# THE INFORMATION PROCESSING APPROACH AND CONCEPT ATTAINMENT MODEL

**Shaikh Kashefa Anjum***

*** Assistant Professor in Education**
Marathwada College of Education
Aurangabad, Maharashtra India

**QR Code**

## Introduction

Information-processing has often been compared to the actions of a computer. Information is coded and fed into a computer in an organized way and then it is stored in the memory banks. When any of that information is required the computer is asked to produce it. The machine searches for the relevant information and reproduces or prints out the items requested. Information-processing by children is basically similar but far more sophisticated. The child receives information, organizes it, stores it, retrieves it, thinks about it and combines it to answer questions, solve problems and make decisions. The most elaborate computer used in creating artificial intelligence cannot match the capacity of the human mind and the nervous system in the input and output of information.

## Information Processing Models

Information processing models are teaching strategies based on information processing theory that are designed to help students to learn content at the same time as they practice thinking skills under the guidance and direction of an active teacher. In recent years considerable emphasis has been placed on the school's role in the development of student's thinking skills. (Link,1985; Costa,1985). Educators are recognizing that this no longer sufficient to simply teach the students what they should know, but in addition, they must be taught

how to know. Information processing specifically provides one valuable framework for addressing the development of students' thinking skills and abilities (Rosenshine & Stevens, 1986).

Thinking skills have now become an issue of major concern to educators in our country and around the world (Beyer, 1984; Costa, 1985; Link, 1985) perhaps in response to the long standing emphasis on basic skills, the need for people to cope with the technological change, the increasing information orientation of our society and the world's ever expanding body of knowledge.

Observing, explaining, predicting and generalizing are the foundation on which thinking is based. However there are other important skills that derive form those fundamental ones. They are, comparing, which is the skill that ask learners to identify similarities and differences in information and hypothesizing which is an extension of the process of generalizing and allows learners to extend their thinking to another as yet unconsidered level. Critical thinking can be viewed as a derived skill that results from the ability to form valid generalizations, explanations, predictions, hypothesis and comparison or the ability to assess the validity of existing statements.

The product of thinking is called knowledge or content. Everything we teach in the school can be described in terms of fundamental forms of knowledge. These forms are facts, concepts and generalizations. Facts can be defined as the forms of content that are singular in occurrence' which occur in the past or present and which have no predictive value.

Models belonging to the information Processing family aim to develop process skills along with mastery of the content. The primary processes involved in the Information Processing Models are observation and inference. The processes are used by students to generate the different content forms, with each form characterized by the process skill involved. Outcomes of the Information processing's represented by figure following

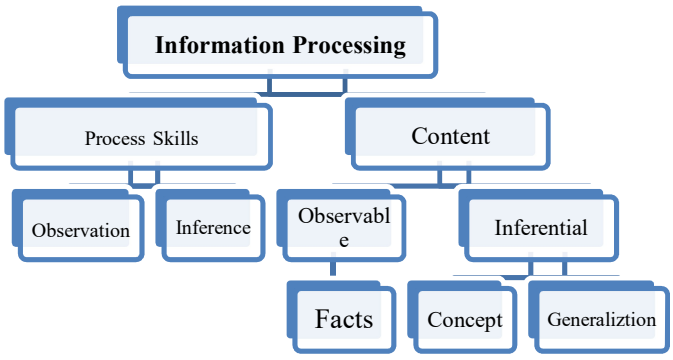


*Figure: Information Processing Model.*

**Types of Information Processing Models**

The important model of information processing family is as follows.

***1. Inductive thinking model***

It proposes to process the information through inductive process.

2. ***Scientific inquiry model of J. Schwab:***

It is designed to teach the method employed by the subject for solving scientific and social problems.

3. ***Concept Attainment model of J. Bruner :***

It proposes to develop concept inductive reasoning i.e., developing a concept after presenting its examples and non – examples.

4. ***Advance Organizer Model of David Ausubel :***

It proposes to increase the capacity of learning to absorb and relate bodies of knowledge.

5. ***Cognitive Growth Model of Jean Piaget :***

It has been designed to increase general intellectual ability especially logical reasoning.

6. ***Memory Model of Henry Lorayne:***

It is designed to increase the capacity to memorize concepts, facts

etc.

**Concept Attainment Model**

Weil and Joyce (1978) presented three types of concept attainment model based on the learning conditions and strategies. There are three variations of concept attainment model. Each has a slightly different syntax but all are developed from different conceptual base they are

i) The Reception–Oriented Concept Attainment Model

ii) The Selection–Oriented Concept Attainment Model

iii) Unorganized Materials Model.

**1. The Reception Oriented CAM:**

In this model the students are more receptive than active. The teacher has a more dominant role, acts as recorder, keeping track of the hypotheses and supplies additional examples. It is more direct in teaching students the elements of a concept and their use in concept attainment

The reception model is more direct in teaching students the elements of a concept and their use in concept attainment. The selection model permits students to apply the awareness of conceptual activity in a more active context, one that permits their own initiation and control. The analysis of concepts in unorganized data transfers concept theory and attainment activity to a real-life setting. The reception-oriented concept attainment model is described in the following section.

***Syntax of the Reception Model of Concept Attainment***

***Phase 1: Presentation of Data and Identification of Concept.***

- Teacher presents labeled examples.

- Students compare the attributes in positive and negative exemplars.
- Students generate and test hypotheses.
- Students state a definition according to the essential attributes

***Phase 2: Testing Attainment of the Concept***

- Students identify additional unlabeled examples.
- Teacher names the concept and re-states 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

In the first phase of the reception model, the teacher presents positive and negative exemplars 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 in common in all the positive exemplars and that they have to compare and justify the attributes and form some hypotheses about the concept. When the pupils have analyzed the examples and hypothesized, the teacher asks the students to state a definition according to the essential attributes.

In phase 2, the teacher presents unlabeled examples. The students identify them as positive or negative. The teacher asks for reason and confirms their hypotheses. When the students have attained the concepts the teacher names the concepts. To test the attainment of the concept further the teacher asks the pupil to generate examples and label them as positive and negative instances of the concept. In the third phase of the model, the teacher analyses the thinking strategies employed by the students.

***Thinking Strategies***

In the reception-oriented model, mainly two kinds of thinking strategies are used- wholist and partist. The wholist stategy is to take the first positive instance of the concept as a whole. In comparing all the attributes of the first positive instance to those subsequent instances and modify the hypotheses and subsequent decision depends on the attributes similarity and difference between the first positive instance and the subsequent ones. In the partist strategy the choice of hypotheses is based on only part of the initial example. If the initial hypotheses are not confirmed then the partist refers back to all prior instances and chooses another hypothesis.

**2. Selection Oriented CAM**

This model places responsibility of concept attainment and attribute tracking in the hand s of the students. An example is not labeled

until the student asks whether it is a yes or no example. The students control the sequence of the examples.

***Syntax of the Selection Model of Concept Attainment***

*Phase 1: Presentation of Data and Identification of Attributes*

- teacher presents unlabeled examples
- Students inquire which examples are positive, based on the first positive instant given by the teacher.
- Students generate and test hypotheses.

*Phase 2: Testing Attainment of the Concept*

- students identify additional unlabeled examples
- Students generate examples.
- Teacher confirms hypotheses, names, concept and restates definition according to essential attributes.

*Phase 3: Analysis of Thinking Strategy*

- students describe thoughts
- students discuss the role of hypotheses and attributes
- Students discuss type and number of hypotheses.
- Teacher evaluates the strategies.

The procedure under the selection strategy begins with the presentation of all the instances representing the various combinations of attributes of a concept. The student is then told by the teacher that some of the examples presented before him illustrate the concept in mind and the others do not. The teacher begins with a positive example. The pupil's task is to select examples from those presented to them, test them one at a time against the first positive example and label them as positive or negative example of the concept in the teachers mind. The pupils may select the examples in any order, but one at a time. The pupils thus generate hypotheses, test them and arrive at the definition of the concept. In the third phase, while analyzing the thinking strategies the selection thinking strategies.

***Thinking Strategies***

According to Bruner and his associates, there are four strategies used in selection-oriented CAM.

1. Simultaneous Scanning
2. Successive Scanning
3. Conservative Focusing
4. Focus Gambling

A Simultaneous Scanner hypothesizes more than one concept with the first instance and his choice of next instance to test will be determined by the elimination of as many hypothetical concepts as possible instance chosen.

A Successive Scanner forms concept hypothesis from the given positive instance and then tests it's against other examples. The disadvantage here is that there is no assurance of giving maximum information possible. The advantage is the relief from cognitive strain as

limited inference is required. A student with the Conservative focusing strategy finds a positive instance and chooses instances that alter one attribute at a time. By choosing a particular instance as focus the person decreases the complexity and abstractness of the task of keeping of information he has encountered. Hence there is relatively more cognitive economy. In the Focus Gambling strategy one uses a positive instance as a focus and changes more than one attribute at a time. The strategy makes use of fewer test choices. But there may be equal chances of requiring more test choices and therefore the name Focus Gambling.

**3. Unorganized Material Model**

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. Syntax of this model of CAM is quite different from that of the other two strategies. It consists of two phases. Phase 1 relates to the description of the concept and phase 2 relates to the evaluation of the concept.

**Social System**

The model has a moderate structure. The teacher assumes a major role initially in choosing the concept, selecting and organizing or sequencing data. The teacher controls action but with subsequent phases, student interaction is encouraged. In the reception-oriented model, the structure moves from high to moderate. In the selection-oriented model, it is relatively structured with students assuming more initiative for inductive process.

**Principles of Reaction**

The teacher has to help the students for the process of hypothesising in the beginning and then for analysts of the concept and thinking strategies. The teacher should encourage analysis of merits of various strategies rather than attempting to seek the one best strategy for all pupils in all situations.

**Support System**

Well organized reference material is the essential support required for this model. Carefully selected and organised materials and data in the form of discrete units easily serve as examples.

**References**

1. Anna Mani, Anila.(2007). Application of information processing models in teaching mathematics at secondary level. *Shodhganga: A reservoir of Indian Theses.* Retrieved from, http://shodhganga.inflibnet.ac.in/handle/10603/12772

2. Cason, Caralyn Leonie Hulda Huebner. (1972). A theory of hypothesis generation in concept learning. an information processing approach. *Research gate.* Retrieved from,

https://www.researchgate.net/publication/36239386.

3. Chitriv, V.G. (1983-84).Evaluating differential effectiveness of Ausubel' and Bruner strategies for acquisition of concepts in mathematics. In Mani, Anila Anna.(2007). Application of information processing models in teaching mathematics at secondary level. *Shodhganga: A reservoir of Indian Theses.*Retrieved from, http://shodhganga.inflibnet.ac.in/handle/10603/22542/

4. Devi, K Rema.(1998). Application of information processing models in teaching chemistry at the secondary and the higher secondary level.Shodhganga : A reservoir of Indian theses. Retrieved from http://shodhganga.inflibnet.ac.in/handle/10603/418

5. Lee, Chingh Chan (1983). A study of the effect of student. conceptual level and presentation forms on concept attainment. In Devi, K Rema.(1998). Application of information processing models in teaching chemistry at the secondary and the higher secondary level. Shodhganga : A reservoir of Indian theses. Retrieved from http://shodhganga.inflibnet.ac.in/handle/10603/418

6. Lemke Elmer Allen (1965).The Relationship of Selected abilities to Some Laboratory Concept attainment and Information Processing tasks. In Minikutty, A. (2005).Effect of concept attainment model of instruction on achievement in mathematics of academically disadvantaged students of secondary schools in the Kerala state. *The Shodhganga: A reservoir of Indian Theses.* Retrieved from http://shodhganga.inflibnet.ac.in/handle/10603/6637

7. Link, F. (Ed.). (1985). Essays on the intellect. In Anna Mani, Anila.(2007). Application of information processing models in teaching mathematics at secondary level. *The Shodhganga: A reservoir of Indian Theses.* Retrieved from,http://shodhganga.inflibnet.ac.in/handle/10603/12772 /

8. Nuzum, Margaret (1983). "The Effects of An Instructional Model Based On The Information Processing Paradigm On The Arithmetic Problem Solving Performance of Four Learning Disabled Students. In Minikutty,A.(2005).Effect of concept attainment model of instruction on achievement in mathematics of

academically disadvantaged students of secondary schools in the Kerala state. *The Shodhganga: A reservoir of Indian Theses.* Retrieved from http://shodhganga.inflibnet.ac.in/handle/10603/6637/

9. Ramadevi, K. (1998). Application of information processing models in teaching chemistry at the secondary and higher secondary level. In Sunikumari,P.M. (2012). Preparation and validation of an instructional design in physics for standard IX by integrating Bruner's concept attainment model and Gordan's synectic model. *The Shodhganga: A reservoir of Indian Theses.* Retrieved from, http://shodhganga.inflibnet.ac.in/handle/10603/12772
10. Shineman, Barbara Palmor.(1980).Student-Teacher" Information Processing Behaviour with Cooperating Teachers Having Similar or Different Conceptual Levels. In Devi, K Rema.(1998). Application of information processing models in teaching chemistry at the secondary and the higher secondary level. *Shodhganga: A reservoir of Indian theses.* Retrieved from http://shodhganga.inflibnet.ac.in/handle/10603/418