CHAPTER - 2

Models of teaching that influence how students process information from their environment are:

1. Concept Attainment Model to teaching concepts with precision.

2. Inductive thinking model, to develop inductive mental processes.

3. Inquiry Training Model to investigate and explain unusual phenomenon.

4. Advance Organizer Model to improve the effectiveness of lectures and other presentations.

5. Memory Model to get the facts straight.

- Joyce, Weil -
CHAPTER - II

CONCEPT ATTAINMENT MODEL : ITS THEORETICAL PERSPECTIVE

2.0 INTRODUCTION
2.1 MEANING OF CONCEPT
2.2 ELEMENT OF CONCEPT
2.3 TYPES OF CONCEPT
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2.5 THINKING STRATEGY USED FOR CONCEPT ATTAINMENT
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2.9 RATIONALE OF THE STUDY
2.0 **INTRODUCTION:**

Helping children learn concepts efficiently is a fundamental purpose of schooling (Joyce and Weil, 1985). It is essential for teachers to use the right techniques for teaching concepts. Teaching the students symbols without providing the necessary experience for conceptualisation becomes merely a factual learning through association which mostly leads the students to acquire incomplete or wrong concepts. If they are taught through the process of conceptualisation, they can learn faster, retain longer and apply the learning to new situations.

So, in the coming caption, the researcher had decided to study the following terminology in detail:

2. Concept formation
3. Concept Attainment Model
4. Strategies of CAM
5. Concept Attainment Teaching
2.1 MEANING OF CONCEPT:

Concept is a word or symbol which indicates a class or group, e.g. flower, river, beauty, love etc. Concept is a category (Jerome Bruner) which is formed on the basis of those characteristics or attributes which are similar and also essential to a particular classification. The essential characteristic of concept is commonness or similarities among phenomena. Almost all educationists and psychologists who have defined concept have laid emphasis on the existing common characteristics in examples. Dececco (1970) defines concept as "a class of stimuli which have common characteristics". According to Bourne et al. (1971) concept is "any describable regularity of real or imagined objects or events." Good (1973) defines it as "an idea or representation of the common element or attribute by which groups or classes may be distinguished."

From the above definitions it can be said that concept is that form of data or content which places ideas, objects, persons or events into a category, taking into account their similarities and ignoring differences, and which is expressed through the medium of words or symbols. Thus concept is not a mere memorisation of individual facts or words. It is a generalised mental image based on the common essential attributes in different unique phenomena. For example,
'Vehicle is a concept based on the common attributes, viz., mobility and means of transportation, in different things such as bicycle, motor car, truck, aeroplane, ship, etc. All these are the members of the same category on the basis of their common attributes but each one of them is unique because of its peculiar features such as shape, size, colour, which are not essential for the concept 'vehicle'. Each concept has the following characteristics:

1. Concepts are expressed through the medium of some name or symbol, e.g., tree, book, +, -, etc.

2. Concepts always represent a class, e.g., "noun" represents the whole class of nouns as names and not a name of a particular thing or person.

3. Concepts are common nouns or abstract nouns, e.g., man, animal, love, etc. Mr. X cannot be called a concept because it is a name of a particular person.

4. There must be more than one example of a concept, e.g., "planet" is a concept and the earth, the mars, the venus, etc., are its examples.

5. Some of the common characteristics of a concept are essentially present in all the examples of that concept.

6. Some of the characteristics may be common in the examples of different concepts. e.g., in the sentences 'Swinging is my hobby' and 'I am reading', the words 'Swimming' and 'reading' have a common feature - 'verb ending in - ing' - yet the two are examples of different concepts.
7. Concepts are the base of instruction and knowledge.

8. The same concept has different names in different languages or sometimes in the same language, too.

9. New concepts are formed along with the development of knowledge.

10. Concepts are found at every level in every field or subject.

The previously formed concepts can be attained or ...

........... Understanding a concept means knowing all the elements of that concept.

2.2. **ELEMENTS OF CONCEPT**:

Joyce and Weil\(^2\) (1985) have identified five elements of concept:

1. Name
2. Attributes (essential and non-essential)
3. Attribute values
4. Examples (positive and negatives), and
5. Rule

Name is a term or label given to a particular category for the purpose of communication, e.g., food, bird, democracy, etc.

Attributes are distinctive features of concept and they vary from concept to concept. Essential attributes are the common features that cause a person to place several
things in one category. Non-essential attributes are slight different among the examples of the same category. It is the combination of essential attributes that make one concept different from another. For example, in the concept 'apple', shape, colour, taste and function (food) are the essential attributes, whereas size is a non-essential attribute.

A single attribute may have a range of acceptable values known as attribute values. The term attribute refers to the basic category such as colour, whereas the attribute value is the specific content of that category (yellow or red). In the above example of 'apple', the value range of the attribute 'taste' is from sweet-to-sour. The attributes and their value range, which distinguish one concept from another are called criterial attributes.

Positive examples or exemplars are the instances of a concept which help the learner choose the essential attributes of that concept. Negative examples are not the instances of the same concept, they are instances of another equivalent concept. They help the learner discriminate between the attributes which define the concept and those which do not. For example, boy, earth, beauty etc., are the positive examples of the concept - 'noun' whereas 'go', 'the', 'hardly' are the negative examples. Rule is a statement of definition which lists all the essential attributes of a concept.
2.3. TYPES OF A CONCEPT:

Concepts can be classified in the following ways:

I. Essential attributes are an important aspects of concept. On the basis of combination of essential attributes in different ways, Bruner identified three types of concepts: conjunctive, disjunctive and relational.

A conjunctive concept is the one in which, each positive example possesses the appropriate values of all the essential attributes. In other words, all the essential attributes are connected with 'and', e.g., in the concept 'triangle', each positive example must possess all the essential attributes viz., three sides, three angles and a closed figure.

Disjunctive concepts are identified by the presence of one or another essential attribute or both. In other words, the essential attributes of a disjunctive concept are connected with 'or', e.g., the concept 'noun'. It is a name of a person or a thing or a place.

Relational concepts are conjunctive concepts but it is a special relationship among essential attributes of two things or persons. e.g., 'father', 'mother', 'hot', 'cold', etc. are relational concepts.
TYPES OF A CONCEPT

CONJUNCTIVE CONCEPT

DISJUNCTIVE CONCEPT

RELATIONAL CONCEPT

FIGURE: 3
II. Concepts can be primary or secondary. Primary concepts are those which are not based on the understanding of other concepts. Secondary concepts are those which can be attained if another concept is understood clearly. For example, 'paper' is a primary concept and 'book' is a secondary concept.

III. Concepts can be structured or flexible due to their validity. The concepts whose meaning remains the same for all structured concepts. Flexible concepts are those whose meaning differ for different people. Concepts in science are structured, whereas concepts in social sciences are usually flexible.

IV. Concepts are of the three types from the view point of how they are apprehended: concrete, inferred and idealised. The attributes of concrete concepts can be apprehended through senses, e.g., plant, river, etc. The attributes of inferred concepts need to be inferred from observation, e.g., emotions, attitudes, etc., can be inferred by observing the behaviour of a person. Idealised concepts such as honesty, democracy, etc., have no representatives in reality. Their attributes are not fixed and finite. The inferred and idealised concepts are also called abstract concepts.

Identifying the type of a particular concept makes clear the relationship and apprehension of attributes
and the possible level of difficulty in learning that concept.

2.4. CONCEPT FORMATION AND CONCEPT ATTAINMENT:

Concept learning is a naturally occurring process in people of all ages. In a restricted meaning, concept learning refers to any activity which requires a learner to group two or more objects together (Johnson, 1971). This classification activity involves the act of generalising within classes and discriminating between classes. Through generalisation and discrimination, a learner groups various objects or events into categories on the basis of their similarities ignoring differences. Each category represents a different concept. This type of concept learning is called concept formation which is the first step towards concept attainment.

In the process of concept attainment, there is only a single concept previously determined by the teacher. The learner attains the concept from the given examples and non-examples by identifying the essential attributes of the concept and by detecting the concept from given examples and non-examples by identifying the essential attributes of the concepts and by detecting the concept rule out of the existing non-essential attributes. It requires the process of discovery which makes the learner go beyond the given information to new insights and generalisations. It enriches his thinking and develops problem solving ability. Bruner
has identified four levels of concept attainment recognition or identification, classification, definition and generalisation.

In short, concept formation is grouping the examples of a concept together, whereas concept attainment is testing positive and negative examples and searching for their features. Thus it is easy to unable and that concept formation and concept attainment are two sides of a coin as two components of a single process of categorisation.

2.5. THINKING STRATEGIES USED FOR CONCEPT ATTAINMENT:

The term 'thinking strategy' refers to the sequence of decisions people make as they encounter each example of a concept. On Bruner's thinking, B. Joyce and M. Weil, in their book: Teaching of Models, identified six strategies, four selection strategies and two reception strategies by which students attain concepts.

The selection strategies are as follows:

(i) Simultaneous scanning
(ii) Successive scanning
(iii) Conservative focussing; and
(iv) Focus gambling.

A simultaneous scanner holds more than one concept hypothesis at a time and uses each example to determine which
hypotheses to hold and which to eliminate. A successive scanner tries only one hypothesis at a time. A conservative focuser tests only one attribute of a concept keeping a positive example in focus. A focus gambler begins with a positive example as a focus and then tests more than one attribute at a time.

The reception strategies are:

(1) Wholist and (2) Partist.

In the wholist strategy, the subject takes the first positive example in to = to as a guide comparing all the attributes of that example to those of the subsequent examples and modifies the hypotheses accordingly. In the partist strategy, the choice of the hypothesis is based on only the part of the first positive example. If the initial hypothesis is not confirmed, the partist refers back to all previous examples and changes the hypothesis. Bruner and his associates found that most people, under reception conditions, are wholists in their initial approach to problem. Learning and teaching of concepts have received much importance because of their educational uses.

2.6. **CONCEPT ATTAINMENT MODEL (CAM):**

Concept Attainment Model (CAM) is an information processing model developed by Joyce and Weil (1978). on the basis of the research work by Bruner and his associates (1956).
It is a teaching strategy to help students attain concepts efficiently by making them responsible for determining the concept on the basis of the provided examples and non-examples of the concept, thus emphasizing students' active involvement and promoting a thorough understanding of the concept as well as developing thinking skills in students.

A concept Attainment activity proceeds in the following manners: The concept is decided in advance by the teacher but not announced to the students. The teacher presents a sequence of instances to the students. They must find out or be told whether each example (a) 'Yes' (positive example that is it exemplifies the concept or not) or (b) 'No' example, that is, negative example that is not. At each encounter students identify the attributes of an example, compare the attribute of positive examples and contrast them with those of negative examples. They form hypotheses about the concept or attributes, test them in the light of further examples, accept or reject them and reformulate hypotheses. This process contributes till all students become satisfied that they have attained the concept. Once the concept is attained, students analyse attributes distinguishing essential attributes from non-essential ones and state a definition or concept rule including all the essential attributes of concept. At last, the teacher confirms the definition and supplies the concept name if the students cannot. Then, students analyse and evaluate the thinking strategies through which they attained the concept in order to find out the best one.
2.7. **STRATEGIES OF C.A.M.:**

B. Joyce and M. Weil\(^5\) have identified types of strategies of Concept Attainment Model: (1) Reception Strategy, (2) Selection Strategy.

(1) **Reception Strategy** is more direct in teaching concepts.

In this strategy, it is the teacher who determines the type and order of the examples to be presented. The labelled examples are presented in a pre-arranged order. Students compare and contrast the attributes of positive and negative examples and identify the concept by framing and testing hypotheses about attributes or concept. Here, teacher or students or both maintain the record of attributes. Then the attainment of the concept is tested by asking students to identify unlabelled examples and generate new examples. Students then enumerate essential attributes of the concept, state the definition and supply concept name. At last the thinking strategies used for attaining the concept are analysed by the students.

(2) **Selection Strategy:**

In selection strategy, an array of unlabelled examples is presented before the students. Students choose from these examples and ask whether the selected example is a 'yes' or a 'no'. Then students frame hypotheses on the basis of the attributes of the positive examples and test them. Having
STRATEGIES OF CAM.

RECEPTION STRATEGY

WHOLIST PARTIST

SIMULTANEOUS SCANNING

SUCCESSIVE SCANNING

CONSERVATIVE FOCUSING

FOCUS GAMBLING

SELECTION STRATEGY

FIGURE: 5
tested the hypotheses, students name the concept, enumerate its essential attributes and define the concept. At last they analyse the thinking strategies used by them for attaining the concept.

Unorganised Materials Strategy: This strategy is mostly used for teaching concepts related to social sciences or other ideal-type concepts wherein attributes are not always explicit. In this strategy, passages or paragraphs are presented as examples. Students identify the concept by reading the unorganised material in these passages, identify the attributes used in them and evaluate the concept by discussing the adequacy and appropriateness of the attributes being used, and then, by comparing the attributes of other examples with the attributes of the concept. Then, the students state the name, the attributes and the definition of the concept.

Syntax of Reception Strategy: Syntax describes how teaching-learning process takes or describes the series of activities which teacher and students have to perform. There are three phases in the syntax of Reception Strategy of CAM as described by B. Joyce and M. Weil.

PHASE - I: Presentation of Data and Identification of Concept:

In this phase, first of all, teacher explains the procedure of the model, that is, the activities to be done
by the students in the different phases. (This is done in a few lessons till the students clearly understand all the phases of the model). Then, teacher presents labelled examples and non-examples one by one in a pre-arranged sequence. Students are informed that there is one idea that all the positive examples have in common; their task is to develop hypotheses about the concept. Students compare and justify the attributes of the examples at each encounter, formulate and reformulate hypotheses and test them. A record of attributes/hypotheses is maintained by students in a worksheet.

PHASE - II: Testing Concept Attainment:

In this phase, teacher tests the attainment of concept, that is, whether students have attained the concept or not, by asking them to identify additional unlabelled examples and by generating new examples. Then the teacher asks the students to enumerate the essential attributes of the concept, name the concept and define it on the basis of the essential attributes. If the students cannot name the concept, the teacher supplies the name.

PHASE - III: Analysis of Thinking Process:

In this last phase, students analyse their thought processes. First, the teacher asks the students to make it clear how they attained the concept, that is, which thinking strategies they used. For this, the teacher asks questions
like; whether they focussed on attributes or concepts, whether they tested one hypothesis or more at a time, and what happened if their hypothesis was not confirmed. Gradually, students begin to compare the effectiveness of different thinking strategies and decide which one was the best for attaining the concept. Teacher merely guides them in coming to conclusion. The Syntax of the Reception and Selection Model of C.A. are viewed in the following table:

**TABLE 2.1**

Syntax of the Reception Model of Concept Attainment

<table>
<thead>
<tr>
<th>PHASE ONE</th>
<th>PHASE TWO: TESTING ATTAINMENT OF THE CONCEPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESENTATION OF DATA AND IDENTIFICATION OF CONCEPT</td>
<td>Students identify additional unlabelled examples as 'yes' or 'no'. Teacher confirms hypothesis, names concept, and restates definition according to essential attributes. Students generate examples</td>
</tr>
<tr>
<td>Teacher presents labelled examples. Students compare attributes in positive, negative examples. Students generate and test hypotheses. Students state a definition according to the essential attributes.</td>
<td></td>
</tr>
</tbody>
</table>

**PHASE THREE:**

ANALYSIS OF THINKING STRATEGY

Students describe thoughts.
Students discuss role of hypothesis and attributes.
Students discuss type and number of hypothesis.
### TABLE 2.2
Syntax of Selection Model of Concept Attainment

<table>
<thead>
<tr>
<th>PHASE ONE</th>
<th>PHASE TWO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRESERVATION OF DATA AND IDENTIFICATION OF ATTRIBUTES</strong></td>
<td><strong>TESTING ATTAINMENT OF THE CONCEPT</strong></td>
</tr>
<tr>
<td>Teacher present unlabelled examples.</td>
<td>Students identify additional unlabelled examples.</td>
</tr>
<tr>
<td>Students inquire which examples, including their own, are positive ones.</td>
<td>Students generate examples</td>
</tr>
<tr>
<td>Students generate and test hypotheses.</td>
<td>Teacher confirms hypothesis: names concept and restates definition according to essential attributes.</td>
</tr>
</tbody>
</table>

**PHASE THREE:**
ANALYSIS OF THINKING STRATEGY

- Students describe thoughts.
- Students discuss role of hypothesis and attributes.
- Students discuss type and number of hypotheses.
The major difference between the Reception and Section Models of concept Attainment is in the labelling and sequencing of examples. In the Selection Model, an example is not labelled until the student asks whether it is a yes or no. Another difference is that students may ask about their own examples in order to attain the concept. The students also control the sequence of the examples by choosing the ones they want to inquire about. The tracking and analysis of attributes is thus not as formal in the Selection Model as in the Reception Model. So the investigator had selected the Reception Model out of two models of Concept Attainment.

2.8. PLANNING FOR CONCEPT ATTAINMENT:

Teaching:

Prior to teaching, teacher has to select and organise material for concept attainment. There are three steps for planning concept attainment lessons: (i) selecting and analysing the concept, (ii) determining objectives, and (iii) preparing examplers.

Selecting the concept means recognising a concept and making sure whether it is worth teaching and relevant, and whether it is suited to the age and intellectual level of students. Analysing the concept means identifying it in terms of (i) its essential and non-essential attributes; and (ii) its type.
Determining objectives means identifying specific educational goals because the use of a particular type of strategy depends on educational goals. Preparing examiners or instances is the most important task. The first requirement for preparing examples is to determine the most appropriate medium of presentation. Teacher has to select those examples which represent the concept clearly. The next step is generating and listing positive and negative examples and arranging them in a sequence that allows students to acquire complete and accurate concept. Except for a disjunctive concept, positive examples must contain all the essential attributes of a concept; negative examples, less than all attributes. Positive examples should represent all the varieties of illustrations of the concept. Teacher should generate enough examples so that some can be used for testing students' attainment of the concept.

Teacher should be very much careful in organising the presentation of data. The presentation of examples should begin with a positive one except in a disjunctive concept wherein the first example should be negative. The 'yes' and 'no' examples should be interspersed and sequenced in such an order that they systematically test the attributes.

Teacher should also devise means for recording necessary attributes and concept hypotheses, as these are identified for the first phase of the model. There should be enough provision for all students to view all examples simultaneously.
2.9. **RATIONALE OF THE STUDY:**

In the present time the importance is given to intellectual development of pupils. This development partly depends on teaching of concepts because concepts are an important tool of thinking. Concept learning serves as a basis for still higher form of cognitive work. It also makes for economy in presenting experiences. Some educational uses of concepts are as follows:

(i) Learning of concepts enables one to develop efficient categories grasping similarities and differences in an array of environmental stimuli and thus reduces the complexity of the environment and gives individuals the environmental mastery.

(ii) Concepts reduce individuals to identify the objects of and to describe and to understand the world around them.

(iii) Concepts reduce the necessity of constant learning by enabling individuals to progress through a discipline and to acquire increasing amounts of knowledge. As long as an object or event displays the defining characteristics of a class, one does not have to relearn at each encounter.
(iv) Concepts provide direction for instrumental activities. Knowing a concept in advance, one can arrive at important decisions in anticipating or planning future activities.

(v) Concepts make further instruction possible. Most of the teaching in school and college at advanced level is done through verbal instructions. These instructions would be fruitful only if the students had already learnt and understood the concepts included in the instruction. Moreover, the acquisition of concepts is a step towards learning rules or principles.

Reviewing the Concept Attainment Model, the investigation had acquired a broad and wide picture of the Model. This enabled the investigator to frame the format of teaching the concept in the class-room. He had to review the past researches done in this field and that is given in the next chapter.
References


3. Ibid., p. 37.

4. Ibid., p. 30.

5. Ibid., p. 38.

6. Ibid., p. 39.