRATEGY

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BLOCK 04 : DESIGNING TEACHING STRATEGY

INTRODUCTION

A teacher wisely uses quite a good number of tactics, and skills to bring about the expected learning outcomes among the students. Apart from different methods of teaching, he or she may make use of teaching strategies also. This Block exclusively deals with different varieties of teaching strategies. **Unit 19** in this Block deals with the concepts like, teaching strategies, approaches and methods of teaching.

Unit 20 deals with different approaches like, conceptual approach, and investigatory approach. **Unit 21** discusses about inductive approach and deductive approach. In **Unit 22,** you learn methods of approach, namely, lecture method and demonstration method. **Unit 23** deals with a special concept, known as 'Assignments' and **Unit 24** again gives the details designing a teaching strategy.

UNIT - 19 ❐ TEACHING STRATEGY - AN INTRODUCTION

Structure

19.1 Introduction

Teaching is a noble profession, and here we deal with students. You know that, child's mind is not like clay or wax, where you can mould it in to any type of sculpture or doll or idols that you want. In each and every moment, knowingly or unknowingly, the child will be interacting with the environment. This definitely will result in behavioural change. But you also know that, a teacher wants the desirable changes in the child. For this he utilizes a number of ways and means of teaching. You may feel interested to know a little more about such ways and means of teaching, like, what are these ways and means of teaching? How many types are there? Will it suit each and every child? Isn't it?

The more you think in these lines, the more clarity you get by means of learning about teaching. Because teaching and learning are inseparable processes. According to philosophers, educationists and educational psychologists, the ways and means used by teachers while teaching is generally called approaches and methods of teaching.

Now a day you know that modernization in the name of globalization has made science and technology to penetrate in to the teaching and learning process of an educational system also. This in turn has resulted into an introduction of a new term what is known as ***technology of teaching.*** Teaching technology means ***"a systematic measure to execute the complex process of teaching with a strong support of theory and practice of educational technology in which the main purpose will be bringing improvement in the task of teaching".***

As it is told earlier, teaching is a highly skill-oriented job. So far you have performed your role as a ***learner.*** But now, you are learning to become a teacher. This requires an adequate training and preparation. Teaching technology definitely will help you to perform your role as a teacher more effectively and efficiently in the process of teaching - learning. Sometimes a teacher has to play the role very tactfully to treat the process of teaching as both a science and an art. For this teaching technology stretches its helping hands to a teacher. It makes a teacher more efficient and effective. Here the effectiveness is explained as the quality learning outcome and efficiency in terms of time taken for that output as less as possible. That is to say, a quality work is achieved in as short period of time as for possible. In other words, it is getting more and better output with the least input in terms of time and effort. Technology in teaching, if it is acquired by a teacher, then he will show an outstanding performance with reference to the following aspects:

- Communication
- Interaction with pupils
- Motivating/inspiring students to learn and also for self-learning skill

To evaluate, diagnose and reinforce the pupils' learning behaviour

Now you may ask a question as how the above said qualities have been derived and assigned to teaching technology? Isn't it? If you go through the fundamental principles and characteristic features of teaching technology it becomes very clear to you.

According to Vedanayagam E. G. (1988), teaching technology is distinguished by the following fundamental principles:

- Teaching is a scientific process involving content, communication and feedback as major components
- Teaching and learning are inter related
- Teaching - learning activities can be generated and could be modified / improved
- Learning outcome can be achieved by creating an appropriate learning environment
- Teaching technology involves strategies, approaches and methods of teaching.

Likewise, in this unit you will be introduced to the meaning, nature and importance of teaching strategies, approaches and methods of teaching in general; their inter relationship as well as the respective differences. It also describes you about how learning experiences are influenced and enhanced by teaching strategies.

19.2 Objectives

After studying this Unit you will be able to:

- Explain the term technology of teaching
- List out the characteristic features of teaching technology
- Define teaching strategy
- Explain the nature and importance of teaching strategy
- Differentiate between approaches and methods of teaching
- Correlate strategy, approaches and methods of teaching
- Differentiate learning experience from teaching strategy

19.3 Teaching Strategy - Concept, Importance

In order to bring about desirable changes in the learner, the teacher has to employ a number of devices. Having the same purpose, teachers in the long ago i.e., in the past history also have utilized a number of tactics and strategies. For example, our ***"Panchatantra stories".*** Each and every story had one need or moral. Here the teacher was narrating the story in such a way that the child automatically was absorbing and inculcating the moral or the hidden need it in to his personality. So, here the story telling was just one among the many teaching strategies.

Let us take another example: A cheetah/leopard wrongly entered to a village, may be captured by using a scapegoat/dog or any domesticated animal. Here the use of a goat is an example for one more type of strategy. Instead of fighting directly with the leopard, villagers have utilized this ***planned situation.***

In the story of Kisa Gowthami, Lord Buddha asks her to bring mustard seeds from a house where no death has occurred. Here Buddha did not preach anything directly to her instead, made her to undergo the learning situation so practically, in such a way that at the end she clearly understood how mortal everybody's life is. Later she whole-heartedly started learning more about metaphysical questions like what is life? Is there after death?, etc., and she became one of best disciples of Lord Buddha.

My dear student, all the above given examples are suggesting you that there are plenty of strategies to teach the concepts of any type at any level of learning. So a strategy means, "It is a purposefully conceived and determined plan of action orienting towards the goal achievement."

To tell you the truth, the term 'strategy' is popularly used in the battlefield, like different strategies are going to be employed to defeat the enemies. But here in the field of education who is the real enemy? It can't be other than the Ignorance. Isn't it? Therefore the teacher as a soldier has to fight with this enemy using several teaching strategies; so that the learner's ignorance/ disabilities to learn will be defeated, and thereby desirable behavioural changes or the learning outcome is assured and there lies the teacher's victory.

Strategies are the means to achieve learning objectives. Inspite of the mastery over the content on the part of the teacher, he/she should be appropriately oriented with regard to the importance and various types of instructional strategies. It is because strategies form the essential and integral part in curricular transaction. Now let us look at some of the definitions of teaching strategies:

Smith et al (1970) identified teaching strategies basically "as being skillful plans that control the subject matter of instruction and direct student behaviour towards selected outcomes".

E. Stones and S. Moris have defined the term teaching strategy in a very comprehensive way. They say that "teaching strategy is a generalized plan, for a lesson which includes structure, desired learner behaviour in terms of goals of instruction and an outline of planned tactics necessary to implement the strategy. The lesson strategy is a part of a larger development scheme of the curriculum."

Now a question may arise in your mind that why one has to use these strategies at all? It is because the use of strategies gives a scientific touch to teaching. It gives the scope for empirical evidences with respect to goal achievement. Strategy tries to visualize the complete personality of the learner and creates a learning situation and also gives a chance to check the desired behavioural changes have achieved or not in cognitive, affective and psychomotor domain of the learner. Hence teaching strategies are said to be more scientific.

Different teaching strategies have different effectiveness in achieving different kinds of learning objectives. However, teaching strategies in general can be classified broadly in to two types, namely,

- Autocratic Teaching Strategy and
- Democratic Teaching Strategy.

***Autocratic Teaching Strategy*:** Here, the teaching strategies will be highly teacher centered and also content or the subject centered in their nature. Lecture strategy, demonstration strategy, tutorial strategy, narration strategy, description strategy, explanation strategy, illustration strategy, role playing strategy etc., can be cited as examples for autocratic teaching strategy.

***Democratic Teaching Strategy*:** Here, the teaching strategies will be highly pupil centered and also give more chance for the interactions between the teacher and the taught and also can have a many number of activities for the purpose of learning. Problem solving strategy, project strategy, group discussion strategy, questioning strategy, independent discovery strategy, guided discovery strategy, assignment strategy, field study strategy, brain storming strategy, computer assisted learning/ programmed instruction strategy, self - study strategy etc., can be cited as examples for democratic teaching strategy.

Importance of Teaching Strategy: By understanding the meaning and nature of teaching strategies, now you may be in a good position to speak a few points regarding how important are these strategies for a teacher. The importance of teaching strategies are:

- More scientific and thereby they assure learning outcome.
- Visualize the child's personality completely
- Enhance the teachers' efficiency and effectiveness
- Give a scope for the critical analysis of a learner's behaviour with respect to learning outcome.
- It smoothens and quickens learning.

'Check Your Progress' - 1

1. The quality of an education system depends upon the teacher's competency in terms of his :
   a. qualification
   b. experience
   c. efficiency and effectiveness
   d. mastery over the subject
2. Teaching strategies take the following point in to consideration as utmost important:
   a. infrastructure
   b. curriculum
   c. syllabus covering
   d. learner and his learning outcome

3. What are the major types of teaching strategies? Give two examples each.

19.4 Approaches and Methods - Differentiation

Wherever you come across interactions, whether it is between individuals, individuals and environment or whatever it may be, it gives a chance to think in terms of a different angle or vision ie., approach. Suppose, a person is asking a favour from somebody, here the interaction shows that, the person who is asking a favour, will be polite enough in his approach. Isn't it? If, he is not polite in his approach means, the thing which he had in his mind (ie., receiving a favour) may not occur at all. Here what I want to say you is, approach depends upon the nature of the task which has to be carried out. Now let us take-up the teaching profession. Here also, you come across interactions. Interaction between the teacher and the taught, pupil and pupil and also, between the subject to be learnt and the learner.

Such interactions also can be analyzed in terms of approaches, namely, teacher centered approach, learner centered approach/child centered approach, activity centered approach and subject centered approaches. Let us take up these approaches one by one to understand clearly.

1. Teacher Centered Approach*:* This is also called an expository approach. Here the interaction is dominated by telling, memorization and recalling of information. That is, usually teachers' role is dominated and students are passive recipients of knowledge. It appears almost like one way traffic. Sometimes, it results in very meaningful learning also. Lecturing, seminar activities, lecture-cum- demonstrations, special talks are the few examples coming under this category. In such a situation teaching environment will be very much formalized and teacher occupies the central position in the classroom.

II. Subject Centered Approach: In this type, the subject matter occupies the pivotal place, and all the curricular activities will be designed based on the subject matter. This is also considered as traditional type of approach.

III. Learner Centered / Pupil Centered Approach: You know that, teaching is a process of transaction. The information is transacted in a socio-emotional set up. The learner centered approach is characterized by the pupil dominated socio-emotional set up. Here

the teaching is considered as a bipolar activity; where teacher and the taught occupy the two poles. Whatever the teacher teaches will be determined by the child's need, interest, attitude, aptitude, and his background as well as his requirements. That is to say, the whole teaching - learning process is geared to the needs, requirements capabilities and interests of the pupils. The interaction here will be dominated by the students' role and activities under a very special type of learning situation where it is psychologically quite open. The teachers role here confines to creating a learning situation, from which a problem may be developed so that by exploring the resources available, students may identify issues, construct hypotheses, clarify and test hypotheses and draw some conclusions. Heuristic, project, discussions, and debates, problem solving etc., are the different approaches, which could be cited as examples under this category. The outstanding feature of this type of approach will be the active participation by the learner.

IV. Activity Centered Approach*:* Sometimes teachers will take up several activities in order to teach certain concepts/principles/generalizations/facts.

Here the activities have to be planned well in advance. The main philosophy behind this approach is that it considers child as a **"Constructor of Knowledge".** It may demand the rehearsing of such learning activities also. Here one may come across of two types of activities, namely, (I) Short Term Activities and (II) Long Term Activities.

Usually science lessons will give much scope for activity centered approach for teaching in a class room situation. The subjects under social science category may need out of school activities much. Anyhow it depends upon the nature of the subject matter or the information which is to be taught rather than on whether it is science or arts. Teaching of science subjects in general demands experiments where science process skills, namely, identification, classification, experimentation, observation and hypothecation shall be inculcated in to the child's personality. In this type of approach the teacher and taught are equally involved irrespective of short term or long term type of learning activities. Let us go through the, following examples to understand this concept still clearly:

1) In order to determine the pH value of water the students may be asked to collect and bring water samples from different sources. Later 'use of the pH indication paper activity' could be done in the class. Based on this students will decide and say their findings as which sample of water is acidic/basic/ neutral. This could take comparatively shorter/ longer time for learning.
2) Students are encouraged to study the effectiveness of the wormy cultured manure by a comparative method. Here two potted plants of the same variety will be selected. One will be growing with the help of traditional or chemical

fertilizer and other will be growing with the help of wormy cultured manure. The collection of data will be with respect to the rate of growth, flowers and their size, colour, shape etc., fruits and its qualities, seeds etc., and also the same type of data will be collected from the next filial generations (if possible). Based on the information collected children are asked to infer which method is the best for the plant growth. This activity may take up comparatively a longer time, depending upon the species selected for the experiment. If pea plant is selected one can complete the whole activity within one and a half month.

Now a days any subject is taught with scientific temperament. So, a teacher can plan number of activities with appropriate approach to teach the subject. For example, inquiry / investigatory can also be used even to teach the subjects like, history, civics, geography or languages also. Only thing is a teacher must be very resourceful and enthusiastic to create activities as a learning medium that's all.

In activity centered approach the pupil will be like a mini scientist or an investigator. His learning will be more professional. And there will be an ample scope for first hand learning.

So far you have come across the terms like teaching strategy, approaches to teaching. Now let us move towards another term 'Methods', which is again one of the most important integral aspects of teaching learning processes.

What Is Meant By Method?

You know that if at all you want to do a thing / work very systematically, it has to follow a method. That is to say, a method corresponds to a certain systematic procedural execution. In teaching, the teachers' prime aim will be bringing desirable behavioural changes in learner. This depends upon effective teaching. This intern will depend upon the method the teacher adopts. You see, there is a great world outside and the mind within is small (for a child) it is the duty of the teacher to bring the two together. Systematically, the teacher interprets the world interims of knowledge and infuses this in to the child's mind. Such a process is said to be 'Method of Teaching'. It is just a way of teaching.

People say that teaching is an art and there are some born teachers. For the ever increasing population, and similarly ever increasing number of learning aspirants, the available number of born and gifted teachers is meager. Hence the need of training of the available persons for teaching profession has arisen. Whoever wishes to come to this profession can improve their teaching skill by following various methods of teaching.

A teacher should feel free to use a variety of methods based on/ according to his / her own abilities/interests and experiences and also the students learning under particular situation / circumstances. Because, method is not an end itself; but it is the means to achieve the pre-determined objectives of teaching.

According to M. Verma, teaching method is a style of the presentation of content in the class room. But Broody says "Method refers to the formal structure of the sequence of acts commonly denoted by instruction. The term method covers both strategies and tactics of teaching and involves the choice of what is to be taught, and in which order it is to be presented".

Method is based on classical theory of organization and it is task centered. Here the content and mode of presentation are the main elements. Method is determined by the subject or the content. For example, the subject / content is "liberation of oxygen during photosynthesis" that demands / determines an experimental or laboratory method. Similarly, if the content is "evolution of man" or "Parliamentary activities" in the subject civics, that demands / determines a lecture method or an expository method. Anyway, a method employs a macro approach to teaching. The teaching methods are evaluated in terms of mastery over subject matter by using achievement tests. In general teaching method aims at the effective presentation of the subject matter to result in the mastery learning by the learner as a learning outcome. Lecture method, lecture cum demonstration method, heuristic method etc., are the examples for various teaching methods. Sometimes teaching method and strategies are used interchangeably. Like, lecture strategy, and lecture method but you should not get confused here. It must be very clear to you now, that, a strategy is more scientific-and each and every step under strategy will be very clear with a definite purpose. Where as a method will be in general terms and bothers simply for the overall presentation of the subject matter.

While selecting an appropriate teaching strategy, task analysis, learning conditions and learning objectives are crucial factors, but method is determined by the nature of the subject matter. Method is a wider term, in which different strategies can be adopted. Both methods and teaching strategies have the same purpose or the objective ie., bringing a desirable behavioural change or learning in simple terms. One can enhance their teaching styles effectively and become efficient teachers by practicing different methods of teaching.

Now after understanding what an approach is and what a method lets us try to differentiate the two aspects.

Approaches	Methods
1. Have been identified in to four main types, namely, • Teacher centered approach • Subject centered approach • Learner centered approach • Activity centered approach	1. Methods are of several types, which can be decided, based on the nature of the subject to be taught.
2. It is explained in context with the interactions between the teacher and the taught or among the students or between the subject and the student	2. Methods are said to be the general way of presentation of the subject matter. They are said to be the means to achieve the pre-determined objectives.
3. Teaching approaches are planned by the teacher in order to bring a desirable change in the behaviour of the student.	3. A method is decided by the nature of the content to be presented in the classroom teaching learning situation.
4. Teaching approach seeks to perceive the complete personality of the child, and enhances the development in cognitive, affective and psychomotor domain and hence facilitates the process of evaluation through criterion referenced tests.	4. Methods of teaching enhance the cognitive development of the child's personality and hence facilitate the process of evaluation through achievement tests.
5. Approach helps in generating a number of strategies so that they could be incorporated effectively in different methods.	5. A method can utilize any number of strategies by allowing them freely in any sequence in a teaching and learning set up. A method also allows a change of strategies in the midst of the process.

'Check Your Progress' - 2

1. What are the types of teaching approaches? Give one example each.

2. Define teaching method.

3. List out any three differences between approaches and methods of teaching.

19.5 Relationship among Strategy, Approach and Method

By this time it must be very clear to you, that, strategies are very systematic steps or actions carried out by the teacher with clear purpose or objective to achieve. Here the objectives in most of the time will be instructional objectives. Hence they are prescribed in behavioural terms. For example, pupil will be able to define, explain, compare, draw conclusions etc., with reference to a selected content or the subject matter. So, a strategy will have a highly structured, deliberately planned actions orienting towards the goal achievement or to achieve the instructional objectives. You also know that methods make use of any number of strategies while presenting the subject matter. Where as an approach speaks about the interactions, it could be between the teacher and the taught, between pupil and pupil or between the subject and the learner. You have to notice here that all the three, that is, approach, strategy and the method intend to bring about the desirable changes in the student's personality in several ways. But they never contradict each other rather may become complementary to each other or even reciprocal to each other. That is why it is very difficult to differentiate them with crystal clearance. It is also because of their integrated nature. They are interwoven in such a way that, their separation, just for the sake of understanding also is difficult. They do not possess any watertight compartments among themselves. It is like, method subsumes strategies, and strategies are generated by means of approaches. So, it becomes first and the foremost duty of a teacher to understand these concepts properly and utilize them in teaching and learning situation appropriately.

Take for example, the process of questioning. Questions can be generated during interactions. That is, here the questioning process can take the form of an approach.

The same questioning can be the strategy, like, how a lawyer makes use of this strategy in eliciting the truth during interrogation in a court scene. A teacher also can use the same as a strategy during teaching. As Swami Vivekananda says everything will be hidden in the personality of the child. Only thing is that it has to be manifested. Through the questioning strategy a teacher can develop the content in a class room situation. Questioning strategy is the main device for teaching - says the great Greek philosopher Socrates. And hence, this is said to be the Socratic Method of Teaching.

In a classroom situation a teacher might be conducting an experiment. While doing this he may ask questions like, 'What are you observing?' "What is the reason for this?" etc., and the very next moment, he may write the chemical equation on the board (use of black board an yet another strategy). Later he may ask one or two students to balance the chemical equation on the board (one more strategy).

In the above example, you have seen, lecturing, demonstration, narration, use of black board, experimenting and questioning and also asking the students to balance the chemical equation etc., all these are deliberately planned actions executed by the teacher in teaching process. Here the teacher has chosen the experimental / laboratory method to teach the content. (This is decided by the nature of the content). This could be a strategy' also. And you know very well now that these strategies are originated because of the approaches and the approach will be the resultant of the interactions. Here interaction may have a dominating role by the teacher; then we call it as teacher centered approach or it may have learner dominated situation (the pupil actively conducting an experiment); then we call it as pupil / learner centered approach or even it can turn to be activity centered approach also or for your greater surprise, it may be a mixture of all these approaches also.

To conclude it could be said that you have to visualize the inter relationship between the strategy, methods and approaches in teaching. One thing is true; whether it is an approach, strategy or a method, it will lie in the hands of the teacher. Hence you are going to get trained in making use of these three essential factors in your 'teaching practice session'.

'Check Your Progress' - 3

1. Is questioning a strategy or an approach? Explain with an example.

2. What is the relationship between an approach, method and strategy of teaching? Explain briefly.

19.6 Teaching Strategy and Learning Experience -Differentiation

Well, all of us accept that, teaching and learning are the two faces of the same coin. Sometimes learning takes place as a direct resultant of teaching and sometimes it happens indirectly also. Teachers' influence on the students' learning is un-questionable. Many a times students may learn several good qualities by the teacher, though the teacher himself/herself may not know it or intentionally might not have planned and taught it. These are said to be nurturing effects. However, for leading properly the students in the path of learning a teacher has to be very careful in the selection and use of the proper approaches, methods and strategies of teaching.

Coming to teaching strategies you know that broadly they have been classified into two groups, namely, (1) Autocratic Teaching Strategies and (2) the Democratic Teaching Strategies. And each group is having several examples / strategies under it. But it is also true that no one strategy is completely perfect. A teacher has to arrive at the proper conclusion with regard to the use of these strategies by taking the following points in to considerations:

- Previous knowledge / competencies / capabilities of the learner
- Learning outcome with reference to instructional objectives in behavioural terms
- Construction or designing of learning situation to fulfill the objectives
- Taking an account of available learning resources
- Other allied limitations or delimitation while executing the strategy

Now having this much of background regarding teaching strategy, let us try to critically analyse how learning experiences are correlated with that of the teaching strategies.

First of all we know that, strategies are scientific in their nature, so that we can trace out a cause and effect relationship in teaching learning process. By telling this it is implied that, one can find out evidently that, this much of learning has occurred because of a particular teaching strategy. Because, strategies give a chance to administer criterion referenced tests, where the learner competencies belonging to cognitive,

affective and psychomotor domain could be assessed or evaluated. Under teaching strategies, students may be given certain responsibilities as an opportunity for learning. For example, organization and utilization of library services, laboratory work, museum and exhibition organization, conducting excursion etc., It will extract an active participation from the students both in scholastic and non-scholastic fields, thereby helping approximation of all round development of the learner's personality.

Now let us again critically analyze what is learning? And what are learning experiences? A desirable behavioural change in an individual is said to be learning. The experiences that are responsible for bringing about such a change are said to be learning experiences. These can be of two types, namely, (I) Direct learning experiences and (II) Indirect learning experiences.

Direct Learning Experiences: These are first hand experiences. It may be due to experience of seeing, hearing, smelling, tasting, touching, feeling, handling and manipulating objects in various ways. It may be because of:

- Observing samples / specimens
- Experimentation
- Setting up of apparatus for an experiment
- Constructing models, charts, plans and diagrams
- Drawing figures/ paintings
- Collecting, analyzing and interpreting the data
- Listening to important facts, points
- Presenting ideas orally or in written format

Indirect learning experiences: These are not firsthand experiences. Hence are called indirect learning experiences. You know that, each and every learning cannot be because of firsthand experience only. Therefore indirect learning experiences also have a place in the process of learning. Any beautiful explanation / narration will help the listeners equally to enjoy the event as it could be with that of a direct experience. Isn't it? For example: by reading about the beauty of Himalayas / any waterfall / stories in journal / a historical event explained in a novel etc., a person can acquire the respective knowledge.

And another example could be observing pictures / portraits / maps (one can compare the area possessed by old India and the present India and exclaim that how big was our old India!). It may be pointed out here that, to differentiate direct and indirect learning experience with crystal clearance is very difficult; rather it is a hair splitting job. It may not be eves desirable also. Many a times, it will be a collective situation where direct and indirect learning takes place at a time.

So, how to differentiate Teaching Strategies with that of Learning Experiences? Let us see:

Teaching Strategies	Teaching Strategies
1. Identified, planned and designed by the teacher.	1. Learner's capabilities, previous knowledge and previous learning experiences are taken in to consideration for designing a teaching strategy.
2. Teachers role may be direct or in direct.	2 . Learning can occur as a result of attaching strategies directly or indirectly. And a learner need not know what strategy was adopted by the teacher.
3 Give a scope to perceive the complete personality of the learner.	3. Learning can take place in cognitive, affective as well as in the psychomotor domain of learner's personality.
4 Give a scope to administer the criterion referenced test and provide the feedback.	4. Based on the strategies applied a learner can get his knowledge of result and can even undergo there medial measures if necessary.
5 By adopting teaching strategies a teacher becomes more scientific, systematic, professional, efficient and effective in his teaching task.	5. Learner becomes more sincere, punctual, so that it leads to true learning, learning to learn and acquire the skill of self-learning.

'Check Your Progress'-4

1. What is learning?

2. State any three co-relating factors between teaching strategy and learning.

3. State any two differences between learning and teaching strategy.

19.7 Let Us Sum Up

Teaching is a complex process resulting in learning. In order to ensure learning teaching utilizes different strategies, approaches and methods. Here it tries to keep pace with modernization and allows intervention of technology into teaching.

- Teaching technology leads to effectiveness and efficiency of teaching learning process
- Teaching approaches could be of four types, namely, teacher centered approach, learner / pupil centered approach and activity centered approach and subject centered approach.
- Teaching strategy is a purposefully conceived and determined plan of action, orienting towards the goal achievement.
- Teaching strategy could be of two types, namely, autocratic teaching strategy and democratic teaching strategy. Lecturing, demonstration, tutorial, narration, description, explanation, illustration etc., are the examples of autocratic teaching strategy and group discussion, question- answers, heuristic strategy, problem solving strategy, projects, excursions, etc., are the examples for democratic teaching strategy.
- Teaching strategies are scientific, assure the learning outcome and also enable teacher to become more effective and efficient.
- They give a chance for critical analysis of a learner's achievement and • competencies. Teaching strategies enhances the rate of learning

- Teaching method is a style of presentation of content in the classroom. A method is determined by the nature of the content, where as a strategy is determined by the behavioural objective of the learner.
- Though the approaches and methods of teaching aim at desirable behavioural changes in the learner there are few subtle differences among them. But teaching approaches, strategies and methods are inter related and they never contradict to each other rather compliment as far as the goal achievement is concerned.
- Teaching and learning are considered as the two faces of same coin. Here learning experiences can be direct or indirect. In a nutshell one can say that teaching strategies and learning experiences of a learner approximately express the cause and effect relationship among themselves.

19.8 Answers to 'Check Your Progress'

'Check Your Progress' - 1

1. (c) Efficiency and effectiveness
2. (d) Learner and his learning outcome
3. The two major types of teaching strategies are autocratic teaching strategies and democratic teaching strategies. Lecturing and lecture cum demonstration are the examples of autocratic teaching strategy. Problem solving and inquiry learning are the examples for democratic teaching strategies.

'Check Your Progress' - 2

1. Teaching approaches can be of four types, namely, teacher centered approach, learner / pupil centered approach, activity centered approach and subject centered approach. Lecturing is an example for teaching approach, problem solving is an example for learner / pupil centered approach and long term or short-term experiments are the examples for activity centered approach.
2. Broudy defines teaching method as "method refers to the formal structure of the sequence of acts commonly denoted by instruction''. The term method covers both strategies and tactics off teaching and involves the choice of what is to be taught, and which order it is to be presented.

3. Approaches of Teaching	Methods of Teaching
1 Teaching approaches are generated in context with the interactions, like, the teacher and the taught, the pupil and pupil and between the subject and the learner.	1 Methods are determined by the nature of the subject matter.
2 Approaches can be of four types, namely, teacher centered, pupil centered, activity centered and subject centered.	2 Methods can be of several types, like, lecture method, heuristic method, project method, problem solving method etc.
3 Teaching approaches facilitate the development of all the three dimensions of the personality, namely, cognitive, affective and psychomotor domain.	3 Most of the times, while teaching a method facilitate the cognitive development among the students.

‘Check Your Progress’ - 3.

1. Questioning can be considered both as a strategy and as an approach. During teaching if a teacher uses this skill with all deliberate planning in order to achieve the learning objective in behavioural terms, then-questioning has to be considered here as a strategy. Similarly, if the teacher starts the lesson transaction through some interactions with the students were questioning is used as device, then it is said to be the approach.
2. Teaching approaches, methods of teaching and teaching strategies are interrelated in the context of a teaching and learning situation. Teaching being a complex process involves interactions essentially. Based on this interaction, approaches are generated. It could be teacher dominated interaction, where we call it as teacher centered approach, and if not it could be either learner centered or activity centered approach. A method is the general way of presentation of the subject matter. And strategy is a well-planned and determined activity that gives the guarantee of learning

outcome. Thus all these three are orienting towards the bringing of a desirable behavioural changes in the learner.

'Check Your Progress'- 4

1. The desirable behavioural change in the learner is said to be learning.
2. Teaching strategy and learning are interrelated factors in a learning environment.
   (a) If the strategy is well planned and deliberately executed then definitely it finds a high correlation with good learning.
   (b) The strategy with the sound background of psychological principles of learning caters to individual difference and assures learning.
   (c) A strategy used properly by the teacher makes his teaching more effective and efficient there by implying quality learning among the learners.
3. a. Though the teaching strategies guide a teaching situation, they are not the ends by themselves; rather it has to be sensed in terms of learning outcome by the learner.
   b. Teaching strategies will explain the teacher's role in the curriculum transaction where as learning experiences will stand as a landmark of the whole curricular activities, in which teaching strategy will be one of the influencing factors of learning outcome.

19.9 Unit-End Exercises

1. Explain the influence of technology on teaching process.
2. What does teaching strategy mean? Illustrate your answer.
3. How do you differentiate a method from that of an approach?
4. What is the effect of teaching strategies on learning outcome of a learner? Explain.
5. Distinguish between method and teaching strategies.

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UNIT - 20 ❐ APPROACHES TO TEACHING - 1

Structure

20.1 Introduction

In the previous Unit you have been introduced to a set of terminologies, (new terms) namely, teaching strategies approaches to teaching and methods of teaching. There we classified the teaching approaches into four categories, like, Teacher Centered, Learner Centered, Activity centered and Subject Approach; and here the classification was based on the interaction between either teacher and the classification was based on the interaction between either learners. This is a very broader type of classification. There is one more type of classification, which specifically takes the content transaction into consideration. You know that, any subject will be made up of facts, concepts,

generalizations or principles. Usually before teaching, a teacher will do the content analysis well in advance. And also a good teacher prepares a plan for resources and learning aids. During teaching which an execution of the deliberate plan is content transaction, he / she may make use of these approaches namely:

- Conceptual approach
- Investigatory approach
- Inductive approach
- Deductive approach
- Self - learning approach

Here the approaches are identified in context with content or information or subject matter transaction. It is also nothing but, providing a learning opportunity for students. That is to say, the teacher with a master mindedness can plan and provide the learning situation in order to make the pupil to learn in palatable doses. It is just like the different paths chosen to reach a particular destiny. It will be very clear if you follow the example given below:

Sriram wants to go the Delhi. For this he has several options or ways / means like,

- Going by bus;
- Going by train;
- Going by Aeroplane

Here the goal being the same could be achieved through the bus or train or plane. Likewise, a teacher keeping the goal as the achievement of a desirable behavioral change in the learner can make it occur by adopting any of the following approaches:

Note that, here the term approach has been used in context with content analysis and its transaction.

A teacher may impart the subject matter in terms of concepts with proper learning environment or he can put the learner in the role of an investigator, to explore the subject matter and while doing investigation, the learner will get acquired with the content or the subject matter. A teacher can teach by adopting / illustrating several examples and making the learner to come out with the generalization etc; See, all this will lie in the teachers' hand. The same subject matter could be taught by adopting different approaches to different group of individuals or pupils at different time. Hence,

this type of classification of teaching approaches seems to be more interesting, because of its functional value. In this particular unit you will come to know about, conceptual approach and investigatory approach with their respective merits and demerits. And also at the end you are supposed to compare the two in context with their relative importance.

20.2 Objectives

After studying this Unit you will be able to:

1. Explain the meaning of conceptual approach.
2 List out the salient features of conceptual approach.
3. Mention the merits and demerits of conceptual approach.
4. Illustrate the conceptual approach with suitable examples.
5. Describe the meaning of investigatory approach.
6. List out the salient features of investigatory approach.
7. Mention-the merits and demerits of investigatory approach.
8. Give examples for investigatory approach.
9. Explain the relative importance of Conceptual Approach and Investigatory Approach.

20.3 Conceptual Approach

Many times you might have come across the term ‘concept’. That too, as far as the subject science in concerned, it is full of facts, concepts and principles. While studying educational psychology, you will see that, many eminent psychologists, have used the term ‘concept’ when they deal with human learning. For example: Gagne’s hierarchy of learning gives a very conspicuous position for concept learning. Jean Piaget also mentions the ‘concept learning’ stage while explaining the process of cognitive development of man. Jerome. S. Bruner, is famous for his concept attainment model of teaching.

Now you may ask me a question, that what is a concept? And what is the importance of knowing it?

As a would be teacher, it becomes your part of learning to know about the term. And also to know, what are the different approaches to teach such concepts to the learners. Because, concepts are learnt by means of experiences. No one can give the learner his concepts; but he can be given the experiences form which he can derive them.

20.3.1 Conceptual Approach - Meaning

To put in simple terms, a concept is an abstraction used to classify words, ideas, objects, feelings, skills, etc; which have certain qualities in common. It is the resultant of one's own cumulative experiences. Concepts are not arrived at directly. Frequently much thought is involved in their development. You may feel like appreciating, after going through the details of how much children think about their experiences and work for learning a concept. It is because concepts develop gradually out of a series of experiences. During such development, concepts move along various 'dimensions'. That is, may be from concrete to abstract, from vague to clear; from simple to complex etc; They may move along with other dimensions, like affective domain or psychomotor domain also. Let us take one example for clear understanding.

Example:

1. If an animal has four legs, one tail and barking ability we call it a dog.
2. Similarly, 4 legs, a flattened wooden plank supported by these 4 legs, make a table.
3. All ideal behaviours seen in a man means, he is equated with Lord Rama (*Adarsha Purusha*).

For teaching a concept, a teacher must identify its properties / attributes which differentiates it from others. It is nothing but just helping a learner to acquire the knowledge of dog as a dog and not dog as a cat! For a child, the concept of 'dog' would be at first just his own dog. Later it is differentiated from Fox, Wolf, Jackal etc., and also from Rabbit, Cat, and Lamb. At this stage 'concept' of Dog developing by moving along the dimension what is called simple to complex, or vague to clarity etc.

Now, it is confirmed to the child by his own experience that 'dog' has certain characteristics which are peculiar to it and separate it from other "Animals with four legs". As the concept gains in clarity, abstractness, precision and its meaning is increased. Therefore, the learner now understands the expressions like "dog tired", "dog-in-the manger" or "doggedness" where "dog" carries with it other implications and relationships involving this affective domain / psychomotor domain also. Hence at the end we can

say that, cognitive, affective and psychomotor components may be part of a concept.

Thus, the learner discovers qualities of the concept gradually and extends the use the concept into new relationships even to the extent abstractness. This of course involves the process of differentiation and integration during concept learning. For example: If the learner has learnt the concepts "flowering plant", "adaptation" and "evolutionary change"-he could understand and can generalize like". "The structures of the flowering plant are the resultant of adaptations through long periods of evolutionary change".

Concept learning can be enhanced by providing a stimulating environment. Now let us take a note on how J. S. Bruner has treated this 'concept learning' in context with teaching - learning process.

J.S. Bruner states that each concept will have its own property or characteristics that differentiate it from other. It may be the colour, texture, form, size, number of parts, etc., and we categorize such concepts or objects based on their common characteristics into one group. For teaching a concept, the teacher must identify such attributes of that concept which differentiate it from others. For eg: Dog and cat have legs (4) and a tail but cat has a different voice from that of a dog.

Further he says, such a categorizing, activity has two components, namely, the act of ***concept formation*** and the act of ***concept attainment.*** Concept formation is the first phase and it leads to concept attainment, indicating acquiring mastery over the concept. Suppose you would like to teach the concept, ***"a few morphological features of insects".*** This may have two phases in your teaching.

Phase - I: Give a general introduction either through lecturing / or questioning strategy and provide several live / or preserved insects to the students. And ask them to list out the commonality that they observe.

Phase - II: Now you provide the other invertebrate animals, like, earthworm, snail, etc; and then, ask the students "do they belong to the same category? Can they be called insects?"

In the above example, the phase I refers to the concept formation stage and phase II to the concept attainment. Note that under concept formation stage, you are supposed to give all positive examples where as under phase-11, all negative examples. So, at the end of this teaching-learning session a learner will reject the 'snail' by telling that 'it is not an insect' and accept 'cricket' as an insect.

‘Check Your Progress’ - 1

1. What is a concept?

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2. How a ‘concept’ extends its meaning with different dimensions? Illustrate your answer.

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20.3.2 Salient Features of Conceptual Approach

After understanding the meaning of concept and conceptual approach, it must be easy for you to list out the salient features of the conceptual approach. Yes, they are,

1. A concept is identified by its meaning, properties or attributes.
2. A concept gradually development in different dimensions.
3. Conceptual approach is characterized by its development similar to the teaching dimensions like from easy to complex, from concrete to abstract etc.,
4. It is recognized by two essential consecutive phases, namely concept formation and concept attainment.
5. Concept learning involves differentiation and integration. The learner discovers the dualities of the concept which may not be there in the beginning and he extends the use of concept into new relationships gradually in the due course.

   Concepts are continuously developing with experience, which implies that each individual will has his own experience and hence his own level of understanding.

‘Check Your Progress’ - 2

1. Mention any two characteristic features of conceptual approach.
2. Name any two eminent persons from the field of educational psychology who have contributed for concept learning.

20.3.3 Merits and Demerits

The conceptual approach is one of the good approaches because of the following points.

- Learner's intellectual development is enhanced so that, he recognizes what is an example of a particular concept and what is not.
- A learner can bring about generalizations by interrelating and extending as well as integrating the different concepts.
- Enables a student to apply the concept in new situation and assures transfer of learning.
- Enables a student to be fit enough for problem solving situation.
  Example: If the student understands the concept of atomic structure, then he can correct write formulae for molecules and express chemical reactions in terms of chemical equations.
- Conceptual approach enhances the power of reasoning and imagination among the students.
- Students will acquire a systematic analyzing ability.
- It develops and reinforces the skill of observation among the students.

By going through the above positive points, you may feel that it is absolutely the best approach of teaching. Isn't it? But each teaching approach will have its own limitations or demerits also. Then, what are the demerits of conceptual approach? Let us make a list:

1. It posses a high mental taxing on both the teacher and the taught.
2. Many a times, the teacher dominates the teaching-learning session.
3. Does not favour for the inquisitiveness, enquiries, investigations and exploration by the students.
4. It cannot give the guarantee of 'learning levels; or 'level of understanding' because, each individual's experience leads for concept attainment with high specificity or subjectivity.
5. It enhances the cognitive development but affective and psychomotor development is not enhanced to that extent.
6. Conceptual approach may not be suitable for the subject or the content which demands an experimental approach.

'Check Your Progress' - 3

1. Mention any two merits of conceptual

2. List out the demerits of conceptual approach.

20.4 Investigatory Approach

Your main aim of pursuing this B.Ed. Programme is to become a good, efficient and effective school teacher. Isn't it? For that you need to know, how will be the mentality of school children. They will be particularly at their adolescent stage. Especially at this stage all children will be overwhelmed by enthusiasm, curiosity and are intrigued with puzzles and riddles. This is from the students' point of view. How a teacher as well as the society wants to treat this target group? For a teacher, he wants his students should behave like a little scientist or like a professional learner. For this to happen, a teacher has to perform a high challenging role.

You might have seen in the majority of the schools that the teacher is the main performer, the dispenser of information and the students as passive recipients. But, actually what is needed is a teacher has to become a guide in helping students uncover the information for themselves. For this a traditional teacher has to surrender his stellar role and the learner should transform himself into a self-teacher role. Again for this paradigm shift, a teacher should transform himself first into a stimulator and then a consultant. If these things happen in reality, then definitely it will result in a very special type of teaching approach what is known as investigatory approach of teaching. Investigatory approach is advocated unanimously and universally to cater to the genuine curiosity, bubbling energy that is stored in an adolescent mind. It has to get channelised properly so that, it will result in true learning and also the all round development of the learner.

Let us go through the following discussion to understand, the meaning, nature, importance, and merits and demerits of investigatory approach of teaching.

20.4.1 Meaning of The Investigatory Approaches

Investigatory approach anticipates a personal involvement in learning, most of the time through experiments in the similar lines as a scientist works and thinks. The experiment is the vehicle for investigations. An experiment usually serves two functions, namely.

1. To generate evidence to strengthen or illustrate some already known by fact, concept or generalization - illustrative functions.
2. To arrive at new information or an answer or a solution to a problem this was not known by the experimenter before the experiment-Investigatory function.

The second function of the above said; help us to understand term 'Investigation' properly. Investigative experiments require the student to apply the principles of inquiry.

But we cannot say that, simply be sending the students into the laboratory they start doing investigation or just memorizing the list of inquiry skills does not mean investigation. The spirit of inquiry is learnt only by participating in it.

So, it is obvious that investigatory approach involves inquiry skills as an integral part. Inquiry skills are the part and parcel of investigation. Hence you must know, first, what are these inquiry skills that essentially constitute an investigation. They are,

a) Deriving and stating a problem.
b) Formulating the hypotheses.
c) Predicting from the hypotheses.
d) Proposing and selecting experimental procedures.
e) Obtaining and recording relevant data.
f) Interpreting data.

Each inquiry skills listed above will have its own explanation in detail. So, let us take one example to understand the above said inquiry skills correctly. Investigatory approach can be understood only when, you are thorough with these inquiry skills.

Example:

1. A teacher displays two jars of tadpoles and asks:

   a. "Why do the tadpoles in jar A have longer legs and shorter tails than those in jar B?"

Or

2. A teacher asks the following question to the class

   "How does a change in the density of air effect a barometer?"

Or

3. How does the addition of solutes affect the freezing point of water ?

Or

4. What kind of weather are people experiencing in Australia?

Or

5. Is the climate of the earth changing?

Or

6. How do some parts of the earth become warmer than others?
7. How does a croton plant which is red in colour prepare it food?

In the above examples, some activities or experiments facilitate investigatory approach and some can fulfill the illustrative function. Let us take the example (I) for further analysis.

a. Deriving and stating the problem:

This is noted by rise of a problem in the learner's mind. His curiosity is aroused by some discrepancy based on his observation of the two jars, A and B. For any learner to derive and state the problem two factors are very important, they are,

i) Curiosity and (ii) Experience.

Challenging the student to identify the discrepant event is in itself a stimulus to his curiosity. And also, the challenge for the teacher is to present the situation so that the student really wants to find out. A clearly defined problem statement simplifies the formulation of a hypothesis and experimental procedures. For this a problem statement should be specified with only one aspect, without any ambiguity.

b. Formulating the hypothesis:

Hypothesis is a tentative guess, which helps further execution of the inquiry. That is hypotheses help in finding solution for the selected problem. For example,

"Why do the tadpoles in this jar have longer legs and shorter tails than the tadpoles in that jar even though they are all of the same age?"

Hypothesis

1. They may belong to different species of frog

2. Something in the water is different in the two jars.

3. Tadpoles have been given different food.

4. Tadpoles in one jar have received injections of hormones.

C. Predicting from the Hypothesis:

Predictions are made from hypotheses, and by testing the prediction through experimentation evidence is obtained, which either supports the hypothesis or does not.

D. Proposing and Selecting Experimental Procedures*:*

Learning experiences in proposing or selecting experimental procedures can be provided in a number of ways. Here a teacher even can assume that the problem, hypothesis and predictions have been developed or given, and further execution of the experiments for testing hypothesis may be continued.

E. Obtaining and Recording Relevant Data:

The laboratory (or field) is the only situation where the student can have experience in obtaining data. This may be in the form of measuring, graphing, using equipment and apparatus, making assumptions, etc.,

F. Interpreting Data:

A scientist usually opines that "Data are the gold extracted from the ore. They represent the facts about particulars that the scientist selects from all available facts, because he thinks they will best serve the aim of science - lead him to the most revealing truths about the particulars he is studying".

While interpreting data, one must have open-mindedness, cautiousness, skepticism and integrity as well as an ability to see relationships in and extract meanings from the data. Students need practice it interpreting data. To train the learner in this direction, you can use transparencies of tables and graphs, and project them during discussion.

Xeroxed copies of such data can be made and interpretation part can be given as homework or assignment. Students can be asked to distinguish between valid and false interpretations.

In order to have investigation as a teaching approach, we may plan the whole activity into three phased activity like

Phase - I: Pre - Experimentation: This involves

i) Deriving and stating the problem

ii) Formulating the hypothesis

iii) Predicting from the hypothesis

iv) Proposing experimental procedure

Phase - II Experimentation: This involves activities like, obtaining and recording data.

Phase - III Post - Experimentation: This involves interpreting the data.

While adopting this investigatory approach, you should have all the above said phases well determined. Practice in the skills that come under pre-experimentation phase, can be developed through discussion in the classroom situation. Here learner will be facilitated to identify and state the problem, formulate the hypothesis and make testable predications.

And Phase II can be like, an individual or a group discover with or without moderate guidance by the teacher. And phase -III can be conducted under the supervision of the teacher.

‘Check Your Progress’-4

1 What are the two essential factors for deriving and stating a problem for investigation?

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_____

2 Mention the three phases of investigation with their components.

_____

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20.4.2 Salient Features of Investigatory Approach

In order to lay down the salient features of investigatory approach you must visualize a

learner as a scientist in teaching learning situation. It itself reveals you so many points, like,

- It is empirical and hence inevitably involves experiment
- Experiments in investigatory approach can serve two functions, namely, illustrating and discovering or problem solving.
- Investigatory approach in turn is made up of inquiry skills.
- Being a major component of an investigation inquiry skills involve the functional activities, like, deriving and stating the problem, hypothecating proposing and selecting a hypothesis for testing executing the experiment, accepting / rejecting the hypotheses and analysis, and interpretation of the data etc;
- Curiosity and experience are the sound basis for the establishment of an investigation.
- Investigation as, a teaching approach will have three essential phases, namely, Phase-I involving deriving and stating the problem, hypothecation, predicting from the hypothesis and proposing experiments - procedure.

  Phase-II involves experimentation and phase-III involves post-experimentation activity involving interpretation of the data.
- Investigatory approach will be free from subjectivity and enhances open-mindedness, intellectual honesty and generates a working zeal among the students.
- Investigatory approach is suitable for most of the concepts in the subject science.
- It is quite different from conventional type of teaching approaches.

‘Check Your Progress’ - 5

1. Investigatory approach in turn made up of

a) Observation b) Hypothecation c) Inquiry skills d) Experiments

2. The very important aspect in any investigation is:

a. Deriving and stating the problem

b. Data analysis and interpretation

c. Experimentation

d. Formulating hypotheses.

3. List out three salient features of investigatory approach of teaching.

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20.4.3 Merits and Demerits of Investigatory Approach

Investigatory approach gives you an option to put the learner in the position of a scientist. Hence it has got several positive points to be considered as its merits. They are,

Merits

- It is child centered to the maximum extent
- It gives a firsthand experience for learning during exploration or investigation
- It provides strong psychological and scientific foundations for learning.
- It makes the learner to become more independent and facilitates self learning.
- It is empirical and enhances, open mindedness, intellectual honesty, skill of systematic analysis and help the learner to be free from prejudices.
- Learner's innate curiosity, enthusiasm, ever energetic personality gets channelised properly and ensures all round development.
- It enables the learner to acquire the skill of observation, experimentation, hypothecation, data analysis etc, which are very essential for science learning.

As you know that no one approach is completely perfect and each will have its own merits and de-merits or limitations. Investigatory approach is having the following limitations.

Demerits:

1. Does not suit for all types of subject matter.
2. Time consuming and un-economic, and doesn't suit for a developing country like India
3. It exerts too much of burden on the teacher.
4. It demands a set of material resources, laboratory equipments, time allotment, which possess a higher level of practical problems.
5. Each class in the school system usually will have a minimum of 60 students - which affects the quality in implementing the investigator approach.

'Check Your Progress' - 6

1 Mention any two merits of Investigatory approach of teaching.

2 List out the demerits of Investigatory approach of teaching.

20.5 Conceptual Approach, Investigatory Approach -Relative Importance

A teacher can adopt any type of approach depending upon the nature of the subject, learners' ability, available resources, etc. Any one approach by itself is not complete and perfect. Each approach has its own merits and demerits. Take for example conceptual approach. This enhances cognitive development and meaningful learning of the concepts. Conceptual approach makes learning easier by attaching meaning to new words. To illustrate this, just observe the three columns with set of words given below.

Ese	**See**	**Can**
Nac	Can	You
Tac	Cat	See
Het	The	The
Ouy	You	Cat

Now compare the time you have taken to learn the above lists of words, which are equal in everything except meaning!. Here the learner learns based on his own experience, and level of understanding. Hence it is said that, a concept cannot be given to a student, only thing a situation can be provided through which he develops his own concept. Conceptual approach is best suited for language teaching, teaching of mathematics,

and also for several concepts in the subject science. Here a teacher's role will be in identifying the properties of a concept which makes it to be different from other (differentiate) and then gradually increasing the meaning in the direction of abstractness. All will be under the teacher's hand, and the master plan will be designed and execution by the teacher.

Investigatory approach as it is already explained, develop itself on experiments. So, if the content or the subject matter demands an experiment for a clear understanding, Investigatory approach suits as the best. Hence to decide which approach has the best is not an easy job, because there is no single answer for it. The importance of either of the approach varies with the nature of the subject matter. Hence it is decided in, context with the subject matter to be taught. Therefore the sub heading is given as the 'Relative importance'.

If the subject matter demands an experiment as a learning experience then you should better to choose Investigatory approach or if the subject matter is having certain concepts that are extended to its abstract level, which does not come under the purview of an experimentation, then you can select conceptual approach.

For Example:

'Plants showing phototropism' - if this is the information, to be thought an experiment can be used here. So, that it goes along with the Investigatory line, where students learn by setting up an experiment using 2 potted young seedlings, one is kept in the normal day light condition and the other will be kept inside a box, having one lateral hole. The plants which are kept inside the box show a different type of growth, where as the seedling will be bending their slender stems collectively towards the lateral hole. This is just to get the sunlight that is vital for all metabolic activities of the seedling. Here the students observe, hypothecate, collect the necessary data with respect to the two potted plants, and test their hypotheses, and conclude that, the bending nature of plants which were kept inside the box was due to the stimulus light, and justify the term 'Phototropism' for such a behaviour by the plants.

The same concept can be taught through the conceptual approach also. This could be in the following lines.

'Phototropism' if at all to be considered as a concept, must possess certain properties, isn't it? Let us list those properties, which make it very distinct and separate from others.

- It is shown by green plants

- It is a response towards the stimulus, sunlight

Teacher by explaining, about the different motions shown by plants, can draw the attention of the students towards Phototropism specifically. Number of pictures, specimen examples also can be used here. Remember all these activities are going to help the students for concept formation which is the I phase of conceptual approach. Hence you have to make use of all positive examples only. Later teacher shows the 'touch me not' plants and demonstrate the movement of leaves before the students where 'touch' is the stimulus and folding of leaflets is the response. Now he asks the students, 'can you call it as phototropism?"

Definitely students say 'No'. And this will be the indication of concept attainment state, which is the II and last phase of conceptual approach where students have learnt the concept 'phototropism' meaningfully.

By observing the above examples, now you can say that, both the approaches are important, but if the subject matter demands an experiment then Investigatory approach becomes more important, and if there is no scope for any experimentation, the conceptual approach dominates. However, whether it is Investigatory or conceptual approach both will be facilitating the students' learning.

'Check Your Progress' - 7

1. Conceptual approach involves

a) Experiments b) Illustrations c) Examples and non-examples d) None of the above

2. Investigatory approach best suits for:

a) Science subjects b) Languages c) Both social and science subjects d) None of the above

20.6 Let Us Sum Up

There are several approaches to teach the subject matter. Teaching approaches can also be classified based on the mode of content transaction. It is like a person can reach his destiny by taking any of the routes. That is to say the same concept or information can be taught by utilising different approaches.

A teacher can decide and select the appropriate teaching approach. To name a few, conceptual approach, Investigatory approach, inductive approach, deductive approach and self-learning approach.

Conceptual approach aims at meaningful receptive learning. The students will learn the concepts by attaching meaning to it with the help of their experience; because, a concept can be any of the following - an abstraction used to classify words, ideas, objects, feelings, skills, etc., that have certain qualities in common. There common qualities are also called as properties. For teaching a concept, a teacher must identify their properties or attributes. A concept can have cognitive, affective and psychomotor components in it. Gradually concepts get extended their meaning towards abstract. It is like, the concept of dog, developing up to 'doggedness' 'dog tired' etc.

Jerome. S. Bruner advocates that a concept can be taught effectively by adopting two successive phases, namely concept formation phase and concept attainment phase During concept formation phase the teacher can explain a concept, by illustrating with all positive examples and during concept attainment phase students are allowed to cross where by their already learnt concept by checking it with negative examples. This approach enhances the cognitive development into the students to a greater extent.

Investigatory approach is one more type of teaching approaches, where it strongly depends upon, observation, and experimentation skills. Investigatory approach is best suited for the subject science.

Investigative experiments require the students to apply the principles of inquiry. Inquiry skills in turn involve, deriving, and stating a problem, formulating the hypothesis, predicting from hypothesis, proposing and selecting experimental procedures, obtaining and recording relevant data, and interpreting the data. Generally it is advised that, to have an investigatory approach of teaching, one should plan the whole activity into three phased, like,

Phase I: Pre-Experimentation Involving

- Deriving and stating the problem.
- Formulating the hypothesis.
- Predicting from the hypothesis.
- Proposing experimental procedures.

Phase II Experimentation: This involves the activities, like obtaining and recording data

Phase III Post - experimentation:

This involves interpreting the data. Investigatory approach is empirical, providing student an opportunity to gain firsthand experience. Thereby it properly channelizes the pelt up

curiosity and enthusiasm of the students and ensures greatly towards all round development of the personality. Conceptual approach and investigatory approach appear to be important on their own context. But either of these approach is isolated or in combination can be used by the teacher who decides their relative importance in relation to the subject matter to be taught. Anyhow both the approaches envisages the cognitive development of the child to a greater extent.

20.7 Answers to 'Check Your Progress'

'Check Your Progress' - 1

1. Concept is an abstraction used to classify words, ideas, objects, feelings, skills, etc; that have certain qualities in common. Each concept will have its own property that differentiates it from other.
2. Concepts get extended with their meaning along with the different dimensions based on the experience. For example, in the beginning 'Snail' an animal will be learnt by its external appearance, habitat, etc. This may be followed by its anatomical study also or the learner may use the term snail as snail speed to explain any lethargic activity.

'Check Your Progress' - 2

1. i) Conceptual approach follows a systematic presentation of the concept where, the properties of that particular concept are identified first.

   ii) It utilizes both positive and negative examples.
2. Jean Piaget

'Check Your Progress' - 3

1. i) Enhances the power of reasoning and imagination

   ii) Develops and reinforces the skill of observation
2. i) It demands a high level of mental abilities from both the teacher and the taught.

   ii) It gives a scope for teacher domination

   iii) Doesn't favour for the investigation or experimentation

iv) It cannot give the guarantee of 'learning levels' or 'level of understanding' because it leads towards concept attainment with a high subjectivity.

'Check Your Progress' - 4

1. a) Curiosity b) Experience
2. Phase I: Pre-Experimentation

- Deriving and stating the problem
- Hypothecation
- Prediction
- Experiment proposal

Phase II Experimentation:

- Data Collection and recording

Phase III Post Experimentation

- Data Analysis
- Interpretation

'Check Your Progress' - 5

1. (d) Experiments
2. (c) Experimentation
3. (a) It is empirical in its nature and involves experiments

   (b) It utilizes inquiry skills

   (c) Curiosity and experience are the basis an investigation

'Check Your Progress' - 6

1. a) It is child centered and provides an opportunity for first hand learning.

   b) It makes the learner to become more independent, and facilitate self - learning.
2. a) Doesn't suit all the type of subject matter

   b) It is time consuming and uneconomical and depends upon too many material as well as laboratory resources.

‘Check Your Progress’ - 7

1. (e)
2. (a)

20.8 Unit-End Exercises

1 Explain the meaning, nature and importance of conceptual approach.

2 What is meant by Investigatory approach? Illustrate your answer.

20.9 Reference

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3. Dores F. Falk, *Biology Teaching Method (1971)*
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UNIT - 21 ❐ APPROACHES TO TEACHING - 2

Structure

21.1 Introduction

You know that the subject matter which a teacher wants to teach will be having some information. This information could be facts, concepts, generalizations / principles etc. In the previous units we have discussed with reference to approaches to teaching in general, and conceptual as well as investigatory approaches in particular. Now we shall move towards understanding a few more approaches. Here we shall try to concentrate on how the generalization or principles could be taught using suitable and appropriate approaches of teaching. Prior to this you should know, what are these generalizations and how do they originate isn't it?

Generalization means any statement of relationship which is of broad applicability. It includes theories, principles, laws, rules, inferences and even some times definitions if they express broad relationships. Generalizations are derived from unifying themes which in turn are made up of facts and concepts. Facts are the basic units. They are isolated pieces of information. Related facts collectively result in concepts. Hence facts and concepts are interrelated, and their combination will result in generalization.

Generalizations can be learnt through inductively or deductively or by both. In this unit you will learn about, the meaning, nature, importance, and merits and de-merits of inductive' approach as well as deductive approach. The relative importance 'of the approaches will also be dealt with in detail.

21.2 Objectives

After studying this Unit you will be able to:

- Explain the meaning of inductive approach of teaching.
- List out the salient features of inductive approach.
- Give expamples for inductive approach of teaching
- Bring out the merits and demerits of inductive approach of teaching.
- Explain the meaning of deductive approach of teaching.
- List out the salient features of deductive approach.
- Give examples for deductive approach.
- Bring out the merits and de-merits of deductive approach.
- Compare the inductive approach and deductive approach with reference to their relative importance in teaching.

21.3 Inductive Approach

The subjects that are prescribed for any studies in schools will be made up of facts, concepts and generalizations. Facts are forgotten quickly. But still they are useful in forming permanent concepts / generalizations. That is to say, facts are building blocks for concepts as well as for generalizations.

Learning of generalization in easier and long lasting and also will beat a higher level when compared with learning of facts. It is because; generalizations are landmarks or outstanding resultant of a formless huge mass of data. Hence, generalizations are said

to be coherent and comprehensive whole. Let us take an example for clear understanding:

Fact : Water is a fluid

Concept : Fluid concentration

Generalization : Changes in the concentrations of materials in the fluid surrounding the cell cause changes within the cell.

To teach such generalizations, there is one very effective and smooth going approach that is nothing but **inductive approach.** It is a methodical way of content transaction. Now you will find the details of inductive approach and its salient features with illustrations that are given below in the successive captions.

21.3.1 Meaning of Inductive Approach of Teaching

Basically inductive approach is a type of reasoning. Several similar examples / incidents / events/ experiences leading to one conclusion will be the essence of generalization and this process is said to be an induction. Here the interaction between the learner and the subject matter proceeds from particular to general. Hence it is also known as discovery approach. In the subject science, the generalizations are observable, measurable and they are empirical in their nature. Hence a teacher can provide quite a good number of learning situations, associated with inductive approach.

One of the definitions of inductive approach as “A variety of directed learning experiences which includes applications of the generalizations can be presented, from which the generalization emerges is said to be inductive approach”. According to the above definitions inductive approach means, an approach of teaching which enables to draw a conclusion or generalizations by observing a series of examples.

If you critically analyse the above definitions, it becomes clear that, a teacher has to provide number of examples serially, so that the students draw the generalization at the end base on their learning experiences with the serial examples deliberately provided by the teacher.

For Example:

I) a) Hydrochloric acid acting on the copper metal

b) Hydrochloric acid acting on Magnesium liberates Hydrogen gas.

c) Hydrochloric acid acting on Zinc liberates Hydrogen gas.

d) Similarly Sulphuric acid, nitric acid and phosphoric acid also, when they react with copper, magnesium Zinc (any metal for that matter) respectively, liberates Hydrogen gas.

So, by doing the above experiments, students will generalize that all acids reacting on metals liberate the hydrogen gas.

II. a) Leaves of Hibiscus plant show reticular venation.

b) Leaves of Neem Plant show reticular venation.

c) Leaves of Rose Plant show reticular venation.

d) Similarly any number of dicot leaves, if checked.

So, based on the above observation, students will generalize that all dicot plants show leaves with reticular venation.

III. The same type of learning experiences could be provided with monocot plants for the teaching of the concept leaves with Parallel venation

IV. Provide number of insects to the students and ask them to note down the common features of such insects. They can generalize obviously that all insects have six legs, compound eyes and exoskeleton system.

V. a) Ask the students to measure the angles in a right angle triangle and find out the total of all the three angles.

b) Let the children do the same activities with abtuse angle triangle.

c) Let them do the same activity with acute angle triangle.

d) Similarly with any shape (acute / abtuse / right angle triangle) and any size of the triangle, if students are asked to measure all the angles and also calculate the total of the three angles in the respective triangles, then definitely they will come out with one generalization that in a triangle the total of all the three angles irrespective of the shape and size will be equal to 180° only.

VI. By observing a series of deciduous forests where the leaves of the majority of the trees whither away during winter season one can generalize that, trees of deciduous forest shed their leaves during winter.

'Check Your Progress' - 1

1. In inductive approach, the generalization is
   a) Told in the beginning itself
   b) Arrived at the end
   c) Not at all present
   d) None of the above.
2. In inductive approach the logical analysis will be from
   a) Particular to general
   b) General to particular
   c) Lateral to central
   d) Top to bottom

3 Fishes, amphibious, reptiles, mammals and birds have backbone. Hence the generalization is

   a) Animals possess back bone
   b) Not all animals possess back bone
   c) All vertebrates possess back bone
   d) All invertebrates possess back bone

21.3.2 Salient Features of Inductive Approach

- It involves the learning situations made up of a number of similar sequential examples.
- Generalization is never told or expressed in the beginning.
- It is a discovery approach where a learner moves from each and every particular example towards a universal generalization.
- This is a logical analysis and many a time forms the first step in learning by exposure.

21.3.2 Merits and Demerits of Inductive Approach

Traditional teaching has not emphasized inductive approach. But later on the view point is changed, and it is said that, learning should be exclusively inductive; since inductive is the method mostly used in science and provides an ample scope for discovery. So, definitely inductive approach has several positive points contributing for its merits.

Merits:

- It is psychologically sound enough and said to be a functional way of teaching.
- It motivates students for discovery and thereby demands active participation by the students.
- Generalizations are learnt more effectively.
- It provides a strong background for transfer of learning.
- It enhances the grasping ability of the students.
- It promotes reasoning power, as well as ability of analysis, synthesis and evaluation.
- It encourages students to become professional learners and supports self learning.

Whatever may be the merits of inductive approach, there are a few drawbacks in this approach. Before adopting this approach one has to take care of the following points also.

Demerits:

- It is highly time consuming, and if every generalization were to be learned by induction, them very few generalizations would be taught during a school year.
- Inductive approach isolated from deductive approach becomes incomplete. Because in real life we use both inductive and deductive thinking in solving many problems.
- It is seldom used in problem solving situations.
- The progress of students will be relatively slow compared to other dynamic approaches.
- Many a times it confines to acquisition of the knowledge only.

'Check Your Progress' - 2

1. Mention any four merits of inductive approach.
2. Mention any two demerits of inductive approach.
3. Give two examples for teaching of any concept through inductive approach.

21.4 Deductive Approach of Teaching

Generalizations are taught by one more methodical way in classroom situation i.e what is known as deductive approach. The approach whether inductive or deductive

that could be used will be decided by the teacher himself. Of course, this again in context with subject matters, its level of difficulty and the learner's ability and other pre-requirements. Some concepts /generalizations will be in such a way that, a teacher's domination will be inevitable. But here also the students can learn effectively. This type of learning is known as meaningful receptive learning. In such situations teachers make use of deductive approach. The details of deductive approach, its salient features with illustrations are given below in the successive captions.

21.4.1 Meaning of Deductive Approach of Teaching

Deduction, contrary to induction is yet another branch of reasoning. But in function it never opposes induction. It is not opposite to inductive approach; rather, it is complementary and supplementary to it. It is also said to be logic of discovery. It begins with one or more generalizations which are assumed to be valid. Here generalizations are used to make inferences about specific situations. It proceeds from general to specific. Many a times it provides an option for the application of the knowledge acquired through induction.

"If a generalization is presented first, and then followed by illustrations or applications - then it is said to be deduction". For example, if students are given the generalization, that, all insects have six legs, compound eyes and exoskeleton system and then presented with several different kinds of insects to examine for these characteristics, - this approach is said to be deductive approach.

Let us take few more examples for clear understanding.

Example -1

A teacher declares the generalization that, always an acid when it reacts with a base, gives out salt and water

Then it is illustrated by

- Hydrochloric acid reacting with Sodium Hydroxide, gives out Sodium Chloride (common salt used for cooking).
- Hydrochloric acid when reacts with potassium hydroxide, gives out potassium chloride and water
- Sulphuric acid reacting with Sodium Hydroxide gives out Sodium Sulphate and water
- Similarly Sulphuric acid reacting with Potassium Hydroxide gives out Potassium Sulphate and water.

- Likewise, all acids (Hydrochloric acid, Sulphuric acid, nitric acid, phosphoric acid while reacting with NAOH; KOH; Ca(OH) etc; give salt and water.

Example 2:

"In a right angled triangle the square of the hypotenuse is equal to the sum of square of the other two sides"- This will be announced by the teacher first. Later, it will be illustrated with, the following examples - like

(i) In a right angled triangle, the hypotenuse is 5cms and the other two sides are 3cms and 4cms respectively. By substituting the values to the respective sides and squaring them, we get:

$5^2=3^2+4^2$

$25 = 9+16$

ii) The values of the hypotenuse and other sides will be changed like, l0cms as hypotenuse and 6cm, 8cm are the other sides.

Similarly: $10^2 = 6^2 +8^2$

$100 = 36+64$

$100=100$

Example 3:

All birds lay their eggs; hence birds are oviparous. Oviparous means a group of animals which propagate through laying eggs. This is learnt through the examples like sparrow, pigeon, parrot, hen/fowls etc; which lay their eggs during reproduction.

Example 4:

'All insects possess jointed legs' - is the generalization.

This could be studied with several insects like, mosquito, cricket, grasshopper, fruit fly etc;

'Check Your Progress'- 3

1. In deductive approach generalization is

a) told first

b) told at the end

c) told in the middle of the teaching

d) Not at all told

2. Deductive approach is
    a) Opposite to inductive approach
    b) Parallel to inductive approach
    c) Neutral to inductive approach
    d) Supplementary to inductive approach.
3. In deductive approach
    a) Examples are followed by generalization
    b) Generalization is followed by examples
    c) Examples are not at all used
    d) None of the above.

21.4.2 Salient Features

- It involves a well organized, pre-planned and learning situation with a fixed parameters of content or the subject matter.
- The generalization or the principle / law will be told in the first step of teaching itself:
- It is a sort of ‘in an advanced’ mode of approach; because by declaring the generalization a teacher sets up the students mind for further learning transaction
- It also said to be discovery approach where a learner checks or verifies the generalization with specific examples.
- It is a cognitive / logical movement which moves from universal principles to specificity.

21.4.3 Merits and Demerits of Deductive Approach of Teaching

All traditional teaching practitioners have advocated deductive approach strongly. The reason was, the deductive approach takes so many factors under its good control, just take for example, declaring the generalization that is to be taught in a particular class itself. It confirms the students what they ought to learn, through the series of examples that are provided in a learning situation. So, let us now concentrate to list out the positive points that can be found in a deductive approach.

Merits:

- It is very systematic and gives a fixed frame work for teaching learning situation.
- It gives a very clear cut picture for students regarding what they are supposed to learn and thus facilitates meaningful receptive learning.
- It enhances a sharp mental ability among the learners for cross verification of the generalized rules / principles.
- It promotes inquiry skills and investigatory abilities among the students.
- It is highly economic with respect to time consumption, efforts and other relative resources.

Apart from the above said positive points, the deductive approach has some negative points also. So, one has to take care of such aspects before adapting it:

Demerits:

- It is not accepted by modern psychologists, because, they say it treats the students as passive learners.
- Students learning on their own are seldom here.
- It can become functional only when the generalization is picked up literally by inductive approach and not if it is only declared / told by the teacher.
- Deductive approach without the support of inductive approach will be a half success.

‘Check Your Progress’- 4

1. Mention any four merits of Deductive Approach.
2. Mention any three demerits of Deductive Approach.
3. Give an example for teaching of any concept through deductive approach.
4. Deductive approach moves from:

   a) Universal to particular

   b) Specific to general

   c) Both a and b

   d) None of the above

21.5 Inductive Approach, Deductive Approach – Relative Importance

After going through the details with reference to inductive approach and deductive approach, now it is the time for us to discuss with their relative importance.

In real life we use both inductive and deductive thinking in solving many problems that we meet. Therefore the learner to be fit in the society needs experiences for developing both kinds of thinking. But in order to bring an effective teaching, both the approaches need to be planned properly in advance. In both the approaches, the acquisition or the attainment of the generalization will be more successful if the learning experience is initiated by a problem that is real one and could be perceived properly by the learner.

Inductive thinking is comparatively a simple approach; only the thing is, teacher has to put more effort to give the suitable learning environment. As it consumes more time, less number of generalizations will be acquired by the students. So, a teacher under the pressure of syllabus completion may quit this approach and switch over to the deductive approach. We cannot deny this point. But, for an efficient and effective teacher, quality learning by the students' counts a lot.

In some cases, it becomes so inevitable that, one has to adopt deductive approach only. This happens in the case of teaching of abstract concepts. Where live examples to illustrate may not be possible at all.

Usually providing a learning situation with inductive approach is preferred. It is because, this approach demands an active participation from the students; and their gain of knowledge will be like, their first hand information. It gives a concrete base for further learning. Later a teacher can go with deductive approach. For here, it could be like; the so obtained generalization is going to be checked with different particular illustrations or examples. Hence it becomes empirical. It smoothens die process of learning by the way of inducto-deductive approach.

If whatever generalization is drawn because of inductive approach is tested with quite a number of particular examples as deductive approaches - that makes a learning cycle complete; which is nothing but inductive approach. If induction doesn't end up with deduction, it is said to be fruitless and if deduction doesn't have the strong support of induction is said to be root less.

Both the inductive approach and deductive approach are complimentary to each other. If considered isolated both of them become in complete. That is to say, what is

left out in inductive approach is fulfilled by deductive approach and vice versa. In scientific thinking there is a constant interplay between inductive and deductive reasoning. Some inquiry skills are essentially inductive; and some others are deductive.

For Example:

1. Observing a group of facts / events.
2. Formulating hypothesis, relating some of the observed facts / events. (inductive reasoning).
3. Predicting possible outcome based on hypothesis. (Deductive reasoning).
4. Testing hypothesis experimentally.
5. Repeating the experiments and testing for confirmation.
6. Interpreting the results and formulating generalizations.

So, a teacher should understand the relative importance of both the approaches and utilize them suitably in' context with the subject matter to be taught and the maturity level of the students. Because, in both the approaches; the attainment of the generalization will be more successful, if the learning experience is initiated by a problem, real and understandable to the learner. Following are some of the tips that could be adopted, while you will be in a teaching situation.

1. Initiate the teaching - learning session by a problem that is real, and could be perceived properly by the learner.
2. Provide experiences where students must arrive at their own solution to problems using inquiry processes.
3. Make sure that there is adequate understanding of the concepts involved in the generalization. Given the requisite understanding the learner can develop his own methods of attacking the problem.

'Check Your Progress' - 5

1. Psychologically, it is advised to start teaching with ……. approach

   a) Inductive approach

   b) Deductive approach

   c) Inducto-deductive approach

   d) Deducto-inductive approach

2. If deduction doesn't have the support of induction then it is said to be: ...
3. If induction doesn't have any sort of application, then it is said to be ...

21.6 Let Us Sum Up

Generalization or principles could be taught effectively and efficiently by adopting inductive approach as well as deductive approach. Generalizations are derived from unifying themes which in turn are made up of facts and concepts. Facts and concepts are inter-related and their combination will results in generalization.

Inductive approach means, an approach of teaching which enables the learner to draw a conclusion or generalization by observing a series of examples. “A variety of directed learning experiences which include applications of the generalization can be presented, from which the generalization emerges is said to be inductive approach.”

For example; all acids like hydrochloric acid, Sulphuric Acid, Nitric Acid, Phosphoric Acid etc; whenever reacted with any metal, like Zinc, Copper, Aluminum etc; will liberate the Hydrogen gas. This is taught by taking each acid and each metal one at a time. So, these series of experiments and the respective observation help the learner to draw one conclusion that, all acids whenever reacted with metals liberate the hydrogen gas.

The salient features of inductive approach are:

1. It involves a number of relevant similar examples presented in an order.
2. Generalization is never told in the beginning.
3. It adopts discovery approach.
4. It provides firsthand experience to the learners.

Because of its nature, inductive approach has certain inbuilt merits, they are,

1. It is psychologically considered as a sound and functional way of teaching.
2. It demands active participation by the students, propelling for discovery learning.
3. Provides strong basis for positive transfer of learning and enhances the grasping ability of the students. It encourages the reasoning, analyzing, synthesizing and evaluating competencies among students and thereby promoting them to become professional learner.

The Demerits, of this approach are:

- It is highly time consuming.
- It becomes a complete learning, only after getting a link: with deductive approach.

If a generalization is presented first and then followed by illustrations or applications - then it is said to be deductive approach. For example, to teach the characteristics of phylum Arthropods, the teacher can say that all the insects have six legs, compound eyes exoskeleton. And then substantiate this generalization with as many insects as possible.

The salient features of deductive approach are:

- It starts with well organized, pre-planned learning situation with a fixed, subject matter.
- The generalization is told in the beginning itself, and later it is supported by a number of particular examples.

This approach is also having some positive points, as merits.

- It provides a very systematic and fixed frame work for teaching-learning experiences.
- It gives a sort of "Mental readiness" to the students.
- It enhances the intellectual power of the students by providing an opportunity to check the generalized facts.
- It is highly economic with respect to time, effort and other relative resources.

If one speaks about the relative importance of inductive and deductive approach of teaching, they may say that, both are very important. If is because in real life we want both the approaches. Both of them are complementary to each other; and they are reciprocal to each other also. In no way they oppose each other. So, with this notion a teacher can select either of the approaches or a good combination of the both depending upon the nature of the subject/ information to be taught.

21.7 Answers to 'Check Your Progress'

'Check Your Progress' - 1

1. (b) Arrived at the end
2. (a) Particular to general
3. (c) All vertebrates possess backbone.

'Check Your Progress' - 2

1. i) It facilitate for learning of generalization more

   ii) It promotes cognitive abilities, like, reasoning, analysis, synthesis and evaluation.

iii) It supports self -learning.

iv) It provides a strong background for transfer of learning.

2. i) Inductive approach does not suit much for problem

ii) Most of the time it confines to acquisition of knowledge only.

3. Example 1:

Concept : " All invertebrates cannot possess backbone".

This could be taught by providing a series of examples, like, earthworm, snails, amoeba, sponges, starfish, etc;

Example 2

Concept: "The songs that can motivate the people to serve our nation are called patriotic songs, This could be taught, by helping the students to learn meaningful a few patriotic songs, sequentially one after the other.

'Check Your Progress' - 3

1. a) Told first

2. d) Supplementary to inductive approach.

3. a) Examples are followed by generalizations

'Check Your Progress'-4

1. i) It enhances meaningful receptive learning.
   ii) It provides an opportunity to verify the generalizations.
   iii) It promotes inquiry skills and investigatory abilities among the students.
   iv) It is highly economic as for as the time, effort and use of resources are concerned.
2. i) It treats students as passive learners
   ii) It takes the support of inductive approach otherwise
   iii) 'Students self-learning is not facilitated much.
3. i) Telling the characteristic features of all unicellular organisms first, and then allowing the student to observe amoeba, euglena, paramecium.
4. a) Universal to particular.

'Check Your Progress' - 5

1. Inductive approach
2. Root less
3. Fruit less

21.8 Unit-End Exercises

1. What is meant by inductive approach? Explain its salient features.
2. Define deductive approach, and explain the characteristic features of deductive approach, with illustration.
3. Give examples for inductive and deductive approach of teaching.
4. Distinguish between the inductive and deductive approach of teaching.

5. List out the merits and demerits of inductive approach.
6. Mention the merits and demerits of deductive approach.

21.9 References

1. Dores F. Falk, *Biology Teaching Method* (1971.)
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3. Walter A. Thurber, *Teaching Science in Today's*
4. Alfred T. Collette, *Secondary Schools* (1964)

UNIT - 22 ❐ METHODS OF TEACHING

Structure

22.1 Introduction

In the unit No. 19.0, you have already been introduced to the concepts, like Technology of teaching, Teaching Strategy, Approaches and Methods of teaching. And in all these cases, Teaching - learning process was perceived in totality. And you also come to know about the term method as a formal structure of the sequence of acts commonly denoted by instruction, where, if the sequence of acts commonly denoted

by instruction, where, it covers both strategies and tactics of teaching and involves the choice of what is to be taught, and in which order it is to be presented. To tell it in a simple way, a method is nothing but a general way of presented. To tell it in simple way, a method is nothing but a general way of presentation of the subject matter, and it enhances the cognitive development among the students.

If at all anybody wants to become a very good teacher, then, knowing, understanding and practising of different methods of teachings becomes the first and the foremost necessary of any task. There are quite a good number of methods of teaching. Each will be advantageous and helpful to the teachers in its own way. So, particularly in this unit you will learn about, Lecture Method, Demonstration Method and Project Method. Each method will be dealt with its meaning, nature, importance, merits and demerits. You will come across certain illustrations also.

22.2 Objectives

After studying this unit, you will be able to:

- List out the salient features of lecture method.
- Bring out the importance of lecture method.
- Mention the merits and de-merits of lecture method.
- Explain demonstration method.
- Bring out the importance of demonstration method.
- List out the salient features of demonstration method.
- Mention the merits and de-merits of demonstration method Explain the project method.
- Bring out importance of project method.
- List out the salient features of the project method.
- Point out the merits and de-merits of the project method.

22.3 Lecture Method

Lecture method is one of the popular methods of teaching. It may be because of its simplicity and less responsibility compared to other methods. Any common understanding about lecturing will be that, it is an oral discourse by a teacher resulting in the learning by the students. But we also know that the main purpose of the lecture

is to teach and not just standing before a large group to speak- that is how Hyman (1974) opines about lecturing. In the same context, Eble (1978) cautions that mediocre discussion classes, poor student's reports, in effective panels or role playing are just as deadly as any lecture might be. If lecture is carefully prepared and executed then, it could be one of the best methods of teaching also. So, for this you should know what is meant by lecture method, and how it becomes significant competence for a teacher. An effective and efficient teacher usually will be well versed in lecture method. Therefore, let us, focus our discussion on the meaning, need and importance of lecture method.

22.3.1 Meaning, Need and Importance of Lecture Method

Lecture method is also known as expository method. Generally the teacher dominates in a teaching learning session, if he adopts lecture method. And many a times it confines to oral presentation. Therefore it is considered as an easy way to teach. If you look at the past history to the modern period, irrespective of any country, you can see the ever existing "Lecture method" in the teaching profession. In all these periods, in most of the occasions, teaching was done by a few manuscripts and from the teacher's store of knowledge through lecturing, questioning and with the use of some other support systems. So, lecture method comes under teacher centered approach.

Because of the above said aspects many will criticize the lecture method. But Inspite of the broadside of criticism which has been raised at it in recent years, it still persists as the most widely used method in secondary schools.

Now let us have a look at the definitions on lecture method, given by different experts.

- "A lecture is a carefully prepared oral presentation of a particular subject by a highly qualified individual". - (Bergevin, Morris and Smith - 1963).
- "Lecturing is informative speaking" - (Cooper 1985)
- Lecture method is teacher centered; provides an authoritarian social situation (W. J. Mckeachie in N.R. Gage - 1963).

  Mckeachie is of the opinion that, lecture method is appropriate when the information to be transmitted is not readily available or is scattered among diverse sources and when an experts has current information immediately desired or needed by a large group of learners in a short period of time (1986). He continuingly says that, lecture method is best suited for the transfer of cognitive information and not for technical motor skills or attitudinal modifications.

- Lecture is a monologue by a lecturer. Here the topic discussed will be arranged in some logical structure and sequenced in an economical manner.

All the above said points with one or two definitions might have made it clear to you that what is meant by lecture method. Isn't it? Therefore now we shall focus our discussion on, "when the lecture method is needed?" and how far it is significant.

Usually lecture method is adopted for

1. Acquisition of information.
2. The promotion of thought.
3. Changing the attitudes.

But evidences have shown that, the lecture method is equally effective as other methods for transmitting information and not for the promotion of thought or for attitudinal changes. (Donald. A. B. 1972). The need and importance of the lecture method can be felt, if you go through the following points:

- To present the information in an organized way when the available time will be of a short duration.
- To give a frame work for learning activities and further studies for learners.
- To explain the analysis of a controversial issues (may be of social context).
- To stimulate or inspire the young learners for further inquiry or indepth studies.

Lecture method becomes more effective and fruitful only when the teacher possesses a content hold or subject hold and also proficient communication skills. In a developing country like India, where increased population growth is a burning problem, educating more students at shorter period of time with a minimum usage of resources becomes very important. For this lecture method is the most suitable one.

If you want to use the lecture method at its best level, you have to bear in mind the following points.

i) A good lecture needs sufficient preparation and self-confidence (Weaver 1983)

ii) You have to stay within the given time frame, for this pre-planning, preparation and organisation of the subject matter - are considered as the essential ingredients for an effective lecture method.

iii) You have to correlate your speaking rate with that of the understanding rate of the students. May be, like, if the concepts or information is easier and familiar, then

faster speaking rate and if the concepts or information is difficult, then slower speaking rate with intentional pauses are advisable.

iv) As far as possible avoid irrelevant utterances. Because, silence is always preferred to meaningless “Uhs”, “Ums”, and “Okays”!

v) Any explanation should have relevant, meaningful examples to clarify and amplify the content. Because, you will be always having a heterogeneous students group. They will be differing in their knowledge, skill and experience. So, to suit everybody’s understanding you have to make use of several examples and illustrations taking their experiences as basement.

vi) Open mindedness is needed for accepting and getting improved in your teaching style. For this, seek your colleague’s critique, feedback from your students, and audio / video / digital documents of sample lectures.

vii) After getting the feedback as said above, look at your, annoying mannerisms, distracting gestures, unnecessary jargon, and over used pet words - And try to overcome this.

viii) Try to present the subject matter in a “talking” way, because it is different than “reading”.

xi) It is said that, voice command is as important as subject matter command. Hence try to use your voice ability with the proper intonation and modulation.

x) Also try to supplement your presentation by using handouts, videotapes, flip chart, chalkboard, over head transparencies, slides, etc; suitably. (If all the above said are available!)

xi) Be sensitive to certain environmental factors (like temperature, excess noise, illumination) and learner’s feedback, (nodding of head in agreement or facial expression body and position).

xii) Relate the subject matter into the daily life experiences and needs of the learners. For example: “The purpose of this class is to provide you with some current information on low cost, high protein foods” - Here the topic to be taught is Mushroom Culturing.

xiii) You have to crete a learning climate and speak clearly, loudly enough and at the speed which is appropriate for the learner group.

xiv) Use a conversational tone, encourage the students for active participation. Because,

waiting until the end of the lecture to ask “Are there any questions?” - will rarely result in active participation by the students.

xv) Last but not the least is, providing an obvious end for your lecture. It has to be through sum relation and highlighting the major points covered. Ending on time is very important because, learner’s attentiveness decreases as you take longer time for lecturing, i.e beyond the stipulated time. Therefore it is best to stop speaking before they stop listening.

‘Check Your Progress’ - 1

1. Lecture Method is one among them:
   a) Child centered Method
   b) Subject centered Method
   c) Activity centered Method
   d) Teacher centered Method
   2. Usually Lecture Method is adopted for:
   a) Acquisition of information
   b) The development of certain skills
   c) The development of writing competence
   d) The teaching of science subjects.
3. A good lecture needs:
   a) Well equipped class rooms
   b) Sufficient preparation and self-confidence
   c) Minimum number of students
   d) Teaching aids
4. A Lecture is a:
   a) Dialogue
   b) Set of sequential learning activities
   c) Monologue
   d) Discussion

5. Lecture Method is also known as:
   a) Experimental method
   b) Problem solving method
   c) Discovery method
   d) Expository method
6. In a lecture method, generally:
   a) Students dominate
   b) Teacher dominate
   c) Both the teacher and the students dominate
   d) No one will dominate

22.3.2 Salient Features of Lecture Method.

If you have understood the meaning, nature and importance of the lecture method, then definitely you are in a position to list out the salient features of the lecture method. They are, as follows.

- It is one among the teacher centered approaches.
- Teacher dominates in the teaching learning situation, that too, in most of the time as an autocratic personality.
- It anticipates meaningful receptive learning by the students.
- It involves the presentation of information in an organised way.
- It is considered as a monologue, because, here the communication will be in mono direction or it is a one-way communication.
- The interaction between the teacher and the taught depends upon the teacher's decision.
- It is best suited for the transfer of information rather than in bringing about attitudinal development.
- In a teaching situation, the whole system will be under teacher's control It does not cater for individual differences.
- It is said to be expository in its approach as it exposes the fund of knowledge before the listeners or the pupils.

- As the number of variables involved in a teaching session is very less, (like, support sys terns, infra structures etc;) it is easily accessible by any teacher.
- This method can accommodate a maximum number of students in a teaching session compared to any other method of teaching,

‘Check Your Progress’ - 2

1. A lecture method most of the time is considered as,
   a) An autocratic performance by the teacher
   b) A democratic performance by the teacher
   c) A lasses fair type performance by the teacher
   d) None of the above
2. Lecture method anticipates
   a) Passive participation by the students
   b) Silent listeners
   c) Meaningful receptive learners
   d) both b and c
3. Lecture method can accommodate
   a) Very less number of students
   b) Any number of students
   c) An optimum number of students
   d) All the above
4. A teacher can use the lecture method for teaching
   a) Even in the absence of support systems
   b) To explain an abstract concept
   c) Associated with an experiment
   d) All the above.

22.3.3 Merits and Demerits of Lecture Method

Lecture method appears to be the best method in most of the time. It is because of its several positive aspects or merits, rather, the advantages or merits of lecture method can be listed as follows:

Merits:

1. It allows a teacher to present the subject matter in a clear, precise and orderly format
2. It is quite economical in time and energy. Because, information can be shared with large groups of individuals in short period of time. Instead of having to repeat the information to several small groups.
3. It is a well known, popular and acceptable method - as most of the students folk is familiar with and feel comfortable with this method.
4. It gives a chance for face to face interaction. Lecturing well is an art; so, students comprehension will be enhanced by direct talking, gesturing and feelings expressed by the teacher.
5. It can intellectually stimulate, engage, arouse and excite a learner's mind for further study and inquiry.
6. One can use it effectively to start a new but difficult topic
7. It is very useful in explaining the difficult and theoretical points which cannot be demonstrated.
8. It awakens critical thinking skills in the students.
9. It may provide necessary information when satisfactory text books are lacking and can give a selective emphasis when there are too many books.

Thus, if a lecture is planned for an optimum time (say 30 to 40 minutes) with carefully constructed, sequentially arranged subject matter, associated with meaningful examples and illustrations, simple language, highlighted by frequent summaries and also with appropriate speed of delivery, intervened by student - teacher's interaction and an obvious end statement - then definitely it will result in effective lecture.

Lecture method is also open to so many demerits. Most of the disadvantages are generally related to its overuse and misuse. Therefore one has to get the knowledge of its limitations. So, that, needed precautions, worth modifications could be brought about during lecturing. Isn't it? Hence, let us have a look at the limitations of the lecture method.

Demerits:

1. Usually lecture method is adopted for transferring of information. So, it never caters to the development of the balanced personality of students.
2. It cannot be said economical if it not achieves the learning outcome, because what is important is, what the students learn, not how much the lecture covers.
3. It is assumed that, student also receives the information as it is presented.. But, in reality, the speed of speaking, the speed of listening and the speed of understanding (by the learners) will not be one and the same.
4. It is against to the principle "Learning by doing" and not child centered in its approach. Hence it appears to be non-conducive and un-psychological in its approach.
5. Teacher is the only active participant and students are passive listeners. Hence it becomes monotonous and sometimes students may feel bored.
6. Teachers may be tempted to finish off a particular topic in the periods at a stretch. Then the fate of the students will be miserable. Because soon after the 20 to 25 minutes, pupils will be completely switching off from listening. (common human nature!).
7. Students get a very little chance for questioning in an authoritative presentation i.e. in lecture method.
8. If never encourages for problem solving and students are not at all given an occasion for formulating their own generalisations.
9. This method does not give the teacher an opportunity to get feedback, either with refer once to his own presentation or to evaluate students' progress during the period.
10. There is a danger of inaccurate or biased information by careless or irresponsible person laities.
11. In its purest form, the lecture provides no verbal interaction between the teacher and the taught.
12. Most of the time it gives a scope to judge on teachers, like, whether or not they entertain the learners rather than on worth wholeness of the content.

So, after discussing on merits and demerits of lecture method, we may come to one conclusion, that if at all one would like to use the lecture method, let it be by taking

a proper note on its positive as well as negative points, then plan it deliberately before execution. While planning, the following points can also help you.

- Say a lot about a little
- Use a lot of examples
- Keep moving (But don't overdo it!)
- Capitalize on variety.

(Because, change alone is a major factor in holding students' attention. Use audiovisuals, discussion strategy, questioning etc; change your rate of speaking, tone of voice, and body gestures). Remember you want variety in everything!

'Check Your Progress'-3

1. Write any two merits of lecture method.
2. Write any two demerits of lecture method.

22.4 Demonstration Method

Nowadays it has become so common to see electronic gadgets performing many tasks. That too, single machine performing two or three functions simultaneously at a time depend upon the need. For example Radio cum Tape Recorder cum, or a washing machine which washes as well as dries the clothes! So whenever a common man purchases such a novel devices, he will ask the shopkeeper, like "how does the machine work? Please show me." Then the shopkeeper demonstrates the working nature of that particular machine isn't? Then what this demonstration is? Definitely it is some sort of "showing". This involves, telling, and showing how the machine works, providing a chance for the buyer to try it himself. If this idea is little bit elaborated systematically and adopted in a teaching - learning situation, then it will take up a very meaningful construction, what could be called as Demonstration Method of Teaching. Generally demonstration method is more appreciated, and advocated than lecture method. It is just because of its effectiveness on pupils learning. Demonstration method gives more chances for learning by the students, compared to lecture method. Now you must be very eager to know some of the details regarding this demonstration method. Isn't it? Hence the following discussion, is dealing with respect to meaning, nature and importance of demonstration method in detail.

22.4.1 Meaning Need and Importance of Demonstration Method

Laird (1986) is of the opinion that, demonstration is merely an ***illustrated Lecture or illustrated presentation.*** This implies that demonstration is a teacher centered approach influencing the students' learning. It can be effective in providing information as well as developing skills step by step. For example, when a teacher shows his class how to mount a transverse section of a plant stem on a slide, and cover it with a cover slip and observe under a compound microscope - he is presenting a demonstration or when a teacher wants to show the process of oxidation by burning a Magnesium wire - he is presenting a demonstration.

By observing the above examples, you can conclude that, demonstration is concerned with acquiring some combination of knowledge and skill. Now let us go through some of the definitions that reveal the central idea of demonstrations:

- Demonstration can be defined as an accurate portrayal of a procedure, technique or operation" (Laird, 1986).
- A demonstration is a method of instruction in which the adult educator actually performs an operation. Therefore demonstration requires adult educators who are highly skilled in the material or the process to be demonstrated.
- Demonstration is any well chosen example of something the learner should be able to do.
- Demonstration and simulation are the methods based upon experiential learning, provide an port unity to observe actual practice and utilize their experience in real life situations" (Jaunted - 1980).

All the above definitions point out one thing that demonstrations involve adults showing how something works and the procedures followed in using it. It can support and supplement content and translate the descriptive materials into actual practice. Therefore, demonstration is a method that requires special skills and abilities in order to perform effectively.

If you take up the subject science as an example, there demonstration involves showing students the apparatus they are to use, illustrating a technique, performing an experiment which could be either too dangerous or too expensive for individual student use or establishing a discrepant event.

Broadly we can classify demonstrations into two types based on the purpose, namely,

1. Illustrative demonstration
2. Investigative demonstration

Illustrative Demonstration: In this type usually, the teacher teaches the topic first on some phenomena, later he performs an experiment before the class in order to illustrate what he had taught.

For Example: The teacher after teaching the concept "Respiration", switches over to some demonstration. Like, first he will tell about respiration as a process which involves taking in of oxygen (Inhale) and giving out of carbon dioxide (Exhale). Then he exercises the inhale and exhale process as it occurs in respiration. (This is also an illustrative demonstration) Later, in order to illustrate, the concept, that the carbon dioxide is liberated during respiration, he conducts the following experiment before the students.

The teacher fills two test tubes with half of water and puts one drop of Phenol red indicator in each test tube. (This indicator gives red colour in alkaline solution and yellow in acidic solution). Now the teacher tells the class that, when carbon dioxide dissolves in water it produces carbonic acid. And he blows through some pipe, in one of the test tubes. Because of this the colour changes from red to yellow and in the other test tube it remains unchanged.

Investigative Demonstrations*:* Here the teacher uses the demonstration as a device to arouse the inquiry mood among the children. He may describe the action of the apparatus and the process involved in it in brief and proceeds immediately with demonstration.

Pupils are guided to understand and analyse the selected problem and are encouraged to hypothecate; and test their hypothesis. Usually pupils readily accept the purpose of demonstration that promises the possibility for minor explosions, odd sounds and other unusual events. It is said that they enjoy the feeling of suspense.

For Example: Teacher demonstrates the action of concentrated hydrochloric acid on the metal Zinc; in which Hydrogen gas is liberated.

The confirmative tests for hydrogen gas is introducing a burning stick near the mouth of the test tube, where the gas is liberated, immediately, very clearly a "Puff 'sound is heard. For students this will be a thrilling experience!

After understanding what a demonstration means now, let us see where it suits well!

- Demonstrations can be employed in order to enable the students to infer generalizations from observations.
- It is also used to a greater extent today for purposes of developing inquiry skills.
- Generally, demonstrations fit aptly in science teaching, including proving, illustrating clarifying and amplifying a scientific concept or principle.

- It is also advocated to do demonstrations to emphasize an intuitive approach in which students are encouraged to guess, hypothecate and leading to problem solving.

For Example:

i) To determine **pH** of a given solution in; detergents, fruit juices, tooth pastes, cosmetics and other household substances.

ii) Earthworm's behaviour for the nail polish eraser's stimulus and them identifying the ganglion in each segment of earthworm's body.

- Demonstration can be used to provide a model of a skill and also to support an explanation of an idea, theory, belief, concept etc;
- Demonstrations can play a significant role in the following situations:
  a) To set a problem
  b) To illustrate a point
  c) To help in solving a problem
  d) As a review
  e) To serve as climax

.

<u>'Check Your Progress' - 4</u>

1. 'Demonstration' is considered as"
   a. A lecture
   b. Experiments
   c. An illustrated lecture
   d. All the above
2. 'Demonstration' clarifies and amplifies the understanding of
   a. Concrete concepts
   b. Universal laws
   c. All abstract concepts
   d. Scientific concepts and principles

3. Generally the demonstrations enhances the skill of

a. Inquiry

b. Explanation

C. Wilting

d. None of the above

As it is already pointed out, demonstration method is more effective than lecture method; one may prefer to adopt this in their teaching. In this method also one should have the subject hold and must be good at communication skills. Demonstration method is not as simple as it appears to be.

It needs a thorough planning, rehearsals, and deliberate preparation well in advance. So, before steeping into adopting the demonstration method, you have to be trained in certain aspects and also should remember some of the important factors. Therefore let us now focus our discussion towards such aspects which are considered as the pre-requirements (pre requisites) for any demonstrations.

Usually any demonstration will have three integral and sequential phases; they are a) Preparation b) Presentation & c) Evaluation. And each of these phases are very meaningful and significant in any demonstration.

A) Preparation*:* Usually a demonstration is "produced" which is similar to that of a "drama produced". Hence a teacher has to give attention towards many factors as a drama director gives. i.e., visibility, audibility, audience participation, contrasts and climaxes etc.,

A teacher has to decide the demonstration method based on the nature of the content. For example if the content is 'detecting starch', then performance by individual students will be for better then a demonstration by the teacher.

- The demonstration should be planned and rehearsed well in advance.
- A good planning and rehearsal of the experiment gives confidence for a teacher.
- The teacher must know the purpose or aim and the procedure of the demonstration very clearly. He should also have awareness about generalizations to be made and the attitudes to be developed while demonstrations.
- The equipments and apparatus needed for demonstration should be listed and arranged in order. It is usually better to keep the apparatus to be used on the left hand side and the used one on the right hand side.

- Demonstration table should be visible to all the students in the class. Therefore it has to be at a little higher level than the pupils seat arrangements.
- Proper care should be taken for adequate lighting, and clarity of the apparatus.
- Make use of other learning aids to help the clear understanding by the students.
- Insist the students to observe infer and write what they observe while the demonstration is going on.

B) Presentation:

- Make the students to become aware of the purpose of the demonstration. As far as possible, keep the purposes of the demonstration as simple, so that they may be given in short, direct statements.
- Write the aim or purpose of the demonstration on the blackboard and ask the students to take it down in their note book.
- Tell the students to commit themselves as to what they think the outcome of the demonstration will be.

For Example:

Concept: Acid turns blue litmus to red and base turns red litmus to blue.

After taking acid, base and water in three different test tubes, (a, b & c test tubes) the teacher asks the question as "How will you identify an acid and a base?" and then performs the demonstration to illustrate one of the properties of an acid a base as well as neutral liquids (though all these apparently may look similar).

- Never say the outcomes of the demonstration in advance. Because it is justified in some of the special occasions only.
- Take the help of the students in arranging or setting up of apparatus for demonstration. This helps the students to acquire the knowledge of apparatus and procedure of the experiment.
- If the demonstration involves several steps or several associated activities, you better stop occasionally and give summaries of results, you may tell it orally or it could be recorded in tabular form on the blackboard; the recording of results in the form of graphs is also helpful.
- You should keep in mind the audience and their active presence participation.

Facial expressions, obvious inattention, questions, laughter and exclamations - all these are helpful clues in judging the effectiveness of a demonstration (But you have to make use of them judicially).

- In general, demonstrations must be short and fast moving.
- Suspense is a useful device for holding attention, like; an explosion or changing of colour without the prior knowledge can be very exciting.
- Get assured about the students' understanding. Because things are apt to happen so rapidly in demonstrations that a pupil may miss some important points. Therefore here and there ask a few students, like, what they have observed and refocus the same question with other students, so that all the students will be alert during demonstration.

C) Evaluation:

This has to be done from three points of view, as:

i) With reference to the aim or purpose of the demonstration. i.e., check whether the experiment has given the pre-determined results?

ii) Has the demonstration resulted in the expected learning out come from the students?

iii) How far the teacher is effective in bringing about the desirable behavioral changes among the students?

'Check Your Progress' - 5

1. The three essential phases in a demonstration are:
   a. Preparation, presentation and evaluation.
   b. Evaluation, presentation and preparation.
   c. Presentation, evaluation and preparation.
   d. None of the above.
2. Say whether the following statements are true or false:
   a. Facial expressions, obvious in attention, questions laughter and exclamations - all these are helpful clues in demonstrations.
   b. Suspense is not a useful device for holding attention in a demonstration.
   c. In general the demonstrations must be short and fast moving.
   d. One should not say the outcomes of the demonstration in advance.

22.4.2 Salient Features of Demonstration Method

By looking at the meaning and nature of demonstration method, one can recognize its characteristic features. So, now let us try to list out the salient features of the demonstration method.

- It is coming under the teacher centered approaches.
- Teachers' role will be dominated, when compared with students' role.
- It tries to concretize some of the learning concepts through illustrations and experimentation.
- Essentially a demonstration will have one or the other type of experiments, namely, illus iterative experiments, investigatory experiments etc.
- Most of the time demonstrations are produced before the students like a drama is produced before the audience.
- The interaction between the teacher and the taught depends upon the whims and fancies of the teacher.
- It depends upon so many situational factors, like, success of an experiment, infrastructures, apparatus and chemicals etc;
- It needs a thorough experience, planning, practice and rehearsals, for its success.
- It can enhance the science process skills among the students, namely, observations, identification, classification, experimentation, hypothecation, inferring etc;
- Usually science lessons increasingly use demonstrations.
- Most of the time demonstrations appear like" One man show" because the whole teaching and learning process will be under the teacher's control.
- A good demonstration could be resulted through the use of adequate infrastructures, deliberate planning, and systematic execution associated with evaluation.

'Check Your Progress' - 6

State whether the following statements are True or False:

a. Experiments are the essential part of demonstrations.

b. Demonstration is not a 'one - man show'.

c. Demonstration does not enhance the development of science process skills among the students.

d. Rehearsal of the demonstration is a pre-requisite for its effective presentation.

22.4.3 Merits and Demerits of Demonstration Method

Demonstration method is of quite advantageous when compared to other methods in so many ways. So, now let us try to list out the advantages or merits of demonstration method.

Merits:

"The role of experience, freedom to make judgments and responsibility for the consequences of choice and action - are the very important points in effective learning (Marinate and Checkering 1982) In this context demonstration is a very good device both for a teacher as well as for students.

- It takes into account the active participation of the students, and gives a chance for observation, and draw inferences.
- Demonstrations are very useful teaching devices and several possible functions at the same time, for example, many laboratory skills as well as investigative skills cannot be developed other than in demonstration method.
- Demonstrations could be used as an effective means of teaching to illustrate a point, to solve a problem to give a review etc;
- It is quite economical with respect to materials involved, effort and time.
- It enables a teacher to utilize-activities that would be too dangerous for pupils, to carry out themselves.
- It is time saver, because it is easier to conduct one experiment than to supervise fifteen experiments; and also, it is true that, an experience teacher can perform the demonstration more smoothly, quickly than pupils.
- Demonstrations break the monotony in the class as a very good stimulus variation and it is a very good alternative for lecturing teaching method which has more power as an attention compeller.
- It is one among the child centered approaches and more psychological in its approach compared to the lecture method.

But this method could be highly beneficial with certain limitations of its own. Beyond such parameters it may become disadvantageous also. So, now we shall try to understand the demerits of demonstration method.

Demerits:

- A demonstration seen is not necessarily a demonstration understood, because, it suits for certain types of learning situation only.
- Demonstrations are often prone to the problems of visibility.
- Pupils have a little opportunity to become familiar with the materials. Usually the apparatus will be presented as "already assembled" or may be assembled so rapidly which would be out of grasping.
- Much scientific information cannot be grasped adequately by sight and sound alone. For example: Odours require close - up observation, texture by touch; and forces through muscular action.
- Many pupils may become too reluctant to raise questions when they fail to follow the steps in demonstration.
- Never encourages the active participation by the students. It is difficult to insure complete mental participation while the body remains inactive, and attention of the pupils could be easily lost due to both internal and external factors and also such loss of attention may go unnoticed by the teacher.

"Check Your Progress" - 7

1. Write any two merits of demonstration method of teaching.

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2. Write any two demerits or drawbacks of demonstration method of teaching.

_____

_____

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_____

3. State whether the following sentences are True or False:
   a. It avoids the activities by the students which would be too dangerous to carry out by them.

b. Demonstrations bring monotony in the class.

c. Demonstration is one among the child centered approaches / methods.

d. It is economical with respect to materials involved, effort and time.

22.5 Project Method

The historical events in the field of education reveal a very important point about 'teaching', which is nothing but, a gradual progressive and evolutionary change from conventional and traditional teaching towards child centered approaches and child centered teaching methodologies. Several eminent educationists, psychologists and philosophers were advocating about the consideration of the child as a centre of teaching learning activity. They stressed, that, teaching - learning process must give due importance to child's interest, its freedom for learning, active participation, attitude towards learning as well as aptitude. Keeping such points in mind, American Philosophers proposed one particular method of teaching that is known as "Project Method". Mainly it is based on pragmatic school of thought. You will get more information about the meaning, nature and importance and also the merits and demerits of project method in the following discussion.

22.5.1 Meaning, Need and Importance of Project Method

Project method mainly concerns with carrying out a useful task in a group in which all the students work with integrity and co-operation. The thrust area in any project will be having the practical and social perspective. Usually projects aim at solving problems. Now, you may get surprised about what are these "problems"? Isn't it?

Project method deviates little bit from the conventional teaching methods. Here a teacher, instead of his oral explanation, class room reading exercises, followed by a test or some sort of questions, he may introduce a subject briefly, point out the main problems and then let the pupils to seek the answers for themselves. This they can do in several ways, such as,

- Reading the text books.
- Using reference books in the library.
- Discussing among themselves.
- Or carrying out practical work in the laboratory, or in the form of some field worker.

So, a project means, it could be in the form of nature study with a strong practical

basics. That is to say, it must be practical as well as social. Because of the above said nature, the project method is considered as “Learning by doing”. And, it is also because it emphasizes “Learning by living”.

As this method involves social interaction to the maximum extent, it enhances learning through association, co-operation, and activity. To get little more clarity with reference to project method, let us take up some of the definitions that are contributed by eminent educationists.

- “A Project is a problematic act carried to completion in its natural setting” - Stevenson.
- “A Project is a whole - hearted purposeful activity proceeding in a social environment”. - Kilpatrik
- “A Project is a bit of real life that has been imparted into school”- Ballard.

Thomas and Long have given a modified definition of project method. According to them “Project method is a voluntary undertaking which involves constructive effort or thought and eventuates into objective results”.

If you analyse the above said definitions, one thing becomes very vivid. That is, project method involves, solving problems by individual student or small group of students over a period of few .days or a few weeks. Sometimes a main problem may have several sub-problems. Projects could be as varied as pupils who undertake them. Dr. Kilpatrick has suggested four simple types of projects. They are as follows:

1. Producer’s type: This type of projects usually deal with the tasks like building constructions, building houses, maybe like, to execute a model of textile factory etc;
2. Consumer’s Type: In this type pupils will get a rich experience with some social enjoyment.
3. Problem Type: In such type of projects, the main purpose will be finding a solution to the selected problem.
4. Drill Type: In this type of projects, no new activity or finding solution is done. Rather the main purposes here will be about getting a mastery over certain skills. For this a time bound repeated activities are designed and executed with intermittent evaluation until the mastery over the particular task or skill is acquired.

After understanding the meaning and nature of the project method, now let us list out the characteristic feature of this method. By doing this you will get a better understanding of a ‘Project’ in particular.

Salient features of the project method:

1. The main objective of the project method in providing a live situation for children to acquire the knowledge in a natural setting.
2. By adopting Dewey's principle "Learning by doing", it reveals the significance and usefulness of learning through experience. Because, "experience" is the greatest teacher, which is a universal truth.
3. The most important essence of Project method is "freedom". It gives an opportunity for self-expression; and also allows child to develop himself fully.
4. Project method basically tries to build a strong link between the classroom level curricular transaction and the real life that is beyond the classroom boundaries.

All the above statements make it very clear that, it is the method which encourages and nurtures the personality development of the child in the social context. After all, education must enable an individual to be fit in his community and society. It inculcates social values, like co-operation, coordination, integration, mutual consideration and also a significant learning outcome.

In our country, with the democratic government, schools and educationists may feel that, project method is the need of the hour. If such is the felt need, then it itself reveals the importance also.

'Check Your Progress' - 8

1. Define 'Project Method' according to Kilpatrick.

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2. Define 'Project Method' according to Stevenson.

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_____

3. Name the four different types of project.

_____

_____

_____

_____

4. Which principles of Dewey's are very much highlighted in the project method?

22.5.2 Steps in Project Method

Project method aims at providing a natural setting for the purpose of learning. If at all it has to be brought into classroom contexts means, it needs a deliberate planning. For this, it has to follow some sequential steps, they are:

1. Providing a situation
2. Choosing and purposing
3. Planning
4. Executing
5. Evaluating
6. Recording

Let us take up the above steps one by one in detail.

1. Providing a situation*:* Most of the suggestions for Project work originate from the teacher only. A project is not told as "Here is a job for you to do", but the teacher must have a problem in mind and be able to raise interest among his pupils. In no case he should dictate what is to be done, but encourage and be initiative. Perhaps the most essential point in starting a project is to let the pupils have a free hand. He must stimulate the pupils to undertake the projects. For this there are many ways, like for example;

- He may provide the lists of suggested projects
- Take the students to science fairs and science exhibition, stamp exhibition, coins' exhibition etc; to trigger the idea of project in the students' mind.
- He can start several tasks through science club activities.
- He may encourage the students to search some information regarding certain current issues by reading text books, journals, publications of certain experimental studies,

survey reports, “do-it-yourself’ science books etc;

Not only the above said points, what is needed essentially to carry out a project study, is nothing but enthusiasm, energy and faith. Apart from this, the environment which is rich in books, apparatus, libraries, museums, visual aids, CDs, electronic documentaries, Internet facilities, etc; also help a teacher immensely to provide situation for the project work.

2. Choosing And Purposing : The very first step here could be the organisation of the class room discussion, in which every student is given an opportunity to contribute knowledge, ideas, ask questions and make suggestions.

Here, the teacher must play a leading role, so that, he facilitate the children to learn, how to organize work for themselves and to accept responsibility in a co-operative activity. In this stage itself, the teacher should nurture the correct and proper understandings of the Project by the students, so that, the purpose of the project should be clearly defined and well understood by the pupils.

If it is a wrong selection by the students, then the teacher should tactfully guide them to see that their project is not worth enough and should allow them to choose another project.

And also you may ask them to write down the reasons for their selection. So, in this stage, as a teacher you are supposed to :

1. Decide how the major problem can be conveniently broken into subsections without losing sight of the main theme.
2. Decide which groups of children are to be responsible for the parts of the study and how they may carry out their work.
3. Decide how the various parts are ultimately to be related to each other and how this relationship may be kept in the foreground throughout and made clear at the conclusion of the work.

You may wonder by looking at the above said points! Yes, we say that project work provides freedom to the children, but yet the above said decisions, will intervene the process. Because, it is usually the teacher who alone is able to see the plan as a whole at the beginning. He must be constantly ready throughout the whole course of work, to help and encourage pupils.

3. Planning : Anyhow, as you have already guessed it, a project work does not fit easily in to the routine school work. In particular, there will be some work to be done

out of school hours, in the lunch hour, after the school and even before the school. It may involve the parents also. By doing such activities in turn it tries to influence the school life over the whole community and thus it tries to lay a foundation for social education. Therefore it is very important to plan the project properly before its real execution.

For this, teacher can ask "How do we plan our project work?" And then the students should plan out the scheme by taking the teacher's guidance. Talking it over; hearing everybody's views and reaching decisions through group effort is the essence of planning stage. Here, you have to encourage every child to participate in the discussion and to make some suggestions. Later you may tell all the students to write down the plan properly.

4. Executing: According to the plan the project should be executed. The plan gives the guidance with reference to the division of different tasks and assigning of different responsibilities among the members of the group etc; here the duties and the responsibilities are assigned to the different students according to their interests and ability.

For example: Students who show interest in reading, must be assigned on some reference work, to collect literary information, and collection of data etc; The one who is interested in physical work may be assigned to similar work, one who show drawing skill, must be provided the same nature of work. Execution of the Project will be the longest and the most dynamic step. Therefore it requires patience. Usually Project work promotes many great activities of knowledge. The teacher has to intervene in the ongoing project work in order to guide, encourage and watch the progress of the students..

5. Evaluating: A project work could be evaluated in several ways. However, the most common type of evaluation is done by taking the pre determined objectives as the basis.

As pupils work on their projects, the teacher should keep clearly in mind, like, what is the main aim of the project and has it been achieved comprehensively and adequately. Usually here the evaluation will be subjective. Because, a piece of work done by a student may be unworthy to compare with talents and abilities of the other student. So, each project should be evaluated on its own merits, not in competition with other projects. While evaluating, each individual's abilities, interests, and background has to be taken with full consideration.

Beyond all the above said points, students should be trained to review their project and find out the mistakes if there are any, by themselves.

6. Recording: This being the last step, is done at the end of the project. For this students should be trained properly to keep a complete record of their project work - like, how they planned, what discussions were held, how duties were assigned etc; Students can prepare the interim reports also. The reports, i.e, interim reports as well as the final reports are valuable. Such records could be referred by the whole class and get benefited out of it.

Students need recognition. So, an opportunity must be provided for them to display such Records, to do some demonstrations, displaying models, results of experiments, some of their rare collections like, specimens, rare rocks, etc;

‘Check Your Progress’ - 9

1. Mention the steps in a project method.

2. State whether the following statements are True or False.

   a. The Project is objective based activity.

   b. Planning will be done after the execution of the project.

   c. ‘Execution’ takes longer duration of time compared to all the other steps in a project work.

   d. Evaluation of the project is not at all an important aspect.

Illustration of a Project:

A Project on “The Study of Water”

The above problem could be chosen, because it is within everyone’s comprehension, like it is used for almost in all of our works. And more than this, if you just critically look at the concept ‘water’ then you will come to know that the concept ‘water’ has a generative power, and it is the source of so many other related ideas, thereby helping in designing numerous projects. For example, students can carry out the projects on the problems like:

- The state of the water tank
- The effluents that are added to the river water
- The anxieties of flood and drought
- Water borne infections and epidemics
- pH values of water from different sources and their repercussions.

- Effect of pesticides and chemical fertilizers on the river water etc;
- The above said type of projects can cover many aspects, like; it calls for many kinds of activity. Provides co-operative work for those with widely different interests and abilities.

The design of the project work during the planning phase has to be plotted in the form of a schematic representation.

For Example:

Topic: pH value of water from different sources and its effect on other aspects.

Work to do	**Method**	**Group**
Make a list of local Water supplies	Use of your own knowledge	A group of student who are interested in carrying this type of activities
Classify as, Borewell, 'River, pond, etc,	Through observation	
Draw a large map of the location	Take the help from teacher	
Find the pH value of The respective samples	Do this in the lab.	
Survey the local areas For the water sources	Data collection	
Find the cor-relation Between pH value and other Aspects	Data Analysis	

So, such topics may be arranged in a smaller number of suitable groups. The emphasis should be on practical work by the pupils, with plenty of discussion at all stages.

22.5.3 Merits and Demerits

Project method, as it is one of the best child centered methods has several positive points. So, such points could be listed as merits. For example;

Merits:

- It gives a strong foundation for the practice of certain learning principles as prescribed by educational psychology, like, law of readiness, law of exercise, law of effect and learning by doing etc;
- It guarantees freedom to the students.
- It assures the intellectual development along with the process of socialization.
- Certain social values, like, democratic values, social adjustment etc; could be well inculcated through this method.
- It brings a good rapport between the school, individuals, and community.
- The development of Head, Heart and Hand could be brought about by adopting this method.
- This method gives firsthand information and experience to the learner.
- It enhances the development of science process skills, namely, observation, identification, classification and experimentation.
- It helps increasing the reasoning power, memory power among the pupils.
- It gives a chance for complete involvement to a learner, and thereby a learner gets the heartfelt satisfaction after a successful completion of the project.
- It indirectly teaches the value of dignity of labour.
- By giving each individual a chance to mingle with socio-emotional situation, the project method develops the confidence among the learners, which is the very basic thing for any progress in the life.

Project method though it appeals to you, is also, not free from pit falls or drawbacks. Such points can be considered as the demerits of the method.

Demerits:

- It doesn't suit a country like ours, where the curriculum, is highly structured, and imposed as a common curriculum or Nationalized Curriculum.
- Most of the time, the project method tends to be incidental
- It denies most of the practical-problems during its execution in context with the school's programme of work.
- Syllabus covering will become the major problem.

- Un-economical, and it consumes more time, effort and resources to cover very little of the curriculum part.
- It appears to be ambitious and also expects too much from the students' side.
- If they adopt this method, teachers are at higher risks, compared to their traditional teaching.

'Check Your Progress' - 10

1. List four merits of project method

_____

_____

_____

_____

2. State any two demerits of project method.

_____

_____

_____

_____

_____

22.6 Let Us Sum Up

- A teaching method is one of the important devices in teaching-learning situation which is usually considered as a general way of presenting the subject matter. In most of the time it enhances the cognitive development among the students.
- Lecture method, demonstration method and project method are some of the effective teaching methods.
- Lecture method is considered as a teacher dominated method, -which involved informative speaking by the teacher.
- Lecture method sometimes, appears to be the best one for a developing country like India, but it falls back in creating a conducive learning environment to the pupils.
- Demonstration method is the one which tries to overcome the drawbacks that are

in the lecture method, and it also tries to impart the information more effectively than the lecture method.

- Demonstration method mainly aims at giving the knowledge to the students in a concrete form - But here also, in most of the time teacher dominates and there will be no much scope for the students to do the experiments.
- Project method is considered as a bit of live situation in which students participate whole heartedly in a socio-emotional setup.
- Project method is one of the best examples for child centered approaches.
- It is very difficult to adopt the project method to all sorts of subject matter in a school teaching.
- Some times the project method appears to be uneconomical, with reference to time, effort and resources.

22.7 Answers to 'Check Your Progress'

'Check Your Progress' - 1

1. d) Teacher centered approaches
2. a) Acquisition of information
3. b) Sufficient preparation and self confidence
4. c) Monologue
5. d) Expository method
6. b) Teacher dominates

'Check Your Progress' - 2

1. a) An autocratic performance by the teacher
2. d) Both (b) & (c)
3. d) All the above
4. d) All the above

'Check Your Progress' - 3

1. Merits of lecture method are

   a. It gives a chance for meaningful learning and it enhances students' comprehension.

b. It is quite economical in time and energy because, it imparts information to any number of students in a short period of time.

2. Demerits of Lecture method are

a. It anticipates the students' rate of understanding will be the same as the teacher's rate of lecturing.

b. It is against to the principle of "learning by doing" and, it is not child centered in its approach, hence, it is un-psychological.

'Check Your Progress'- 4

1. d) All the above
2. d) Scientific concepts and principles
3. a) Inquiry

'Check Your Progress'- 5

1. a) Preparation, presentation and evaluation
2. a) True

   b) False

   c) True

   d) True

'Check Your Progress'- 6

a) True

b) False

c) False

d) True

'Check Flour Progress'- 7

1. Merits of demonstration method:

a. It is a very effective method of teaching because, it acts as a time saver, and it is easier to conduct one experiment than to supervise many experiments done by the students. An experienced teacher can perform the demonstration more smoothly, quickly than pupils, and still can make students understand effectively.

b. It is one among the child centered approaches, and hence psychological. It provides the information in concretized manner to the students.

2. Demerits of demonstration method:

a. It doesn't guarantee the students' learning, because, a demonstration seen is not necessarily a demonstration understood.

b. It does not enhance the acquisition of scientific information, because scientific information cannot be grasped adequately by sight and sound alone.

3. a) True

b) False

c) True

d) True

'Check Your Progress' - 8

1. According to Kilpatrick "A project is a whole - hearted, purposeful activity proceeding in a social environment".

2. According to Stevenson "A project is a problematic act carried to completion in its natural setting".

3. d) Association, co-operation and activity

4. i) Producer's type

ii) Consumer's type

iii) Problem type

iv) Drill type

5. "Learning by Doing."

'Check Your Progress'- 9

I. The steps in a project method are

i) Providing a situation

ii) Choosing and purposing

iii) Planning

iv) Executing

v) Evaluating

vi) Recording.

2. a) True

b) False

c) True

d) False

‘Check Your Progress’ - 10

1. Merits of Project Method:

a) It nurtures certain social values, namely, democratic values, social adjustments, as well as enhances learning.

b) It gives first hand information to the pupils.

2. Demerits of Project Method:

a) It will become an over burden on the teachers and acts as an obstacle for the syllabus coverage.

b) It is un-economical, because it consumes more time, energy, effort & resources.

22.8 Unit-End Exercises

1. What is a method? Explain the meaning and importance of lecture method.
2. Define ‘Demonstration’ Compare the demonstration method with that of lecture method.
3. What is a project? Describe the steps involved in a project with an illustration.
4. What are the merits and demerits of Project Method.

22.9 References

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UNIT - 23 ❐ ASSIGNMENTS

Structure

23.1 Introduction

Assignments or what is called Home Works is one of the integral parts in teaching learning process. Sometimes these will appear as the last part in a teaching session, but they cannot be considered as the least part. It is because of their significance! If the assignments are of monotonous type, then, they will lose their significance. Usually assignments are done without teacher's supervision. In order to make it an yet another interesting endeavor, a teacher must show her creativity by giving a novel, challenging, and interest creating assignments. Assignments could be of different varieties, like, individual assignments or group assignments, text book based assignments or non-text book assignments, daily assignments or unit assignments. Similarly, oral or written assignments. Assignments can take up the form of 'Do it yourself' activity, Small Group discussion', 'Laboratory assignments'; and the "Reading assignments", also.

One thing is evident, that, assignments demand students' participation very actively. In the hands of a wise, professional and experienced teacher, it becomes the means of providing students exciting and new opportunities for self-directed learning. It is advocated that, a teacher has to develop tailor mode assignments to meet the unique needs of the specific students. As a would be teacher, you should imbibe this quality. Having this point in mind, the present unit' has been designed. Here after going through this unit, you will come to know about some of the meaningful assignments, their nature and importance with respective merits and demerits.

23.2 Objectives

After studying this Unit you will be able to:

- Explain the significance of 'Do it yourself' type of activities.
- Give Examples for 'Do it yourself' of activities.
- List out the salient features of 'Do it yourself' type of activities.
- Mention the merits and demerits of "Do it yourself' type of activities.
- Describe the meaning and importance of Small Group Discussion.
- Give an account of salient features of a small group discussion.
- Compare the merits and demerits of a Small Group Discussion.
- Explain 'Reading Assignment'.
- List out the salient features of Reading Assignment.

- Compare the merits and demerits of Reading Assignments.
- Explain the meaning and importance of Laboratory Assignments.
- List out the salient features of Laboratory Assignments.
- Give an account of merits and demerits of Laboratory Assignments.
- Suggest a few Laboratory Assignments.

23.3 'Do It Yourself'

As the term itself is indicates, it is exclusively a student's activity, where, a student's active participation is strongly demanded. This gives a greater shelter for varieties of activities, where a student can learn on his own. The activities may be of long duration or short duration or easy one or difficult one. Some of the revised high school text books of recent days have already given a due importance for such activities. If you just open the school text books, you could see small boxes either at the top right end side of the page or at the bottom left end side of the page. These boxes contain a message or information or questions which aptly suit for 'do it yourself' activities. Some of them are laboratory experiments and some are just book reference type. So, in the following discussion you will come to know, the meaning, nature and importance of 'Do it yourself' type of activities and the salient features of such activities with merits and demerits. After going through this passage, you can also design a few 'do it yourself' type of activities.

23.3.1 Meaning and Importance of "Do It Yourself"

'Do it yourself'- the term itself is fascinating! Is not it? This is used as a phrase in teaching session. It is usually posed by the teacher to the students, so that, it will result in a arising interest, and challenges then to indulge in some of the dynamic learning activities.

'Do it yourself' could be a very good teaching strategy where, a teacher's role will be almost nil but for providing some problematic situations or some academic puzzles. A teacher can use this as a device to motivate, to involve, and also to develop interest among the students. Hence during teaching it could be used at the beginning or while the process is going on or even at the end of the teaching session. Generally the subject science gives much scope for such type of activities.

'Do it yourself' activities usually include certain simple experiments, and some relevant learning activities. Such activities compulsorily have to be devoid of dangerous

applications and dangerous activities. Because these are going to be conducted by students themselves, that too in the absence of a teacher.

No doubt, that, 'Do it yourself' activities are child centered in their nature and hence are considered as very important in the system of education. Here the child's curiosity, interest, tremendous amount of energy- all will get channelized properly. Child's head, heart and hand- all will get coordinated. More than this, the freedom what is experienced by the students, gives them immense pleasure also and the success they get in such activities will act as a very strong reinforcement and thereby makes the stimulus response bond in terms of learning very stronger.

Since a teacher can generate quite a number of 'Do it yourself' activities based on the units to be taught, he or she can help students to do an in-depth study of that particular unit. By creating this type of learning situations, students are forced to think broadly, divergently, and put a number of hypothecations into action. So, their reasoning power also gets enhanced. Apart from all these points, it is like "joy of learning" i.e. to say, students enjoy learning. It also develops confidence among them, and there will be no question of humiliation because, it is highly individual specific. Most of the time, especially in our Indian education system the success or failure of "Do it yourself' activities does not influence the pass/fail i.e. promotion of any students! Because of this the students will have a mood of "feel free", and these activities will also be in the style, what is known as "learner friendly". So, the combination of the above said two points makes it a very good and strong nurturing process for their independent learning. Now you may feel, like, how these activities have to be constructed?

As you know it already, there are no any standardized, universal 'Do it yourself activities'. They have to be framed, designed by the teachers only. Teachers can do this by referring relevant literature, accessing through internet and consulting the experts. But this has to be done deliberately. Therefore it has certain sequential steps which are ought to be followed during their construction. So, now let us critically observe what those steps are and what is to be done in each step.

A) Formation of Objectives : This is very important, because a set of objectives with clarity can lead the process further very smoothly. Usually a teacher while constructing unit plan and lesson plans for a particular unit can get an insight of such activities. Therefore, the instructional objectives of teaching of that unit will definitely help the teacher to frame objectives for 'do it yourself' activities also.

For Example:

i) The concept $S = ut + 1/2\ at^2$- has to be taught. Here an intelligent teacher can put 'Do it yourself' activity as a sandwich, i.e. in the regular teaching-learning situation. Ask a student to stand in the corridor of the top floor of a building. He is having a stop clock in his hand. Now ask him to calculate the height of the building without using any measuring tape! Of course, this question is completely theory based; because the student can start and drop the stop clock simultaneously from the location where he is standing. So, when the watch reaches the ground, the variable time taken for that will be obtained; here variable 'a' will be equal to variable 'g'. So, distance 's' problem.

ii) The concept: Microbes. A teacher after teaching could assign a work to the students as follows: collect water samples from different sources/ponds. Mount a drop of water on slide, cover it with the cover slip and observe it under the compound microscope. Draw the sketches of the organisms that you observe under the microscope.

B) Motivating the Students*:* This stage is the one in which a proper encouragement should be provided by the teacher and it should be in such a way that, in no way students should-feel it as a forced activity or compulsion by the teacher. As it is told already, such activities are done in the absence of teacher it does not mean that can keep quiet, after initiating the students. Rather he has to keep an eye informally on them to get a guarantee about their active participation and complete involvement.

C) Approval of The Results*:*. This is the third stage, where a teacher has to give the feedback to the students. For example, a student may come and report that, he has identified several paramecia in his observation. This has to be verified and approved by the teacher. A teacher can use this as a first step to assign few more 'do it yourself' type of activities to the students.

So, the above said phases keep both the teacher and taught very busy in academic activities. The outstanding point here will be definitely the "enjoyment of learning". Because it will be always a thrilling experience for the students!

23.3.2 Salient Features of 'Do It Yourself'

Now let us try to put the salient features of 'Do it yourself' type of activities one by one.

- This is an exclusively a student's activity, which does not require teachers supervision.

- The source for such activities usually will be the teacher or the recent text books.
- The source for such activities usually will be the teacher or the recent text books.
- These activities are not going to be the deciding factors for the promotion of student from one standard to the next standard.
- Most of the time such activities are generated spontaneously or informally, by an experienced, talented teacher.
- 'Do it yourself' activities are the best platform in bringing co-ordination of cognitive, affective and psychomotor domains of student's personality.
- These activities could be individualized or could be given to the group of students.
- 'Freedom' is the real essence of such activities, where students will feel free to undergo such experiences. It is also because; these activities are "learner friendly" in their nature.
- Do it yourself' activities will have a strong relevancy with the subject matter to be taught. Sometimes these increase the parameters of the syllabi, thereby keeping the learner in a continuously learning track.

23.3.3 Merits and De-Merits of 'Do It Yourself' Activity

As a would be teacher, it is essential for you to know what are the merits and demerits of such an approach. Hence let as list out the merits and demerits one by one.

Merits:

- It is highly individualistic, and child centered, hence the learner will acquire the first hand information.
- Keeps the learner always in a continuous track of learning.
- Draw the attention of the learner, and keep the cognitive, affective and psychomotor domain of the learner in an active and highly dynamic state.
- Enhance the students learning ability, reasoning competency and also develop the science process skills among the students.
- Students can undertake these activities according to their innate rate of learning. There will be no chance of a serious comparison among the students.
- They give a thrilling experience to the students, because they are 'learner friendly' in their nature and students enjoy the full freedom in carrying out such exercises.

Demerits:

- There are no standardized 'Do it yourself activities'. Hence a teacher has to generate, which is again a burden for him.
- Time consuming, and demands certain minimum facilities, without which these cannot be executed.
- Sometimes they may drag the students out of the track.
- Since these are conducted in the absence of a teacher, they may result in some dangerous situation, which will be a risk factor.
- There will be no authentic recognition for such activities.

'Check Your Progress' - 1

1. Assignments are carried out by the students in the teachers'

   a) Presence b) Absence

   c) Association c) None of the above.

2. 'Do it yourself' activities enhance

   a) Guided learning b) Rote learning

   c) Independent learning d) All the above

3. 'Do it yourself' activities are

   a) Child centered one b) Teacher centered one

   c) Subject centered one d) Activity centered one

4. Mention the three essential steps that have to be followed while constructing ' do it yourself activities'.
5. Write any two salient features of 'Do it yourself' type of activities.
6. Mention two merits of 'Do it yourself' type of activities.
7. Write any two demerits of 'Do it yourself type' of activation.
8. 'Do it yourself' type of activities must be compulsory in the curriculum - what do you say? Give one reason for your answer.

23.4 Small Group Discussion

'Discussion'- The term itself is having a magic power in it. I say this because, whenever, you see a 'discussion', you could obviously note the active participation of the individuals. Suppose, if the same type of discussion is brought to a class room, then one thing becomes very obvious, i.e. active participation by the students. Isn't it? But this job is not that easy! However, by getting ourselves trained in bringing discussion method for teaching, our wish could be fulfilled! So, first, let us try to understand the term properly and later we shall proceed towards the other details.

By definition, a discussion is "talking over subjects" such discussions have some important functions in a teaching- learning session. But unfortunately what happens is, teachers usually tell "we shall discuss now" - and this will be followed by a lecture or sometimes it may happen in this way, like, teacher tells "Let us discuss the new topic" but it often means "I will now ask you some questions and you will try to guess the answers".

In a true class - room discussion, all pupils should feel free to express their viewpoints. For this to happen, pupils must first have something in their mind that provides them with a few viewpoints. Because, they cannot discuss something about which they know nothing. And also it is true from the above said definition that a teacher should not dictate or influence the opinions of the pupils.

Discussions can be carried out in a number of ways. "For example, a teacher can treat the whole class as a single group and involve it in an active discussion. A forum made up of 3 to 5 members, could be another type, known as Forum Discussion. Here the forum will prepare and present the opinions or statements to the whole class on a given topic. The teacher will act as a moderator, and questions, clarifications will be taking place between the forum and the whole class.

'Debate' is another type, where *for* and *against* viewpoints are presented. Usually members of 2 teams alternate in making 5 to 8 minutes presentation.

Researchers have shown that, the greatest amount of learning occurs after a highly stimulating discussion as students leave the classroom. When students continue to argue on the way out of class, it gives vivid evidence that they have had a provocative session. This will motivate some students to learn more about the topic. They may continue the discussion at home with parents or friends. They may go to the library to read recent and relevant materials. But if the discussion takes the form of "a small group discussion" then its fruits will be long lasting. Hence, from next onwards, we

shall concentrate to know more about “small group discussion” - as a teaching strategy:

23.4.1 Meaning and Importances of Small Group Discussion

Generally a small group will have 3-4 students, often employed by the teacher for different purposes. The division of classes into small groups and making them to get prepared for the discussion on a topic will be an excellent teaching technique. By doing this a teacher can give justice to individual differences: It will be an excellent way also, to encourage active pupils participation in the class.

If a teacher adopts, small group discussion as a teaching strategy, it generates quite significant positive effects on students learning. So, if you understand what these significant positive effects are, then you will very clearly know about the importance of small group discussion as teaching strategy in context with 21th century also.

Why do we need small group discussions?

- One of the most important reasons of using small group discussion is that, by doing so a teacher facilitate to achieve one of the most important goals of education, i.e. development of an individual as a perfect person to live and work within the society of men. It enhances the process of socialisation.
- It provides an apt channel for the pent-up energy among the adolescents, where they learn to listen as well as to speak meaningfully without unnecessarily becoming emotionally upset.
- The heterogeneity in the class will be a big problem. To some extent this is solved by making small groups to discuss on a selected topic in which at least a few students of “like minded” nature participate together.

Because of these statements you may feel like, grouping the students in a classroom. Isn’t it? For that, a teacher should keep a few points in her mind before framing the small groups, for discussion. So now let us take a note on those points.

- A group must be formed by taking the common needs, interest, attitudes and abilities of the individuals.
- Forming the groups and assigning any tasks or involving the group in discussion should have a democratic atmosphere.
- Discussions in the absence of relevant information is meaningless. Hence it has to be planned and designed well in advance.

- A teacher must be well prepared to take up the role of a moderator and guard the process of discussion by going out of track.
- A discussion as far as possible must end with a due stress on specific conclusions.
- Avoid controversial agreements and do not allow the discussion to result in emotionalism.
- Small group discussion will be in vain, if it excludes less gifted students.
- A teacher should take care that the discussions are goal oriented and move continuously towards the desired objectives.
- Before initiating the discussion activity one must be sure that during discussion, the selected topic could be developed through an exchange of ideas.
- Discussions are commonly used for the motivation of pupil activities. They are effective when they raise problems that the pupils believe to be worth solving.

Now we shall have look at discussion activity as where will it fit in.

Usually, after dividing the whole class with different small groups a teacher can initiate the discussion by a number of tactics. As a moderator, there are certain duties to be followed by the teacher they are as follows:

- To keep the discussion moving
- To keep the discussion relevant to the topic under consideration.
- To encourage all pupils participation.
- To encourage acknowledge all contributions.
- To summarize frequently and keep the discussion clear.

‘Check Your Progress’ - 2

State whether the following statements are True or False:

1. A small group discussion must be carried out in a democratic atmosphere.
2. In a small group discussion the teacher role will be nil.
3. Even knowing nothing also, pupils can discuss.
4. Small group discussion is possible only with gifted children.

23.4.2 Salient Features

Small group discussion is characterized by the following features:

- Basically a discussion is a talking over subject matter from various points of view.
- Normally the whole class will be divided into small segregated group made up of 3 to 4 students.
- As far as possible the group will maintain homogeneity.
- The group will have the individuals with common goal, interest, attitude and aptitude.
- The small group discussion has the potentiality to come out as the best example for team work.
- It gives an ample scope for oral presentation.
- It will be impregnated with active students' participation by means of interactions between the audience group and the group that presents the discussion.
- In a small group discussion activity, the teachers' role is said to be a moderator's role.
- A well balanced small group discussion will always be the resultant of a deliberate planning in advance.
- All the participants who present the discussion must and should be having a back ground: that provides them with viewpoints.

23.4.3 Merits and Demerits

Small group discussion as it denotes an extension of classroom teaching learning activity under a democratic situation has several positive points. So, these points can be considered as merits; and they could be listed as follows:

Merits:

- It provides an ample scope for active participation by the students.
- A good discussion assures certain amount of freedom, which is definitely enjoyed by the pupils.
- It helps for rational thinking, skill in putting one's own ideas logically, critical analysis among the students.

- It develops the team spirit, and makes the students to learn co-operation and work in coordination with the groups' consent.-
- It enhances the cognitive, affective and psychomotor development among the students.
- It brings interest in reference works as well as gives a chance to taste the intellectual work. Hence it could change a student's personality into a professional learner.
- But you know, the small group discussion strategy is also associated with some of the drawbacks. Now, let us list the demerits of the small group discussion:

Demerits:

- A teacher cannot go on providing this type of learning activity for all the topics for all the time.
- It is unconventional type of strategy so, it may pose varieties of incidental problems.
- A heterogeneous class, will feel it difficult to follow, because, some of the students may get neglected or shy natured students may not participate at all.
- Usual classroom discipline could be disturbed and may become problematic to maintain the normal classroom activities.
- Irrelevant discussions may creep into this strategy.
- Only a few students may lead the discussion and others may become passive learners.

'Check Your Progress' -3

1. State any two merits of small group discussion.

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2. State any two demerits of small group discussion.

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23.5 Reading Assignments

In any educational activity, most of the time, you come across reading and writing tasks. Reading, writing and doing some mathematical calculations form the conspicuous and major task in any system of education. As the title above is revealing itself, we are going to focus exclusively on "Reading Assignment" from here onwards. You know that Reading is an individual affair, because groups cannot read! Only individuals can read. Reading after all is a way of acquiring ideas, facts and information. This 'Reading Activity' deserves to be taught in secondary schools because; large number of pupils read so poorly that they need corrective work. It is also true that, reading approach differ with different subject matter. If at all a teacher wants to assign some Reading activity to the students, means, then he or she must know the depth and breadth of a reading activity. Therefore let us try to understand the nature, meaning and importance of Reading Assignments. And at the end we shall also take a note on merits and demerits of reading assignments.

23.5.1 Meaning and Importance of Reading Assignments

Reading is a complex process and it is also a demanding act, which warrants reader's attention. Usually reading is done (i) to get information and also for (ii) Enjoyment. Always, 'reading' will be individualistic. A successful reading will be analytical, intensive and extensive in its nature.

Reading analytically means, a reader will be reading in terms of questions! Like, for example, the pupil will ask, what the author is trying say? When the reader has discovered the answers to the right questions, one can say that, he has analyzed the book. That is why it is said that, 'Reading is a straight - forward activity' (i.e. making noises from a book)! But in reality (abled reader means), the act of reading essentially is a silent and motionless one. Here the purpose will be acquiring the message which the print medium conveys.

In all the above said points, you should notice that, 'Reading' means it is not fast reading, rather it is better reading. It may take up the different styles, namely, skim - read - Re-read and Re-reading intensively. And it could be associated with extracting the important ideas from a bit of writing, out-lining and note-taking. Exports say that teaching 'Reading' is a humanizing process. Reading activity involves several skills as well as thinking; but if you consider broadly, it affects the entire personality. Because the world of people and events encountered on the printed page may shape a reader's attitude toward his fellows, toward school, toward parents and towards the life in general.

The teacher bears a great responsibility for the judicious selection of reading matter to which the learner is exposed and for providing expert guidance in the interpretation of what is read. A reading assignment keeps a learner very busy in certain functional tasks, namely classifying ideas, distinguishing between facts and fancy, facts and opinions, finding cause and effect relationships, making generalizations, interpreting idiomatic and figurative language; drawing inferences; recognizing emotional reactions, motives, judging relevancy - etc, and such so many activities.

Illustrations:

1. Students could be assigned to read two stories written by different authors, and asked to give a critique on that.
2. Students are asked to read two to three novels of the same author and make a comparative study.
3. The whole class has been divided into twelve groups and asked each to choose one of the members of the solar system for special study. The class then adjourned to the school library for the remainder of the period. The next day the groups reported on their findings. Many had done outside reading at home and in the community library.
4. Thirty five species of insects were collected on a Biology field trip. The teacher asked each pupil to select one insect and read about its eating habits and like pattern. As reports were made, the pupils entered the information in a table in their notebooks. This was followed by several other pupils volunteering to investigate the remaining species in order that the table is complete. So, thus they were motivated for 'Reading Assignment'.

Before assigning a Reading Task to the students, a teacher should know the following points, and allot the task according to the nature of the work as well as student's ability.

1. Skimming: It is searching through reading materials for a single piece for information, which could be a preliminary activity for further more careful reading.

2.Very Rapid Reading: It is clone while reading light, easy, fast-moving fiction for entertainment only.

3.Rapid Reading: Usually, the information in the newspapers and magazines are suitable for rapid reading.

4.Average Reading: Reading a relevant article assigned in the subjects like science, social studies, certain novels in language subjects.

5. A Slow and Careful Reading: A student is expected to read in such a way that, he can retain the details, weigh the truth of what he has read, it includes "thought time" as well as "Reading time".

If Reading assignments are provided with some deliberate planning, then definitely the results will be if a better quality. Therefore a teacher, while adopting this technique to his or her teaching, has to be according to the following steps:

a) Adopt a problem consciousness: It should not be a problem simply because a teacher or a text - book suggests, rather there must be a purpose for solving the problem, and this may be achieved by several readings and analysis.

b) Develop wide experience and broad background: It is because textbooks have limitations. Therefore for the more able students, provisions should be made for wide reading to build background for understanding the laws, principles etc.,

c) Activate the problem: Students need proper motivation and encouragement before actually the work starts. Hence use diagrams, concrete objects, and blackboard illustration to focus the attention on the problem.

d) Help students to ask meaningful questions: Sometimes students may not have questions at all! It may be because, they have not read carefully. Guide them, through your own questions to read and analyse the problem again.

e) Be sensitive to the student who is using an unsuccessful attack on the problem: Encourage re-reading, careful and critical thinking. Help the student correct his procedures.

f) Generalize the solution to every problem: By doing this, it may get a chance of wide application in solving new problems.

The main aim of teaching Reading and using Reading Assignment strategy is that children should understand, and enjoy what they read. For this, supplementary reading materials, paperbacks, magazines, periodicals, newspapers, monographs, government publications, library materials must be available. Pupils could be allowed to select the reference materials. For this optimum books should be readily available, in a classroom library- Even, students can browse under supervision and in some rare cases a teacher can force a particular book on pupils to go through.

Reading literature is not the same as textbook reading. Therefore some of the results of the reading assignments done by the pupils independently should be shared with the whole class. For this, small group discussions, panels, interviews could be used. Later the results of such a major, work could be prepared as a written document.

Having reading assignments seem to be of immense value, because of its implied results. Hence, it is advocated at secondary school level. Based on the above discussion, now let us try to list out its salient features.

23.5.2 Salient Features of Reading Assignments

- Reacting is an individualized activity which involves reading analytically. Hence reading assignments enhance the mental ability among the students.
- It can be catering to all types of subjects, namely, social sciences, science, mathematics and also literature studies.
- Students will be independent in selecting the relevant reading materials. But here and there, intermittently a teacher can guide this type of assignments.
- It involves extensive study materials other than text books, namely supplementary reading materials, paper-backs, magazines periodicals and research publications etc.,
- It is purely an academic activity.
- Each pupil can be assigned this type of activity.
- Teacher plays a dominant role in assigning reading activity.
- It brings a bigger horizon for the concepts, principles and generalizations that are seen in the text books.
- It keeps the teacher and the taught as every busy individual.

23.5.3 Merits and Demerits

Reading assignments have been considered as very important activities. It is because of its significant influence on the readers. This implies that, it has several merits under its credit. Hence, now let us list out the merits of reading assignments.

Merits:

- It enhances the cognitive development and intellectual ability among the students.
- It inculcates a critical taste and the ability to select suitable reading materials. Pupils can build their own personal libraries.
- It brings a sort of intimacy with the books.
- Pupil can locate certain significant lines based on his feelings, jot down those points, in his personal dairy.

- It results in the development of good study skills.
- It develops functional vocabulary that is necessary for the understanding of the subject.
- Reading assignments can become a primary source of information for student's independent learning.
- It can give proper weightage to the students with their respective individual difference.

Now it is the time for us to look at the negative face of Reading Assignment activity. Such points could be categorized as demerits.

Demerits:

- Books and other reading materials will have severe limitations in their usefulness, mainly because of their one-way communication.
- Printed words and punctuation marks are symbols that are intrinsically meaningless. Before they can serve their function pupils must be able to interpret them.
- The most serious limitations of books and other printed materials which are mainly used in reading assignments are the limitations of words in general. Words are again symbols; they have no meaning in themselves. Unless and until the teacher interferes, this activity will remain as half done.
- It helps only the cognitive development to a-greater extent and the other two remaining domains are neglected.
- Just as there are no perfect reading materials, so there are no perfect readers.
- It is again a over burden on the teacher. It warrants more risk from a teacher. Because reading can affect negatively to the personality development of the students also it could be like, inculcating negative attitudes, values or habits. At this juncture the teacher is held for responsibility!

'Check Your Progress' - 4

1. State whether the following sentences are Tare or False:

a) Reading Assignments are exclusively meant for teachers only.

b) Any reading material could be selected for reading assignments.

c) Reading is not an individualized activity.

d) Reading habit enhances the critical thinking among the students.

2. Fill in the Blanks:

a) Reading may take up the different styles, namely,……,……, ……and …… intensively.

b) A slow and careful reading includes ……time'' as well as time''.

c) Reading assignments enhances the ……ability among the students.

3. Write any two merits of reading assignments.

4. Write any two de-merits of reading assignments.

23.6 Laboratory Assignments

In this section you will come to know about one more type of very interesting assignment which is known as laboratory assignment. Laboratory assignments have a strong base of "Learning by Doing" principle. Experimentation is the essence of Laboratory work. Because of such activities, so many blind beliefs, and superstitions have been eradicated from the society, and in turn it has brought social welfare to the human society. Hence experts in the field of education have advocated that students must get trained in the skill of investigation and experimentation. A teacher can provide certain situation, in which students will explore the subject matter in a laboratory. This can be in presence of a teacher also. Sometimes a teacher can give certain safer experiments as laboratory assignments also. In the following discussion, you will come to know about what is meant by laboratory assignments? Why it is important? As well as the merits and demerits of such assignments.

23.6.1 Meaning and Importance of Laboratory Assignments

As a novel approach a teacher can find it desirable to organize the whole class into several small groups of students in order that each group may perform a different type of experiment and present its findings to the entire class.

Experiments and laboratory work are almost but not quite synonymous terms in the secondary school science programme. It is also true that some laboratory activities cannot be called experiment. But in practice most of the experiments done by pupils are part of their laboratory work and most of their laboratory work involves experiments. Usually scientific experiments, originated work involves experiments, known as "open ended experiments". Such experiments are different from illustrative experiments and investigatory experiments. An open ended experiment does not have a pre-determined out com that the pupil is expected to obtain in order to consider the experiment a success. All experiments for that matter, if they are truly experiments, are open minded!

Generally, laboratory assignments as in the case of all assignments are expected to be carried out in the absence of a teacher's supervision. Hence, while assigning such laboratory tasks a would be teacher like you should have clear idea about this. Therefore, let us consider the following points:

- Laboratory assignments could be given to the students in the form of open-ended experiments, in which the experiment is used to answer a question.
- The pupil performing the experiment does not know the outcome of the experiment before performing it.
- The design of the experiment is frequently determined by the pupil.
- The pupil makes his own observations and draws his own conclusions.
- The conclusions drawn by the pupil serve as a basis for formulating new hypotheses which are similarly tested.

When the pupil has performed the experiment and has drawn his conclusions from the data that he has collected, he can then be asked to predict experimental results for related experiments. This implies that, a pupil has to think more to interpret his observations and data. They could also see that, open-ended experiments will lead to other experiments and it trains them in viewing an experiment from every angle. Such experiments or laboratory assignments may vary with the time taken, as long term or short term laboratory assignments. Even some of the experiments can be continued by the students as a homework assignment.

All the above said descriptions might have given you a clear picture of laboratory assignment. Isn't it? It is very interesting as well as a challenging aspect for a teacher who wants to utilize this strategy in his teaching. But one cannot deny its significance also! The importance of laboratory assignments could be thought of in different ways, for example:

- It takes the routine curricular program beyond its rigid parameters and enhances the development of an individual in totality.
- It encourages divergent as well as convergent thinking.
- It keeps the teacher and the taught always busy.
- It helps the students to form several hypotheses and gives an open opportunity to test them. Thereby it enhances confidence among the students.

  Apart from the above said points you may be able to write few more, to express the importance of laboratory assignments. Isn't it? Then, why to waste the time? Come on, list few more points on your own!

23.6.2 Salient Features

Laboratory assignments have been appreciated by all because of its explicit advantages. This is also because of the specific characteristic features. So, now let us try to list out the salient features of laboratory assignments.

Laboratory assignments invariably involve the activities, observations and experiments which will be almost out of dangerous and risks.

Laboratory assignments involve the science process skills that are exhibited by the students. The laboratory assignments are very dynamic activities, which are made up of certain science processing activities, namely, observation, identification, classification, hypothecation, and experimentation etc.,

Majority of the time, laboratory assignments will be made up of open ended experimental activities.

These assignments consider the performance of the experiment as the important one than the final results or the findings.

A teacher can assign a variety of experiments to the students. After referring good books other then the prescribed text books, here are some of the experiments that could suit the above said type of assignments.

	Type	Examples
1.	Operation of devices	Electric bells, telegraph sets.
2.	Testing Chemical properties	Acid base tests; starch tests etc.,
3.	Finding physical properties	Focal lengths; hardness of materials
4.	Microscopic examinations	Feather structure; microbes identification.
5.	Anatomical studies	Stems, leaves, crystal shapes
6.	Simple experiments	Heart rates; solutions.

Before assigning any experiment to the students, a teacher must see that whether the purpose of the activities be readily understood, and more than that, whether it challenges them! It is better if the following questions are taken into consideration, before the task is assigned.

- Is the purpose easily understood?

- Can clear cut directions be given?
- Are the procedures simple and direct?
- Can results be obtained in a short time?
- Are the materials familiar to pupils?
- Are the materials inexpensive, readily procured and easily stored?
- Are applications of the findings obvious?

‘Check Your Progress’ - 5

1. Laboratory assignments help in the development of:

   a) Laboratory skills b) Science process skills

   c) Writing skill d) Reading skill.

2. The essential point that a teacher must look into, before assigning Laboratory activities is,

a) It should involve teachers’ role as a dominating factor.

b) It must be challenging as well as suit the students level of understanding.

c) It must be very easy for the students.

d) None of the above.

3. Give any two examples for Laboratory assignments.

4. Mention any two salient features of Laboratory assignments.

23.6.3 Merits and De-Merits

Laboratory assignments are very much appreciated by the students. It is because of the thrilling experience they get while they conduct experiments. So, let us now list out the merits of such activities.

Merits:

- It is a very efficient and effective means to enhance the science process skills, namely, observation, identification, classification, experimentation etc., among the students.
- It is based on “learning by doing” principle; hence learning lasts for a longer period.
- Students’ confidence, skill of planning, hypothecation-will develop to a greater extent.

- Students personality, unknowingly will be taking the role of young scientists! This is definitely a very good aspect.
- It includes all the merits of child centered approach, like, child's interest, attitude, aptitude, his background and interest all will be taken into consideration.
- It caters for individual difference and tries to give justice for students learning. Now, let us take a note about the demerits of laboratory assignments.

Demerits:

- First of all, laboratory assignments need at least a minimum level of infrastructure facilities. But you know that, in reality so many schools are devoid of a simple laboratory.
- All subjects cannot be taught through this type of activities. It best suits for science and science related subjects.
- It is expensive, consumes more time and effort.
- Allowing students to conduct laboratory assignments on their own may lead to some dangerous situations.
- It mentally taxes the teacher by exerting more risky responsibilities.
- Usually one should be fit enough to carry out such activities. This is a cumulative result of the earlier learning's. In Indian situation, we cannot expect the students with all the fulfilling requirements from their primary and upper primary education.

'Check Your Progress' - 6

1. List any two merits of laboratory assignment.

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2. List any two demerits of laboratory assignment.

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23.7 Let Us Sum Up

Assignments or what are popularly known as homework are one of the integral parts in teaching profession. Though the majority of the assignments are carried out in the absence of a teacher, they influence the students learning significantly! No doubt in it! Nowadays these assignments have taken a paradigm shift, in order to create interest and to extract commitment by the students. Hence an assignment could be 'Do it yourself' activity or 'small group discussion' or 'Reading Assignment'.

'Do it yourself' activities are exclusively students activity which is considered as the best platform in bringing the co-ordination of cognitive, affective and psychomotor domains of student's personality.

The essence of 'Do it yourself' activity is the "Freedom". Where the students feel free to undergo such experiences and such activities will be "Learner friendly" in their nature, so that they enjoy learning. Small group Discussion is yet another type of unusual teaching strategy in which students flock is dynamically involved. One should be reminded that, a well balanced small group discussion will always be the resultant of a deliberate plan, which is done well in advance.

Similarly reading assignment also moves in a slightly deviated, practice where, reading habit is very much highlighted. It can be catering to all types of subjects and all types of individual. It is because; most of the time, reading will be an individualized activity. This could include extensive study materials, namely, supplementary reading materials, paper backs, magazines, periodicals and research publications.

All the above said activities are beneficial to the students in their own way. But it does not mean that they are free from demerits. Hence, a judicial use of all of the above said activities either in a collective form or separately must be utilized, well depending upon the situations.

23.8 Answers to 'Check Your Progress'

'Check Your Progress' - 1

1. a) Absence
2. b) Independent learning
3. c) Child centered one
4. The three essential steps that have to be followed while conducting 'Do it yourself' activities are:

a) Formation of objectives

b) Motivating the students

c) Approval of the results.

5. Two salient features of 'Do it yourself' activity are:

a) 'Do it yourself' activities are said to be learner friendly activities, with an essence of 'freedom'.

b) These activities are subject based and sometimes they increase the parameters of the syllabi, conveniently.

6. The two merits of 'Do it yourself' activity are:

a. It is highly individualistic and child centered in its approach.

b. It enhances the student's learning ability, reasoning power and also inculcates the science process skills among the students.

7. The two demerits of 'Do it yourself' activity are:

a. It is un-economical and time consuming.

b. Usually these are conducted in the absence of a teacher's supervision by which is a prone to dangerous situations.

8. 'Do it yourself' activities have to be included in the high school curriculum, because, it is a very good means of all-round development.

'Check Your Progress' - 2

1. True
2. False
3. False
4. False

'Check Your Progress' - 3

1. Two merits of small group discussion are:

- It gives a dynamic forum for active participation by the students.
- It brings interest in reference works as well as gives a channel to taste the intellectual work; thereby it can change the student's personality into a professional learner.

2. Two demerits of small group discussion are:

- Such activities will have limited scope; hence these cannot suit all types of topics for all the time.
- Usual classroom discipline could be disturbed and this poses a problematic situation.

'Check Your Progress' - 4

1. a. False

   b. False

   c. False

   d. True

2. Fill in the Blanks

   a) Skim, Read, Re-read and Re-read

   b) "Thought time" and "Reading time"

   c) Mental

3. Two merits of Reading assignments are:

   a) It develops a good study skill

   b) It helps in developing functional vocabulary, which is necessary for the understanding of the subject.

4. Two de-merits of Reading assignments are:

   a) Books and printed materials have several limitations, in which a student may feel it very difficult to understand, because, after all the words, punctuation's, sentences all are symbols only.

   b) It doesn't favour the all round development of the students.

'Check Your Progress' - 6

1. Merits of Laboratory assignments:

   a) Students will behave like young scientists and it assures them to become professional learners.

   b) Students' confidence, and skill in problem solving get enhanced.

2. Demerits of Laboratory assignments:

a) It demands at least a minimum level of infrastructures and laboratory facilities.

b) It doesn't suit for types of subjects and it involves certain amount of risk factor.

23.9 Unit-End Exercises

1. Explain the meaning and importance of assignments?
2. What is meant by 'Do it yourself'? Illustrate your answer.
3. Explain the salient features of small group discussion.
4. What is meant by "Reading Assignment"? Explain it with two examples.
5. What are the merits and limitations of "Reading Assignments"?
6. Explain the nature and significance of laboratory assignments.
7. Compare the merits and demerits of laboratory assignments.
8. Suggest any two laboratory assignments.

23.10 References

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UNIT - 24 ❐ DESIGNING A TEACHING STRATEGY

Structure

24.1 Introduction

In the beginning of this Block, you have come across the term "Teaching Strategy". It is also said there, that the term "Strategy" has originated from military science. So, it is a plan deliberately prepared to fight and defeat an enemy. In the field of education, "Ignorance" is our enemy. Hence here a teacher has to plan more deliberately to fight this "invisible enemy" For this you,. as a would be teacher should know some of the theoretical aspects of constructing such teaching strategies. So, in this unit we will be discussing on, how to design a teaching strategy, what are the factors to be considered while designing it and also about instructional objectives. At the end you can go through about entry behaviour concept and also how to locate and use the available resources.

A strategy is always considered as scientific in its approach. By telling this, it is implied that, a teaching strategy will have a sound basis of objective, based on which a

learning situation could be designed. A strategy caters to all the personality dimensions, i.e. cognitive, affective and psychomotor domain of the students. Hence, a criterion referenced test is advised to test the effectiveness of a teaching strategy. So, a strategy will have three essential factors in it, namely, (i) The objective or the purpose (ii) Teaching - learning situation in general and learning environment in particular and (iii) Evaluation that could be through a criterion referenced test. For fulfilling all the above said aspects a teacher has to understand the theoretical background of designing a teaching strategy, factors that influence while constructing this strategy. Hence the following discussion is presented for the above said purpose.

24.2 Objectives

After studying this Unit, you will be able to:

- Explain the process of designing a Teaching Strategy.
- Describe the factors to be considered while designing a Teaching Strategy.
- Define instructional objectives.
- Explain the nature of instructional objectives.
- Define entry behaviour.
- Explain how to make use of the available resources.
- Suggest the means of creating an appropriate mix of approaches and methods.

24.3 Designing a Teaching Strategy

You know that, while teaching a teacher will be obviously aware of the heterogeneity of his class. Inspite of this, a teacher plans his teaching for the whole group. By doing this, he might have classified those learners into “special”, “advanced”, “college preparatory”, “terminal”, “heterogeneous” or “homogeneous” groups. Such grouping implies that, the teacher is trying to provide the information or facilitating learning based on the individual differences in a broad and general way. That is to say, teachers plan their objectives, materials, resources, techniques and teaching strategies to meet the needs and abilities of the majority of students within the total group. In the first unit of this block, you have already been introduced to certain new terms, like, technology of teaching, teaching strategies, and tactics. To conclude this block, let us again touch upon few more points on teaching strategies, and its allied terms, namely, objectives of teaching, instructional objectives, entry behaviors etc.,

24.3.1 Factors to be Consider

Teaching is a profession which involves certain skills as well as fund of knowledge. Teaching is helping pupils to learn. The professional teacher would estimate the situation and then select the most suitable strategy and tactics in accordance with his diagnosis of what the situation calls for. In this content, a strategy refers to the overall approach to teaching: In defining any strategy, it is important to remember that content i.e. the subject to be taught is very significant factor. That is to say, in deciding what strategy to use, one crucial factor is, deciding what subject matter to include. Thus content is a part of a strategy.

To select a strategy means, it has to be done in context with several variables, but one general pattern could be adopted and this general pattern could have five steps, which are as follows:

1. Diagnosis
2. Preparation
3. Guiding Learning
4. Evaluating the results of Learning
5. Follow-up

Let me tell you what all the above said steps mean in brief. Diagnosis is the step in which the teacher determines what should be done. Preparation refers to the teachers getting themselves ready to teach, motivating the pupils, and planning. Guiding learning includes the class proper the presentation, discussion, or whatever is done. In the evaluating step, the teacher attempts to assess the success of his teaching by finding out how much the pupils have learned. The follow-up is the process of filling in the spots that pupils seem to have missed teaching and if necessary and building on what the pupils have learned. The key step in all these of course is diagnosis. Without diagnosis one does not have an adequate basis on selection of any strategy. It is also obvious that, good diagnosis depends upon an analysis of as many of the variables in the particular teaching - learning situation as possible under the circumstances. So, now let us look upon those variables or the factors one by one.

- The first and the foremost factor to be considered for designing a strategy are the **objectives**. It could be overall objectives that influence the type of curriculum and overall strategy or grand strategy, sometimes more specific objectives that influence the choice of the content. And the objectives may confine to any of the domain,

namely, cognitive or affective or psychomotor domain, based on this, the relevant strategies have to be designed.

- The target group or the students are the one more factor. Because, each student will be unique and will be having his own interests, abilities, attitudes, potentials background, goals and style of learning. Consequently, the teaching strategies have to be designed. So, whenever a teacher is planning for teaching he must use his professional knowledge for both pupils in general and individual pupils in particular.
- Understanding and utilizing the knowledge of group dynamics can make one's teaching more effective.
- Nature of the subject to be taught is one more factor which influences the designing of a teaching strategy.
- Another factor is the technology that is available. By technology, I mean, both the techniques, tools and the infrastructure that are available. But of course, here the trick is to select the right combination of techniques, equipment and materials for specific occasions.
- Environment that surrounds the school is yet another factor. This includes both the community in which one lives and the society at large. Environment of the school is very important.
- Teacher himself can be considered as the last but not the least factor. It is because; every teacher has strengths and weaknesses, likes and dislikes. So, designing or selection of any teaching strategy is influenced by one's competence, ideals, general attitudes, and personality. Therefore it is advised a teacher should follow the style of teaching that he finds compatible.
- Teaching strategies and tactics should be consistent with good communication techniques.
- Although teachers must adopt the proper teaching strategies for the goals at which they are aiming, the success of it lies with the skillful use of it. For this, the teacher must consider not only his teaching goals but also the subject matter, pupils and other classroom variables.
- In order to know which strategies and tactics to choose and utilize, one must diagnose the situation.

In general, while designing teaching strategies, a teacher has to give due consideration to certain principles. Now let us go through those principles.

1. Principle of selection: Always a teacher must pool out all the available relevant man-material resources first, then he/she has to select the appropriate ones and then should give a good structured designing. So, selection, sequence and structuring constitute the principle of selection.

2. Principle of maxims of teaching: The maxims of teaching like from simple to complex, easy to difficult, known to unknown, concrete to abstract, etc., have to be given due importance while constructing a teaching strategy.

3. Principle of variety: Teaching strategies can be used, interchanged in any order without disturbing the continuum of teaching - learning process. Hence varieties of teaching strategic activities have to be used, to avoid monotony. For example: observation, collecting of materials / specimens / information or demonstrations and experimentation, educational games, dramatization, group discussion, any of this sort could be utilized by the teacher to enhance the quality of the learning process.

4. Principle of motivation: This being the basic to learning, teacher should judiciously adopt motivating factors in teaching strategies. For example: praising, rewarding, reinforcing etc.,

5. Principle of co-relation with environment: Teaching learning process occurs in a socio-emotional, bio-physical and cultural environment. Hence it has to be in co-relation with the learner's environment. Then only learning becomes more meaningful. Whatever the child learns in the classroom becomes valid only when it is applicable in his living environment.

6. Principle of Feedback: Feedback is an avenue to check the quality of teaching and learning process. A teaching strategy should have an in-built component of evaluation and feedback factor. A system of continuous evaluation plays an important role in providing regular feedback indicating strengths and weaknesses of the process. A vigilant teacher can make use of a number of strategies for the purpose of getting feedback, which ensures the effectiveness of his teaching in terms of learner's learning.

7. Principle of Child's All Round Development: Adopting strategies in teaching will give a chance for a teacher to perceive the child's / learner's personality completely. That is, not only his paper-pencil performance, but many other important factors of his personality. Hence, learner's strengths as well as the weaknesses can be diagnosed with suitable strategies. Based on this a teacher can plan remedial measures to overcome the observed defects in the learner - of course, this will be again through one or the other strategy/singly or collectively applied. All round development is not a single

process, but a duty conscious teacher with all the relevant commitment can put the sincere effort in this direction.

8. Principle of Individual Difference: You know that, in a classroom a teacher will get a group of heterogeneous individuals. It is a universal phenomenon that, no any two individuals are alike. But paying individual attention to the students is one of the fundamental duties of the teacher. This is in a way assuring the "equal educational opportunities" to the heterogeneous group in a classroom situation. Students with a special talent should be provided with opportunities to proceed at a faster pace and similarly, there should be provision for remedial instruction for those who lag behind as slow learners.

'Check Your Progress' - I

1. Mention any two principles that have to be followed while designing teaching strategies.

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2. Mention the factors which have to be kept in mind while framing teaching strategies.

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24.3.2 Instructional Objectives

Objectives are means to achieve the broader goals and aims. If objectives tend to become more and more specific, then they will take the form of instructional objectives. For our understanding, we can conceive the broad goals and aims as the horizontal dimension of on educational system, where as the objectives constitute the vertical dimension. These objectives will determine the more immediate and detailed procedures, content and techniques to be selected for any given instructional unit.

An instructional objective is a description of what a successful learner will be able to do at the end of instruction. The statement of an objective must be written is observable terms, so that it can give an opportunity to test the learning of a learner. Hence such objectives are variously referred to as: "behavioural, "operational" or "instructional objectives".

Instructional objectives may be stated for desired long or short range learning out comes. For example, for the unit to be taught, which may take up almost the whole month, the objectives will be long range instructional objectives. Similarly, the shortest range objectives would be those for each daily lesson within the unit. Instructional objectives may apparently look very limited. Isn't it? The more limited an objective, the more likely that it can be attained within the allotted time with less danger of superficiality. There is more likelihood that verbalization of the pupils will approach the desired objectives if the statement of the objective is expressed in simple language.

While forming the instructional objectives, following criteria have to be kept in mind.

1. Usefulness : The desired learning should have value in the lives of the pupils.

2. Timeliness : Learning should be concerned with material familiar at the present time, not with obsolete devices and ideas.

3. Fitness : The learning should fit into a sequence leading toward broad objectives.

4. Appropriateness : The learning experiences provided to students must be appropriate for the maturity and backgrounds of the pupils concerned.

5. Practicability: Learning experiences that are needed for the development of a learner must practically be possible.

If the instructional objectives are stated with all clarity, then it helps the teaching process to run in a smooth way. Therefore, now let us list out the uses of well defined instructional objectives:

- It specifies very precisely the goals to be achieved with all clarity.
- Objectives are the valid criteria for evaluating students' achievement.
- These are the very good means for getting feedback. That is to say they can act as a very good frame of reference to decide, like, how far the students have learnt, as well as how much good, the teacher is in teaching!

‘Check Your Progress’ - 2

1. Write any two uses of instructional objectives.

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2. What are the five criteria that help in framing instructional objectives?

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Now let us go through some of the examples for instructional objectives:

Pupil will be able to :–

- Define cell
- Explain the process of photosynthesis
- Reason out the causes for failure of sipoy mutiny.
- Write the map of India.
- Write a labeled diagram of a human heart.
- Set up the apparatus for the experiment to show the reaction between an acid and a base.

In the above examples, you may notice that, the instructional objectives have been spread over to cognitive, affective and psychomotor domains. Bloom and et al, have further classified each domain into different categories. According to them cognitive domain has the following hierarchical categories,

1. Knowledge 2. Comprehension 3. Application
4. Analysis 5. Synthesis and 6. Evaluation.

Similarly in the affective domain, the classification follows the hierarchy as given below:

1. Receiving 2. Responding 3. Valuing
4. Organization 5. Characterization.

In the psychomotor domain, no standardized classification is available. However, the NCERT has taken all the above said taxonomical aspects into consideration and has prescribed its own parameters for national system of education. Hence, in practice, while writing lesson plans, the instructional objectives will spread over between knowledge, understanding, application and skill only. It is anticipated that, 'Application' level can subsume the instructional objectives of analysis, synthesis and evaluation level.

24.3.3 Entry Behaviour

Instructional objectives, as it has been explained in the caption 24.3.2, help a teacher in teaching immensely. They give a general guideline, for the classroom transaction as well as throw light on the subject matter or content also. Based on this,- a teacher is able to carry out the content analysis. Most of the decisions a teacher takes is based on the above said procedure. All the activities that are carried out in a teaching - learning session will influence the personality of the learner. If the resultant of such activities is a desirable change in the learner's behaviour, then it is said that, **'learning'** has occurred.

Therefore before the start of actual teaching a teacher plans for it, the first and the foremost thing that has to be done while planning is, writing down the instructional objectives. This is followed by content analysis almost at the same time the teacher has to analyse the entry behaviour of the learner. Now you may ask a question, i.e. what is meant by entry behaviour? Go through the following explanation.

Entry Behaviour:

As you know it already, the teaching learning process is to be carefully planned for the purpose of attaining the pre-determined objectives. This is a complex task. Hence, in order to carry out this task smoothly, it is broken down into simple, sequential steps. It is known as analysis of the task or task analysis - as it is termed in educational technology. By definition "the process of breaking tasks down into their simpler components is called task analysis" (Gagne 1977). In planning the activities for attaining the teaching learning objectives, the task may be broken down into the subtasks, as follows:

- Identifying the entry behaviour of the learners and their performance deficiency.
- Identifying learning experiences to be given to the learners.
- Identifying the appropriate methods and strategies for providing learning experiences.

- Planning for the appropriate teaching learning situations or environment.

Now let us try to look at the first step again. It says about identifying the entry behaviour of the learners. This is a very important step. It helps a teacher to know about the potential abilities, previous knowledge of the curricular subjects, interests, aptitudes and attitudes of the learners.

So, if a teacher knows the levels of knowledge and understanding of the students, then he can plan perfectly for further teaching. Because entry behaviours influence the further learning very significantly. For example, if the students have acquired perfectly the knowledge of **addition** and **subtraction**, in the subject basic mathematics, then only they can learn the **multiplication.** If not means, whatever is done by the teacher with respect to the teaching of multiplication will be in vein. This is where; a teacher has to verify the entry behaviours of the children.

Acquisition of the knowledge of letters, words is very important for the learning of "sentence construction". Here one thing you should know that, entry behaviour encompasses the behaviour of not only the cognitive domain, but also the behaviours of affective and psychomotor domain. Entry behaviours are the essential pre-requirements, for any teaching learning situation. Nowadays, most frequently heard term is "Entrance Test". It is administered over a group of individuals, to know about their general mental ability, clerical aptitudes, mechanical aptitude or musical aptitudes etc., In order to take up the courses like Engineering or Medicine, one has to go through CET procedures! Similarly certain recruitments by the government as well as from the private sectors, is going to be based on written tests and viva voce. All this implies that, knowing about the entry behaviour of an individual helps a lot not only for further learning but also for conceiving any profession as the career.

'Check Your. Progress' - 3

1. Entry behaviours are

   (a) The behaviours of the students before teaching.

   (b) The behaviours of the students after teaching.

   (c) The behaviours of the students while teaching.

   (d) None of the above.

2. Entry behaviours are identified through:

   (a) Annual Examination

(b) Terminal Examination

(c) Entrance Test

(d) Achievement Test.

24.3.4 Available Resources

Whatever may be the strategies and tactics that are planned, one thing is evident that, teachers must choose their strategies and tactics partially on the basis of the tools and materials available to them. Usually, here, the material means books, encyclopedia, newspapers, periodicals, laboratory equipment's and other infrastructures. Apart from this, a teacher has to be sensitive enough to locate and identify some of the easily available materials that can be turned out as resources. For example, a school garden can give plenty of opportunities to generate several teaching strategies, and tactics. Based on this a teacher can design very effective learning situation.

As far as possible the daily experiences, common materials must come in priority as teaching resources. That is how, a simple, unwanted rusted iron piece, can trigger the idea of "oxidation" which is nothing but a chemical reaction between Iron and Oxygen. Likewise, "coins collection", "stamp collection" - if once done means, can be used as learning aides for many years. Charts, maps, scientific diagrams, models, two-dimensional and three dimensional learning aids, - whether prepared by the teachers and students or purchased all can be considered as a resource. Apart from this any apparatus broken or out-of-use, can be rebuilt, and in this situation, students active involvement can be generated, there by a broken apparatus can also become a resource

A good library, and well equipped laboratory - are the two essential resources for teaching. As you know, majority of the schools in our country are devoid of such a facility. There comes the question of "Available Resources" Therefore, a teacher must be resourceful enough to convert the ordinary and normal classroom itself as a laboratory and carryout the teaching process.

Radio programmes, T.V. programmes and certain educational channels which are exclusively meant for imparting educational information is yet another resource. Of course, their availability to the schools may be under question. Similarly, computers, CDs, computer aided instructions are the very effective learning aids. Efforts are being put by the government to supply the computers to several schools under different schemes and projects. Most of the time, while planning for the use of electronic gadgets, where a power supply is a must, one should think about the "power cut schedules" and "un-scheduled power cut" also. Then, a teacher has to decide, whatever is available, whichever is the best, a practically possible for use; that has to be selected.

Community resources are one more source for teaching. In this way, the botanical gardens, plant nurseries, zoo-garden, factories, post-offices, banks, transportation agencies - all these can be used as resources. Then the experts, subject specialists, experienced professionals also considered as resources, "Human Resource" rather. A teacher has to tactfully, use such persons and their expertise for the benefit of the students. So, a teacher may wish to have all the sophisticated equipment's and resources to impart effective and efficient teaching. But reality may not be compatible for his anticipations. Hence he has to decide and select the best resource among the available ones, where he could reach and use them conveniently.

24.4 Creating an Appropriate Mix of Approaches and Methods

In the previous units of this block, you came to know about different teaching strategies, approaches and methods. That is, under approaches you have been introduced to teacher centered, learner centered, activity centered and subject centered approaches. In this type of approaches the "interaction" between the teacher and the taught was the deciding factor, associated with the nature of the subject matter. Later you have been introduced to conceptual approach, investigatory approach, inductive and deductive approach. Here the conceptual approach, inductive approach may look similar partially. Under conceptual approach, up to "concept formation stage", it is exactly similar to that of "inductive approach". Under investigatory approach you go for experimentation. Experiments may be for an inquiry or for an illustration. Here also, many experiments done to draw one generalization may look like an inductive approach. And all such activities definitely lead to concept formation and concept attainment.

So, that not only the cognitive development but also the affective as well as psychomotor development is enhanced. And coming to methods, which is nothing but a general way of presenting the subject matter can have an inter-woven network of different approaches. All this is practically possible, because, no one method or approach is having water tight boundaries. They can get mixed up homogeneously in any situation, depending upon the talent of the user, and to whom it is used. Whatever may the approach, strategy or method and tactics - all will aim for learner's learning outcome only. Hence a teacher can have all the freedom to use judiciously the appropriate method, strategy and approach or it could be the combination of such approaches and methods also.

24.5 Let Us Sum Up

In this unit, we again touched upon few more points with respect to teaching strategies, approaches and methods. While designing a strategy, there are certain factors which have to be considered, namely, diagnosis, preparation, guiding learning, evaluating the results of learning and follow up. And the principles to be followed are principle of motivation, principle of co-relation with environment, principle of feedback, principle of child's all-round development and principle of individual difference.

Instructional objectives are the means to achieve the educational aims and goals. These are in the form of statements, written well in advance of the actual teaching. Essentially these will be written by using action verbs, what are known as "Behavioural Terms". It must be brief, precise, empirical observable and free from ambiguity. While framing the instructional objectives, one should take care about its "usefulness", "Timeliness",' "Fitness", "Appropriateness" and "Practicability".

Entry behaviour in. the one which will be located and identified before the actual teaching starts. By knowing this, a teacher will be aware of the student's level of knowledge and understanding. Based on this further learning situations are designed. Entry behaviours are the essential pre-requisites for teaching of any concepts. Entrance tests are administered over the students, to identify their interest, attitude and aptitude and thereby helping them to select the courses in which they fit or for career guidance also. Whatever may the ideal learning situation that is expected by a teacher but the reality makes him to use the available, best suited resources only. For this a teacher must be very sensitive to identify the common, but the best and easily available resources. And also he must be efficient enough to use them effectively. This is also true with the case of different teaching strategies, approaches and methods. All these can blend or mix up to a homogeneous get-up. Hence whatever approach, strategy and method is suitable can be picked up and could be used collectively. This is again a subjective creation by the teacher.

24.6 Answers to 'Check Your Progress'

'Check Your Progress' - 1

1. (a) Principle of Motivation

   (b) Principle of Maxims of Teaching

2. (a) Diagnosis

(b) Preparation

(c) Guiding Learning

(d) Evaluating the Results of learning

(e) Follow-up

'Check Your Progress' - 2

1. (a) They are the good frame of reference for the planning of teaching process.

   (b) Instructional objectives are the valid criteria for evaluating student's achievement.

2. (a) Usefulness

   (b) Timeliness

   (c) Fitness

   (d) Appropriateness

   (e) Practicability

'Check Your Progress' - 3

1. (a)

   (b)

24.7 Unit-End Exercises

1. Explain the factors that are to be considered while designing a teaching strategy.
2. Describe briefly the principles of teaching strategy construction.
3. What is meant by instructional objectives? Why are they significant?
4. Explain the term "Entry Behaviour".
5. Write a short note on selection of resources.

24.8 References

1. Leonard H. Clark , *Strategies and Tactics in Secondary School, Teaching - A Book of Readings* (1970).
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