



## A Study of the Effectiveness of Concept Attainment Model (Cam) on Learning Science at Primary Level

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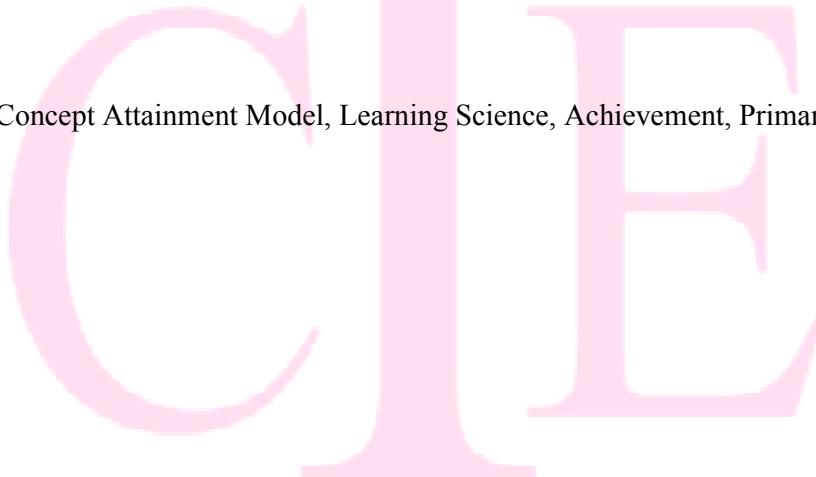
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### Abstract

*The present study is experimental in nature. The objective of this study was to study the effect of Concept Attainment Model of teaching on achievement in Science at primary level. A sample of 100 students was selected at random. 50 students were selected randomly to form an experimental group. Another 50 students were selected randomly to form the control group for the study. The experimental group was taught through the Concept Attainment Model of teaching and the control group was taught through the Conventional method of teaching. The data was collected and analyzed with the help of suitable statistical techniques. Concept attainment model was found to be effective in terms of achievement of students in Science.*

**Keywords :** Concept Attainment Model, Learning Science, Achievement, Primary level



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#### **INTRODUCTION**

The process of teaching learning aims at transmission of knowledge imparting skills and formulation of attitudes, values and behaviour. Teaching is a complex activity, which is a cluster of different roles and responsibilities. A teacher has to master multiple roles in order to become more professional. The professional competence can be expanded in two ways: first by increasing the range of teaching strategies that are needed to be employed; second by becoming increasingly skilful in the case of these strategies (Joyce and Weil, 1972). The purpose of teaching is to maximize learning (Gagne, 1963).

Bruner (1972) emphasized four major features of theory of instruction in effective teaching : 1. Predisposition towards learning 2. Structural body of knowledge 3. Sequences of material to be learnt 4. The nature and paring of reward and punishment. It means that a theory of instruction in teaching is concerned with how what one wishes to teach can best be learnt, with improving rather than describing teaching. It is true that teaching is a process by which teacher and students create a shared environment including sets of values and beliefs, which in turn colour their view of reality. Models of Teaching have an important place in teaching. Joyce and Weil (1972) developed more than 20 models for achieving specific instructional goals and classified them into 4 families of which information processing strategies provide an effective means of knowledge in the schools. One of the important strategies in this family is Concept Attainment Model, which is designed to teach concepts in an effective way. It emphasizes on the development of both process skills and knowledge of the concept, which serve as the means to the development of the intellectual skills in students. Several studies have been conducted to evaluate the different dimensions of Concept Attainment Model. Pani

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(1988) found that the Reception and Selection strategies of Concept Attainment Model were equally effective in terms of attainment of science concepts. Two investigators namely Sushama and Singh(1987) conducted a study and found that is more effective than Biological Science Inquiry Model. At the same time, Gagnrade (1987) compared the achievement of science of class VIII and class VII students taught using a combination of Concept Attainment Model and Lecture Method with those taught using Conventional Method and found that the first method is more effective. Das (1986) found that Concept Attainment Model is effective in developing the teaching competencies of pre-service student teachers. For second language instruction, Louvet (1988) developed three strategies using the Concept Attainment Model: Reception, Selection and Organized material strategies. However no attempt has been made, so far, to analyse the effectiveness of Concept Attainment Model on Achievement in Science. The investigators' experience and awareness regarding the methodology of teaching exists in the present school system convinced her that there is a felt need to change the method of Science instruction. Any meaningful attempt to evolve a new strategy of teaching will be a great help and remedy to the present monotonous system of instruction.

### **CONCEPT ATTAINMENT MODEL (CAM)**

The term Concept Attainment Model is historically linked with the work of Jerome S. Bruner and his associates. This Model is intended to teach specific concepts by comparing and contrasting examples that contain the concept with examples that do not contain the concept. It is built up from Bruner's work on the cognitive activity called categorizing. He is of the opinion that categorizing helps to reduce the complexity of environment and necessity for concept learning. Categorizing activity has two components: the act of concept formation and the act of concept attainment. Concept formation is the act by which new categories are formed while in Concept attainment, the concept is determined in advance, and the task is to determine the concept on the basis of exemplars and non-exemplars.

The purpose of Concept Attainment Model is

- 1.to understand the nature of concepts,
- 2.to be more effective in attaining concepts,
- 3.to teach specific concepts, and
- 4.to become more aware of conceptualising activity and to employ it with unorganised data

### **The six elements of a concept**

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The main elements of a concept are name, essential attributes, non-essential attributes, positive exemplars, negative exemplars and rule.

- 1. Name :** The name is the term or label given to a category. “Apple” “square”, “parliament” are all names given to a range of experiences, objects, configuration or process. As Concept Attainment Model is an inductive model, it proceeds from specific to general, the name must be written first.
- 2. Essential Attributes :** The common features or characteristics that cause to place dissimilar items in the same category are called essential attributes. It is also called criteria or critical attributes. It helps pupils to distinguish between the exemplars and non-exemplars of the concept.
- 3. Non-Essential Attributes:** Some of the slight difference among items in a category are called non-essential attributes. The task of learning a new concept is made more difficult by the presence of many non-essential attributes.
- 4. Positive Exemplars:** Bruner used the term exemplar to indicate the array of all instances of the concept. Those instances that contain all the critical attributes are called positive exemplars.
- 5. Negative Exemplars:** The absence of one or more essential attributes makes an instance a negative exemplar of the concept.
- 6. Rule:** It is a statement specifying the attributes of a concept. A rule or definition is a device for summarising the findings of the search for attributes. A correct rule statement merely reflects successful utilisation of the other elements of a concept.

### Types of concepts

Attributes combine in three different ways to produce three types of concepts.

- 1. Conjunctive Concepts :** In a Conjunctive concept , the appropriate values of several attributes are jointly present. Conjunctive concepts are often the easiest to learn and to teach because of the additive quality of their attributes and values. Simply, attributes and values are added together to produce a Conjunctive concept.
- 2. Disjunctive Concepts :** Disjunctive concepts are defined by the presence of some attributes and the absence of others.
- 3. Relational Concepts :** A Relational concept is one that has a specific relationship between attributes. When a learner can identify the positive exemplars of a concept from the negative exemplars on the basis of essential attributes, distinguish between the essential and non-essential attributes in the positive exemplars of a concept, and define the concept in terms of its attributes, we can say that the learner has attained the

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concept.

### **Variations in Concept Attainment Model**

There are three variations in concept attainment that have been built from the basic study of Bruner and his colleagues. Each has a slightly different syntax but all are developed from a common conceptual base.

**1.Reception Oriented Concept Attainment Model :** In this Model, the students are more receptive than active. The teacher has a more dominant role, acts as recorder, keeping track of the hypothesis and supplies additional examples.

**2.Selection Oriented Concept Attainment Model:** The Model places responsibility in the hands of the students. An example is not labelled until the student asks whether it is a ‘yes’ or ‘no’. Student controls the sequence of the examples. The tracking and analysis of attributes is not as formal in this model as in Reception model. This model leads to a quicker attainment of the concept.

**3.Unorganised Model of Concept Attainment :** This Model is much more a group discussion than an instructional game, like the Reception and Selection strategies. The teacher’s role is to facilitate discussion and ensure that it focuses on the development of a concept in the material. Other variations of Concept Attainment Model suggested by Eggen, Kauchak and Harvert (1979) are the following:

**4. Concept Learning :** Concepts can be learned through the process of observation.

**5.Concept Enrichment :** When the concept formed by the students is not complete, concept enrichment exercise may be used. The goal of this is to define concepts more precisely.

### **Components of Concept Attainment Model**

**1. Syntax:** The syntax of Reception Model of Concept Attainment is as follows.

#### **Phase 1: Presentation of data and identification of the concept**

- Teacher presents labelled examples
- Students compare attributes of positive and negative examples
- Students generate and test hypotheses
- Students state a definition according to the essential attributes.

#### **Phase 2: Testing the attainment of the concept**

- Students identify additional unlabelled examples as ‘yes’ or ‘no’
- Teacher confirms students hypotheses
- Teacher names the concept

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- Teacher restates definition according to essential attributes
- Students generate examples

### **Phase 3: Analysis of thinking strategies**

- Students describe thoughts
- Students discuss role of hypotheses and attributes
- Students discuss type and number of hypotheses
- Teacher evaluate the strategies

In the first phase of the Reception Model, the teacher presents the positive and negative examples in the pre-determined sequence. This data may be in the form of pictures, anecdotes, sketches, diagrams, events or any other illustrations.

The pupils are told that there is one idea common in all the positive examples and that they have to compare and justify the attributes and form some hypotheses about the concept. When the pupils have analysed the examples and hypothesised, teacher ask the students to state a definition according to the essential attributes.

In phase two, the teacher presents unlabelled examples, and the students identify them as positive or negative. The teacher asks for reasons and confirms their hypothesis. When the teacher knows that the students have attained the concept, the teacher names the concept. The teacher does not ask the students to name it because they are not familiar with the name of the concept. Only when the students have already attained the concept, the teacher uses the Model for concept clarification and may ask the students to name the concept. To test the attainment of the concept, the teacher asks the pupils to generate examples and label them as positive or negative instances of the concept.

In the third phase of the model, the teacher analyses the thinking strategies employed by the students. The students report their pattern of hypothesising, whether they focussed on attainment of concept, whether they did so one at a time or several at once, and how they changed their hypothesis when it was not confirmed.

#### **Reception Thinking Strategies :**

The two Reception strategies are Wholist and Partist. The Wholist strategy is to take the first positive instance of the concept and use it into, as a guide, comparing all the attributes of the first instance to those of subsequent instances to and modifying the hypothesis accordingly. It is similar to Focussing. In Partist strategy, the choice of a hypothesis is based on only part of initial strategy. The Wholist strategy is regarded as the ideal strategy, one that minimises strain and maximises performance.

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The effectiveness of Concept Attainment Model (Reception oriented) with variations in demonstration in terms of specific teaching competencies of pre-service teacher trainees was studied by Choudary and Katre (1986). It was found that (1) the reactions of the students did not differ due to the different treatment given to the groups, and (2) a large body of student teachers' reaction to the model and their willingness to implement the model indicate a favourable reaction towards it..

In another study Gagnrade (1987) compared the achievement on science of class VIII and class VII students when taught using a combination of Concept Attainment Model and Lecture method and when taught through conventional method by taking separately intelligence, attitude towards science and previous year achievement in science as covariates. He found that the combination of Concept Attainment Model and Lecture method was significantly superior to the Conventional Method of teaching science to class VIII and class VII students when the groups were matched in respect of intelligence, attitude towards science and previous year achievement.

A comparative study by Sushama and Singh (1987) evaluated the effectiveness of Concept Attainment Model and Biological Science Inquiry Models of teaching on pupils' achievement in biological studies. Three sections of class VIII students were taken for the experiment. Pre-test and post-test were conducted for the experiment and control groups before and after the experiment. From their study, it was found that Concept Attainment Model is more effective than Biological Science Inquiry Model.

Louvet (1988), using the Concept Attainment Model, developed three strategies for second language instruction: the Reception, the Selection and the organized materials strategies. All these strategies use analytical and evaluative thinking skills during the Concept Attainment lesson, focusing on teacher objectives, general content, and the process being used. Specific examples are provided of how the three strategies can be used in classrooms.

In another comparative study, Pani (1988) compared Concept Attainment scores of groups through Reception and Selection strategies of Concept Attainment, and studied the effect of personality factors on Concept Attainment scores of two groups. He found that the Reception and Selection strategies were equally effective in terms of attainment of science concepts.

With a view to assess the concept attainment, Zacharia (1989) assessed the effect of Concept Attainment Model on the teaching of Economics in standard VIII in schools of Kerala. It was concluded that it is possible to teach concepts in Economic in

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high school classes through Concept Attainment Model. Moreover Concept Attainment Model is more effective than the conventional method in teaching of Economics.

### **SCOPE OF THE STUDY:**

The present study has made an attempt to test the effectiveness of Concept Attainment Model on Achievement in Science of standard VII. It is expected that the findings of the study will help the curriculum planners to make needed changes in the content of Science textbook. It will also help the teachers to understand the effectiveness and necessity for the application of model approach in the teaching of Science. It will be of great help to all those who are concerned with educational strategies. It is hoped that the findings of the present study will help to open new frontiers in educational practices.

### **OBJECTIVES OF THE STUDY:**

1. To study the effectiveness of Concept Attainment Model in relation to achievement in science of VII std. students.
2. To study the interaction effect of treatment and intelligence in relation to achievement in science of VII std. students.

### **HYPOTHESES OF THE STUDY:**

1. There will be no significant difference between the mean score of achievement of students learning by the Concept Attainment Model and Conventional method.
2. There will be no interaction effect of treatment and IQ on achievement of VIIth std. students.

### **METHOD**

#### **PARTICIPANTS:**

**SAMPLE AND POPULATION:** The students studying in primary girl schools of gujarati medium of Anand taluka were considered as a population of this study.

The present study was conducted on a total sample of 100 VIIth standard students of GOJO Shardamandir Primary School, Vallabh Vidyanagar. The students of two divisions of standard VII were selected. One group was considered as the Experimental group and the other as Control group. Each group comprised 50 students.

**MEASURE:** The Achievement Test was conducted as post-test to test the post academic ability of students. The test was prepared based on the blue-print. Items were prepared keeping in mind the objectives of learning and the content of the topics – ‘Separation of substances’ and ‘Measurement’. The maximum marks for the test were 50. The test items

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prepared were shown to experts and some changes effected accordingly.

**PROCEDURE:** The  $2 \times 3$  Factorial design was used in the present study. The study was conducted on a final sample of 100 students (two divisions of 50 students each) of standard VII of GOJO shardamandir primary school, Vallabh Vidyanagar. One division was selected as the Experimental group and the other as the Control group. The Experimental group was taught using Concept Attainment Model and the Control group was taught using the Conventional Method for 15 days. After that the achievement test was conducted on both the groups.

### **METHODOLOGY IN BRIEF**

The  $2 \times 3$  Factorial design was used in the present study. The study was conducted on a final sample of 100 students (two divisions of 50 students each) of standard VII of GOJO shardamandir primary school, Vallabh Vidyanagar. One division was selected as the Experimental group and the other as the Control group.

The tools used were

- (i) Intelligence Test by K.G. Desai
- (ii) Lesson transcripts based on Concept Attainment Model and Conventional Method.
- (iii) Achievement Test in Science which was used as post-test

The Experimental group was taught using Concept Attainment Model lesson transcripts and the Control group in the conventional way. The effectiveness of Concept Attainment Model on Achievement in Science was determined by administering the Achievement Test to both groups. The data thus collected were tabulated and analyzed using statistical techniques like Mean, Standard Deviation, Critical Ratio, and Analysis of Variance (ANOVA).

### **RESULT**

#### **Data and result of test of significance of the difference between the Means of Achievement test scores of students in Experimental and Control groups**

Group	N	M	SD	SE <sub>D</sub>	Critical Ratio (C.R. value)	Significance p- value
Experimental	50	34.38	5.62	1.00	2.54	0.013
Control	50	31.84	4.30			

$$df = 91.734$$

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The table value shows that there is significant difference between the means of the Achievement scores of the students in Experimental and Control groups (C.R. = 2.54, p<0.05). This means that the two groups differ significantly in their academic ability. Since the mean score of the Experimental group is greater than that of the Control group, the Experimental group is superior to the Control group in Achievement.

### **Data and result of interaction effect of treatment and IQ on achievement of students**

Source	Sum of Squares	df	Mean scores	F - value	Significance p - value	Partial Eta squared p - value
Treatment	235.079	1	235.079	15.634	0.00	0.143
IQ	565.431	2	282.716	18.803	0.00	0.286
Treatment*IQ	481.684	2	240.842	16.018	0.00	0.254
Total	1282.194	5				

R squared = 0.461 (Adjusted R squared = 0.432)

The table value shows that there is significant effect of treatment on achievement of students (F-value = 15.634, p<0.01). There is significant effect of IQ on achievement of students (F-value = 18.803, p<0.01).The table value also shows that there is significant interaction effect of treatment and IQ on achievement of students (F-value = 16.018, p<0.01).

### **LIMITATIONS OF THE STUDY**

It is hoped that the procedure adopted for the present study is adequate enough to throw sufficient light on the problem under investigation. Despite all possible precautions taken to get valid and reliable results, certain limitations have crept into the study, which are inevitable in the case of a study of the present type, conducted on Models of Teaching. The limitations include the following:

1. The study was confined to only two classes due to lack of time.
2. Only 14 lesson transcripts on Science were prepared due to the shortage of time
3. Due to limited time and resource at hand, the investigator could not specially evaluate the nurturing effects of the model.
4. Due to lack of time, the members of the Information Processing Family of Models were not included in the study.

### **DISCUSSION**

The result shows that the concept attainment model is effective in learning science concepts. It shows the positive effect in on achievement of science which supports the conclusions of Pani (1988), Sushma and Singh (1987) and Gagnrade (1987).

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### **CONCLUSION**

The concept attainment model helps in evaluation and understanding of student and deep knowledge of concept. With the help of concept attainment model students can understand the similarities and differences between different concepts. Students can correlate their experiences in education. This model is useful for students at any level. The new concepts can be explained by this model.

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