CHAPTER NO. II
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2.1 GENERAL

Both the models chosen for comparison belong to the Information Processing family. These models namely, The Concept Attainment Model and The Advance Organiser Model are concerned with the attainment of Concepts. The former involves an inductive mode of teaching whereas the latter reflects a more deductive mode of instruction.

The authors of the Concept attainment Model (Jerome Bruner) and the Advance Organiser Model (David Ausubel) share a common view about the nature of the Concepts and about conceptual learning.

2.2 CONCEPT ATTAINMENT MODEL.

This model belongs to the category of information processing models. This model was developed by Bruner for teaching students of all ages to learn concepts and practice analytical thinking skills. The design of this model, first suggested by Joyce and Weil (1972), is based on the research of Jerome Bruner and Associates who investigated how different variables affected concept learning.

Concept learning is a natural activity as evidenced by the enormous number of concepts small children bring with them to school. They know many concepts such as letters,
colours, shapes, parts of the body, and a number of relation concepts such as many, small, bigger, above, below etc. before they enter school. These concepts are well fixed with them. They learn these concepts through concrete examples and non-examples. For instance a teacher wanted to teach the concept of car, points to cars as positive examples and towards negative examples as not cars. When a child inappropriately labels a negative example as positive (e.g. "No, that is not a car, it has only two wheels it is a bike or a two wheeler). 

Unfortunately this technique of teaching concepts through examples and non-examples is greatly reduced when the child joins the school. The one to one teaching relationship and its personalized feedback is lost, the teaching becomes expository and examples are replaced by words. But there are certain categories of concepts that cannot be taught through expository mode, the only effective teaching way to them is through examples. The concept attainment model is designed to capture these essential features of concept learning while at the same time extending the thinking skills of the students.

The Concept attainment Model was developed from the work of Jerome Bruner, Jacquino, Goodnow, and George Austin. Their work "A study of thinking" culminated many years of research into the process by which people acquire concepts. This model helps the student to develop and form
new Concepts and also provide opportunities for students to apply previous knowledge.

2.2.1. THEORY OF CONCEPTS

Bruner views any concept as having three elements:

(i) Examples
(ii) Attributes.
(iii) Attribute-Values.

Examples are instances of the Concept. In Concept attainment, the negative and positive examples are tested and searched for their features. Every example both positive and negative can be described in terms of its attributes and in terms of its attribute-Values. What makes one concept different from another is the combination of attributes. The distinguishing attributes and their Value-ranges are called Criterial attributes. If any one criterial attribute is missing from an object, that object is an example of a different concept. Usually, the attributes in the examples we come across every day are not so clear. Noisy attributes make it more difficult to find the essential features of our concept.

If as teachers, we want to know whether students have formed or attained Concepts, we must determine whether they describe their concepts in terms of the essential attributes or whether they distinguish example from non-examples. All Conceptual Learning, according to Bruner
rests on knowing which features are non-essential. Every positive example contains all the essential features of the concept.

2.2.2 ELEMENTS OF A CONCEPT

(i) Name is the term given to a category.

(ii) Essential attributes: The common characteristics that cause us to place dissimilar items in the same category are called essential attributes.

(iii) Non-essential attributes: Some of the slight differences among items in a category reflect non-essential attributes. The common misunderstanding about attributes is for people to refer to a particular feature of a concept as an attribute when it is actually an attribute-value. The function of attributes is to help us distinguish between examples and non-examples.

(iv) Positive examples: Those instances that contain all the criterial attributes are called positive examples.

(v) Negative Examples: The absence of one or more criterial attributes makes an instance, a negative example of the concept.

(vi) Rule: The last element of a Concept is the rule. A rule is a definition or statement specifying the attributes of a concept.
2.2.3 TYPES OF CONCEPTS.

Bruner identified three types of concepts:

(i) **Conjunctive**: These concepts are defined by the joint presence of several attributes.

(ii) **Disjunctive**: These concepts require the presence of some attributes and absence of others. Disjunctive concepts are often defined by either or characteristics.

(iii) **Relational**: These concepts like Conjunctive Concepts have several attributes, but these bear some kind of relationship to one another.

2.2.4 STRUCTURE OF THE MODEL.

The model has two cyclical phases which are followed by closure and application.

**PHASE I PRESENTATION OF EXAMPLES**:

In this phase teacher explains how the activity would proceed and then he says that he has some concept in mind and then he will display for the students an example and a non example. He can give more examples and non examples if need arises.

**PHASE II ANALYSIS OF HYPOTHESIS**:

This phase begins when students formulate a hypothesis or think in terms of attributes of the concept.
or a name for the concept by comparing and contrasting examples and non-examples.

Phase I and Phase II are cyclical because one can go back to phase I and again shifts to phase II. For example, when a teacher notices that students have formulated a false or wrong hypothesis or hypotheses are unclear and vague, he goes to phase I and gives more examples and non-examples of the concept. At this point students again return to phase II, determining what hypotheses are acceptable and which ones had to be rejected based on examples. They may suggest new hypothesis. The process of presenting examples, analysing hypotheses, presenting additional examples and continuing to analyse hypotheses continued until all the hypotheses but one were eliminated.

PHASE III CLOSURE:

When the analysis process has eliminated all but one of the hypotheses, the students are then asked to define it explicitly and identify the attributes.

PHASE IV APPLICATION:

In the final phase the students apply the concept

(i) by giving examples and non-examples of the concept, and

(ii) by classifying examples

2.2.5 ELEMENTS OF CONCEPT ATTAINMENT MODEL:
2.2.5.1 FOCUS

The educational objectives of the Concept Attainment Model are:

(a) CONTENT GOALS

1. To acquire a new Concept.
2. To enrich and clarify known Concepts.

(b) THINKING SKILL GOALS

1. To develop an awareness of thinking strategies.
2. To understand the nature of Conceptual activity.
3. To develop skill of hypothesizing and analyzing.

SPECIFIC BEHAVIOURAL OBJECTIVES OF THE MODEL

The specific behavioural objectives of the Model are:

1. The pupil correctly recognizes examples.
2. The pupil generates new examples.
3. The pupil locates examples in books.
4. The pupil states the Concept rule.
5. The pupil states the attributes of concepts.

2.2.5.2 SYNTAX

There are two strategies followed in concept Attainment Model. These strategies are:

(i) Selection and (ii) Reception.

2.2.5.2.1 SYNTAX OF THE SELECTION MODEL:

Phase I Presentation of data and identification of Attributes.
Teacher presents unlabelled examples.

Teacher labels two examples one as positive and the other as negative.

Students inquire which examples are positive.

Students generate and test hypotheses.

**PHASE II: TESTING ATTAINMENT OF THE CONCEPT**

Students identify additional unlabelled examples.

Students generate examples.

Teacher confirm hypotheses.

**PHASE III: ANALYSIS OF THINKING STRATEGY**

Students describe thoughts.

Students discuss role of hypotheses and attributes.

Students discuss type and number of hypotheses.

**2.2.5.2.2. SYNTAX OF THE RECEPTION MODEL:**

**Phase I Presentation and Identification:**

Teacher presents labelled examples (both positive and negative).

Students compare the attributes.

Students generate and test hypotheses.

Students name the concept.

Students state a definition.

**PHASE II: TESTING ATTAINMENT OF THE CONCEPT**

Identifying additional unlabelled examples.

The pupils generate exemplars.
PHASE III. ANALYSIS OF THINKING STRATEGY:
- Discuss thoughts
- Discuss the role of the hypotheses.
- Discuss the type and the number of hypotheses.
- Evaluate strategies.

2.2.5.3. PRINCIPLES OF REACTION:
During the initial stage of the lesson the teacher should support the students' hypotheses—emphasizing however, that they are hypothetical in nature. Later the teacher needs to turn the students' attention towards analysis of their Concepts and their thinking strategies. The teacher should encourage analysis rather than attempting to seek the one best strategy for all pupils in all situations.

2.2.5.4. SOCIAL SYSTEM:
While using the Reception Model of Concept Attainment the teacher selects the Concepts, Organises and labels the material into positive and negative examples and sequences the examples. The pupils are required to study the attributes of positive and negative examples and frame hypotheses. The teacher supplies additional examples when needed.

When using the Selection Model the teacher presents unlabelled examples and he has no control over the sequence of examples chosen by the pupils. Further the pupils have
to frame a hypothesis, regarding the concept, and then select an example and ask the teacher whether it is a 'Yes' or a 'No'.

2.2.5.5. **THE SUPPORT SYSTEM:**

Concept attainment lessons require material that has been designed so that concepts are embedded in the material. The material must be organised so that positive and negative exemplars are pointed out to the students.

2.2.6. **PLANNING, CONCEPT ATTAINMENT ACTIVITIES:**

I. **IDENTIFYING GOALS:**

Content goals: At this stage, the teacher decides about the specific objectives of the content to be presented. The instructional objectives are formulated keeping in view the age, class, course of study and taxonomic category of the objective. The teacher decides whether this purpose is that the students are able to define the concept, understand and apply it to new situations etc. In short, deciding on exactly what you want the students to know about the concepts.

Thinking Skills Goals: The thinking skills, students employ in a concept attainment model, are more demanding than those used in inductive or other models of teaching concepts. In this model, students are required not only to observe and describe examples (as in inductive model), but also they are asked to hypothesize a label for the concept. So this model requires more demanding skill
objectives than other models being used for concept teaching. Students may follow scanning or focusing or sometimes both while analysing examples and formulating hypotheses or naming the concept.

2. SELECTING EXAMPLES:

The guiding principle in selecting examples is identifying those that best illustrate the characteristics of the concept. The examples are selected so that each contains the combination of essential attributes and none of the non-example contain the same combination.

3. SEQUENCING EXAMPLES:

Having selected examples and non-examples, the final step in planning is to place them in a sequence designed to most effectively promote practice in thinking skills. If the development of thinking skills is an important objective for the teacher, examples should be sequenced in such a way so as to maximize the use of thinking skills. So examples may be arranged in a logical or psychological or in chronological order.

2.2.7. IMPLEMENTING CONCEPT ATTAINMENT MODEL:

In order to implement concept attainment activity effectively, the development level of the students must be considered. For young or inexperienced learner or those used to teacher centred expository lessons, the concept
attainment procedure may be confusing in the initial stages. This problem is short lived, however, if the teacher takes a little extra care in introducing the activity.

This model can be implemented in two ways: strategy one is known as Reception Strategy which is simple and less complex. It can be used in initial stages and with younger and inexperienced learners. The second strategy is called Selection Strategy. This is used with experienced and older students. This strategy should be used when we want to lay more emphasis on thinking skills rather than on content goals. The difference between the two strategies is in terms of presentation of examples and way of thinking and arriving on hypotheses.

In strategy I, only the first two examples are presented with subsequent ones being presented sequentially and one at a time. In strategy II, the first two examples are presented and labelled as in strategy I. However, it differs from strategy I in one primary respect. In strategy II lesson, all the examples are displayed to the students from the beginning of the activity. After presenting all the examples and labelling two, the teacher asks the students to hypothesize concept names, which are listed on the blackboard. The student scan the remaining examples for those which might substantiate or refute the hypotheses on the board. Students then choose an example from the list and indicate whether they think it is positive or negative.
They also state what changes, if any, would made in the hypotheses if their classification was correct. The teacher then verifies the classification. If the classification was found to be correct, then appropriate changes are made in the hypotheses. If the classification is incorrect the hypotheses are re-analysed in light of the new information. The student then selects additional examples and repeat the analysis process until one hypothesis is isolated.

( Based upon this model a specimen lesson plan is appended as appendix A-1. )

2.3 ADVANCE ORGANISER MODEL:

David Ausubel is unusual among educational theorists. He stands in contrast with those who advocate discovery methods of teaching, open education and experience based learning. He stands unashamedly for the mastery of academic material. To Ausubel an Organizer is an intellectual scaffolding:— a structure on which the students could hang the ideas and facts to which they would be exposed during their lessons. There are two types of organizers:

- Expository organiser.
- Comparative organiser.

Expository organisers are especially helpful because they provide ideational scaffolding for unfamiliar material. Comparative organisers on the other hand, are used mostly with relatively familiar material.
His theory of meaningful verbal learning deals with three concerns:

- how knowledge (curriculum content) is organised.
- how the mind works to process new information (Learning).
- how these ideas about curriculum and learning can be applied by teachers when they present new material to students (instruction).

Many theorists have explained how learning occurs but do not help us teach and organise a Curriculum. The Advance Organiser Model of teaching provides recommendations to teachers for selecting, ordering, and presenting new information. This model does not expect the learner to have to do anything with the material except to internalise it.

2.3.1. THE OBJECTIVES OF THE ADVANCE ORGANISER MODEL:

- To help teachers convey large accounts of information as meaningfully and efficiently as possible.
- To help students acquire subject matter.
- To strengthen student’s cognitive structures.

By cognitive structure, Ausubel means a person’s knowledge of a particular subject matter at any given time and how well organised, clear, and stable it is. Ausubel maintains that a person’s cognitive structure is the foremost factor governing whether new material is
potentially meaningful and how well it can be acquired and retained. Before we can present new material effectively we must increase the stability and clarify of our students' prior knowledge. Strengthening students Cognitive Structure in this way facilitates their acquisition and retention of new information.

2.3.2. ELEMENTS OF ADVANCE ORGANISER MODEL

2.3.2.1. SYNTAX OF THE MODEL.

PHASE I: PRESENTATION OF AN ADVANCE ORGANISER

- Clarifying the aims of the lesson.
- Presenting the Advance Organiser.
  Identify defining attributes, Give Examples, provide multi context, Repeat terminology of subsumer.
- Prompting awareness of relevant knowledge and experience in learner's background.

PHASE II: PRESENTATION OF LEARNING MATERIAL

- Make logical order of learning material explicit to students.
- Maintain attention.
- Make organiser explicit.

PHASE III: STRENGTHENING OF COGNITIVE ORGANISATION

- Use principles of integrative reconciliation.
- Promote active reception learning.
- Elicit Critical approach to subject matter.
- Clarify.

The Syntax activities found within the phases of the Model are based on:
- The principle of integrative reconciliation.
- The principle of progressive differentiation.
- Active reception learning.

The two principles are intended to increase the discriminability, clarify and stability of the new learning material. Active reception learning is intended to bring about learner's involvement in expository teaching. Ausubel's Concept of Active reception learning includes the basic skills of Critical thinking.

There are several ways to facilitate integrative reconciliation of the new material with material in the existing cognitive structure. The teacher can:
- remind students of the whole Cognitive organisation.
- Ask for a summary of the major attributes of the new learning material.
- Repeat precise of definitions.
- ask for differences between parallel subsumers.
- ask students to describe how the learning material supports the concept.
Active reception learning can be promoted by:

- asking students to describe how the new material relates to a single aspect of their existing knowledge.

- asking students for additional examples of the concept.

- asking students to verbalize the essence of the material, translating it into their own terminology.

- asking the students to examine the material from alternative points of view.

- relating the material to contradicting material, experience or knowledge.

A critical approach to knowledge is fostered by asking students to recognize assumptions or inferences that may have been made in the learning material.

Difficulties of the students can be solved in Phase III.

It is not possible to use all these techniques in one lesson. Constraints of time, topic, and relevance to the learning situation at hand will guide their use. However, it is important to keep in mind the four goals of this model and to have in your teaching repertoire the techniques for implementing them.

Ideally, the initiation of Phase III is shared by teachers and students. At first, however, the teacher will have to respond to the student's need for clarification of
some area of the topic and for integration of the learning material with existing knowledge. Until students become socialized to the goals and procedures of meaningful verbal learning, the teacher will have to initiate questions or comments that promote active reception learning and a critical approach to the subject matter.

2.3.2.2. THE SOCIAL SYSTEM

The teacher controls the content (intellectual structure) and instructional process (Social structure). The interaction is primarily from teacher to student.

2.3.2.3. PRINCIPLES OF REACTION

- Clarify meaning of the new material.
- Differentiate and reconcile new material with existing knowledge.
- Promote personal relevance of the material.
- Promote a critical approach to knowledge.

Students will initiate their own questions in response to their own drive for meaning. If not, the teacher will elicit student's reactions through questions or will provide brief explanations.

2.3.2.4. THE SUPPORT SYSTEM

Well-organized material is the critical support requirement of this Model.

2.3.3. IMPLICATIONS FOR TEACHING USING ADVANCE ORGANIZERS

In the actual teaching situation, the primary way of strengthening cognitive structure and enhancing
Retention of new information is through the use of advance Organisers. Ausubel describes advance organisers in the following ways: An Advance Organiser is introductory material that is presented ahead of the learning task and is at a higher level of abstraction and inclusiveness than the learning task itself. Its purpose is to explain, integrate, and interrelate the material in the learning task with previously learned material and also to help the learner discriminate the new material from previously learned material.

The most effective organisers are those that use concepts, terms, and propositions that are already familiar to the learner as well as appropriate illustrations and analogies.

Advance organisers are generally based upon the major concepts, propositions, generalisations, principles and laws of a discipline.

Based upon its model a specimen lesson plan is appended as Appendix A.2.