CHAPTER II

THEORETICAL OVERVIEW

Concepts of Models of Teaching
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A model of teaching is a step-by-step procedure that leads to specific learning outcomes. Effective instructional models allow students to become active participants in the learning process; take students through specific sequential steps; and reflect research about thinking, learning and behaviour. If a teacher creates a single environment in the classroom or utilizes the same instructional approach over and again, only those students who learn well in that environment or with that approach will succeed. The teacher who utilizes a variety of instructional approaches is more likely to reach all students in the classroom. Moreover, students are encouraged to learn in a variety of ways. A model of teaching approach emphasizes the need for variety in the classroom by developing a teacher's repertoire of instructional approaches to meet the range of objectives.

2.1 CONCEPT OF MODELS OF TEACHING

According to Joyce and Weil (1972), a teaching model is a pattern or plan which can be used to shape curriculum or course to design instructional materials and to guide a teacher's actions. Thus, a model of teaching can be used to design face-to-face teaching in classrooms or tutorial settings to shape instructional materials, including books, films, tapes, computer-mediated programmes, curricula and long-term courses of study. Apart from the above ways, it creates the necessary environment which facilitates the teaching learning process. The core of the process
of teaching is the arrangement of environment within which the student can interact (Dewey, 1910). Thus, a model of teaching consists of guidelines for designing educational activities and environments. It is a step-by-step procedure that leads to specific learning outcomes. (Gunter, Estes, and Schwab, 1990).

Models are perspective teaching strategies, designed to accomplish particular instructional goals (Eggen et al., 1979). Thus a model of teaching is designed to achieve a particular set of objectives. It is not a substitute to any teaching skill. Rather, it creates the conducive teaching-learning environment in which teachers teach more effectively, by making the teaching act more systematic and efficient.

A teaching model is a good tool of teaching in which components are interrelated and arranged in a sequence whereas method is mode of accomplishing an end. It is concerned with teaching techniques for implementing model. Models are based on practice, empirical work, theories of learning and speculations about the meaning of theories and research done by others.

According to Sansanwal and Singh (1990) “A model of teaching is a blue print where theory based, well sequenced, replicable steps are given for the creation of certain instructional effects in learners. A model of teaching is not a haphazard combination of facts. It is, on the other hand, a systematic procedure to modify the behaviour of learners. The models of teaching deliberate the behavioural outcomes which the learner would demonstrate after completing specific instructional sequence.
2.2 DISCOVERY LEARNING MODEL

One important feature of progressive techniques has been the emphasis on child centred approaches, which see the pupil as an active and independent learner, with the teacher facilitating his or her learning. The most important child-centred approach is the use of discovery learning which emphasizes that students should have experiences which lead them to find key concepts for themselves. Bruner (1961 b) in particular has argued that learners must construct their own system of understanding and that didactic teaching will result in a limited ability to apply knowledge to new situations. According to this view, discovery learning will automatically match learning to the child’s development as the child progresses through different stages. Bruner argues that pupil will develop their knowledge when they revisit curricular areas, in a spiral fashion.

Discovery learning is learning in which students construct an understanding on their own. Discovery learning stands in contrast to the direct instructional approach, in which the teacher directly explains information to students. In discovery learning, students have to figure out things for themselves. Discovery learning meshes with the ideas of Piaget, who once commented that every time you teach a child something you keep the child from learning.

Educationist John Dewey (1933) and cognitive psychologist Jerome Bruner (1966) promoted the concept of discovery learning by encouraging teachers to give students more opportunities to learn on their own. In their view, discovery learning
encourages students to think for themselves and discover how knowledge is constructed.

Discovery learning can be defined as, the learning that takes place when students are not presented with subject matter in its final form but rather are required to organize it themselves. This is assumed to involve discovering relationships that exist among objects and events. The discovery method is used to discover new knowledge through experimentation, problem solving or project work.

The most important and most obvious characteristic of a discovery approach to teaching is that, particularly after the initial stages, it requires far less teacher involvement and direction than most other models.

The study of science as discovery necessitates the utilization of a variety of human resources. It is based on student’s active participation. He is engaged in laboratory work, searching new ideas in books, reading journals, identifying problems, developing hypothesis, planning experiments, conducting experiments and gathering data. It also needs sufficient background in the subject. It requires the student to work with an open receptive mind.

There are two types of discovery learning. Pure discovery learning and Guided discovery learning model. In ‘Pure discovery learning’, students are encouraged to learn on their own and instruction is minimal or non existent. Pure discovery approach increases motivation, as the children become deeply involved with the task, but that the learning that results can be relatively unfocussed and requires a large amount of time.
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Guided discovery learning means the learning in which students are encouraged to construct their understanding with the assistance of teacher-guided questions and directions. It increases long-term retention and transfer.

2.2.1 Discovery Learning and Teaching

According to Rousseau, “Let him not be taught science; let him discover it”. As can be seen in Rousseau’s citation the concept of discovery learning is not new. Discovery learning was a major focus of research and development during the curricular reform movement of the 1960’s. Its central role in this educational reform may be traced to the Woods Hole Conference convened by the National Academy of Science in the United States, chaired by Jerome Bruner of Harvard. The discovery approach, as conceived in Woods Hole, was succinctly summarized in the Process of Education (Bruner 1960). Twenty or thirty years later, the virtues and limitations of discovery learning are still debated in educational journals (Harris and Taylor 1983, Wellington 1981). Discovery learning has also been mentioned in association with the constructivist approach to learning (Driver 1989). In this entry, the nature of discovery learning will be described, various interpretations of the role of the teacher and the student in discovery learning will be examined, findings of selected relevant research will be reported, the relationship between the discovery, inquiry and constructivist approaches will be explored and the future of discovery learning and teaching will be considered.
2.2.2 The Meanings of Discovery Learning and Teaching

Discovery Learning refers to the unique individual experiment by which, concept evolve in the mind of the learner, rather than being transmitted ready-made. Discovery applies so long as a specific rule or generalization is not mentioned by a teacher, it is usually confined to hierarchically arranged subject matter in which the learner has considerable background. With instruction he has a fairly high probability of deriving by himself correct answers and generalizations. (Wittrock 1966). Discovery Learning is the opposite of “reception” or “being told” or “being passive” (Shulman and Tamir, 1973, p. 111).

Discovery Learning is commonly equated with inductive learning when the subjects proceed from the specific to the general. It is just as plausible, however, to assume that the learner begins with a high-order generalization from which he or she derives more specific conclusions and thus discovers answers and even generalizations. (Wittrock 1966, p. 42).

According to Bruner, what is most important for teaching concepts is that the child be helped to pass progressively from concrete thinking to the utilization of more conceptually adequate modes of thought. The foundation of any subject may be taught to any child at any stage in a form that is understandable to him / her. Any subject can be taught effectively in some intellectually honest form to any child at any stage of development. (Bruner, 1969). Basic ideas are to be taught to young children such that they understand them intuitively and have a chance to try them out on their own. Then
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they can continue to use them in progressively more complex forms, to deepen their understanding and increase effectiveness in using the concept.

According to Bruner, students learn best by discovery and that the learner is a problem solver who interacts with the environment, testing hypothesis and developing generalizations. He describes discovery as a matter of rearranging or transforming evidence in such a way that one is enabled to go beyond the evidence so assembled a new insight. "Discovery is something that the student does beyond merely sitting in his seat and paying attention. Discovery is the process of search and selection. What is sought for and selected varies with the kind of learning that is taking place." (Gagne, 1966).

Bruner does not restrict discovery to the act of finding out something that was unknown to human mind before. Rather discovery includes all forms of obtaining knowledge for oneself by the use of one’s own mind. Discovery is a necessary condition for learning the variety of techniques of problem solving, a transforming for better use, indeed for learning how to go about the very task of learning.

Learning by discovery is described as any learning situation in which the learner completes a learning task without extensive help from the teacher. Kersh and Wittrock (1962) defined Discovery Learning as learner’s goal directed behaviour when he is forced to complete a learning task without help from the teacher.

In discovery learning, the child comes to manipulate his environment more actively and achieves his gratification from coping with problems. Discovery learning occurs when individuals use their mental processes to figure out the meaning of
something for themselves. The principal content of what is to be learned is withheld from the student. The task of the student is to automatically discover what is to be learned. In order to do this, the student must add up observations and inferences, make comparisons and interpret data to create a new insight.

2.3 ORGANISATION OF DISCOVERY BASED ACTIVITIES

A science teacher should recognize students in small groups and assign roles to them to do specific tasks. This will seek involvement of students in learning. Each group can be assigned different tasks and can be asked.

- To outline a procedure to answer the questions
- To gather all necessary materials
- To conduct the investigations
- To collect and observe
- To analyse data
- To draw inferences and
- To write a report

In Discovery Learning the most significant conditions are freedom to the learner, providing a responsive environment, guidance of the science teacher and encouragement to continue learning through discovery.
2.3.1 Selecting and Planning for Discovery Based Activities

Discovery method is based on the basic assumption of involving the learner in an activity where he gets an opportunity to use his mental processes. Therefore, a teacher should select those activities which provide meaningful participation to the learner and he feels a thrill of doing this activity.

Such activities should match the age level of the learner and his background.

They should be arranged in a sequence based on the maxim “simple to complex”. Learners will be able to use processes of science which start from simple observation to the difficult one in preparing theoretical models. Such activities should be related to the syllabus of the learner, otherwise he will not take interest. If he is interested, it should be taken as his individual investigatory project.

2.4 PROCESS OF DISCOVERY LEARNING MODEL

The various processes included in this model are acquisition of new information, transformation and evaluation.

Often information runs counter to or is a replacement of what the person has previously known implicitly or explicitly. Refinement of knowledge is the acquisition of a new information. Transformation is the process of manipulating knowledge to make it fit to new tasks. Evaluation involves checking whether the way we have manipulated information is adequate to the task.

2.4.1 Steps in Discovery Learning Model

Discovery Learning involves the learning process like observation, collection and classification, identification, formulation and verification of hypothesis interpretation and discovering relationships, discrimination and categorization,
analyzing, generalizing and problem solving. Clark and Starr (1976) have reported the particular learning sequences for employing discovery learning, selecting the generalization or generalizations, setting up a problem situation, setting up experiences that will bring out the essential elements such as problem solving, questions and demonstrations etc.; setting up experience that will bring contrasting elements; draw generalizations or concepts and apply the generalization or concept.

2.4.2 Educational Implications

Bruner’s eloquent plea for the use of discovery oriented techniques in schools is advertised in several articles and books. Among the better known are ‘The Act of Discovery’ (1961 a) and ‘The Process of Education’ (1961 b). This act, while not firmly based on the evidence of research data, provides a number of specific suggestions for educational practice that have received a great deal of attention. They include the following, “the curriculum of a subject should be determined by the most fundamental understanding that can be achieved of the underlying principles that give structure to the subject (p.31).

Knowledge of underlying principles and accordingly of the structure of a subject is assumed to facilitate the formulation of generic coding systems, since these are based on organizing principles. For example, it is obviously much easier to arrive at some concept that relates aspen, birch and alder once it has been discovered that they are all deciduous hardwood. Indeed, it is the “peopleness” of individuals, the “treeness” of “trees”, the “birdness” of birds that allows to be related to in similar ways and that permits going beyond the information given, Bruner’s argument with
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respect to curriculum is that unless its organization is such that, it facilitates the formation of structure (coding systems), it will be learned with difficulty, it will not lend itself to transfer, and it will be remembered poorly.

“Any subject can be taught to any child in some honest form” (p.52).

Bruner’s adversaries have been quick to point out that not any subject can be taught at any age. For example, ‘proportion’ can probably be not understood by a four-year-old. Bruner’s reply to this is that we should look at the possibility of teaching aspects of any subject at any age level. Perhaps some aspects of proportion can be taught to a four-year old. The important question is “how can teaching be made effective for every young child? Bruner’s (1966) answer is that the form can be simplified and the mode of presentation geared to the simplest representational systems available. Since children progress from motor or sensory (enactive) representation to representation in the form of relatively concrete images (iconic), and finally to abstract representation (symbolic), it follows that the sequence in teaching should be the same. In other words, it is possible to present a subject, so that, a child can first experience it, then react to a concrete presentation of it, and finally symbolize it, that is the best instructional sequence.

A spiral curriculum that develops (that redevelops) topics at different grades is ideal for the acquisition of generic codes. Bruner argues in several places (1961 b, 1966) that spiral curricula seem to be ideally suited to the development of coding systems. Not only the repetition that may necessitate, but also the careful organization of subject matter in terms of principles and the characteristic progression from the
simplest to the most complex understanding possible, parallel to the ideal development of a coding system. To begin with, learners are exposed to the most general, most inclusive idea, and then to a series of specific, simple instances or concepts. As they discover relationship among these, they form the coding systems that are highly conducive to a transfer, recall and discovery.

A student should be given some training in recognizing the plausibility of guesses, (p.64). Bruner speaks, in this connection, of the intuitive leap of the educated guess, which is something more than a blind attempt but something less than going beyond the information given. The latter involves making predictions on the basis of what is known about similar instances. An intuitive leap is less certain than that, Bruner argues persuasively, to discourage guessing is tantamount to stifling the process of discovery.

Audiovisual aids and concrete examples should be used in teaching.

One reason advanced to support this recommendation is that audiovisual aids provide students with direct or vicarious experiences and thus facilitate the formation of concepts. This relates directly to Bruner’s suggestion that the best instructional sequence is one that progresses in the same direction as the child’s progressive representation of the world does, that is from enactive to ionic and finally to symbolic.