14 Concept Attainment Model

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A number of critical themes are emerging these days about the types of teaching practice that impact positively on student achievement, confidence and engagement in Mathematics. They focus teaching on the learner and encourage teachers to introduce content in ways that facilitate enhanced cognition.

Concept Attainment is an instructional strategy that uses a structured inquiry process. It is based on the work of Jerome Bruner. In concept attainment, students figure out the attributes of a group or category that has already been formed by the teacher. To do so, students compare and contrast examples that contain the attributes of the concept with examples that do not contain those attributes. Students then separate the examples into two groups. Concept attainment, then, is the "search for and identification of attributes that can be used to distinguish examples of a given group or category from non-examples".

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Before we move on, it will be worthwhile to understand – what is a concept? "A concept is a class of stimuli, which have common characteristics". The learning of concepts involves successfully identifying these common characteristics that defines them as a category. On the contrary, in our schools, most of the times concepts are explained, at the most with suitable examples and students are made to remember the concept by rote. Students never get the idea of what attributes formed a particular concept and such clarity remains alien to them. Students never get an opportunity to form their own concepts based on certain attributes of their own.

The Concept Attainment Model (CAM) tries to address this issue and provides ample opportunity for a child to explore the attributes of a concept. It engages students and encourages them to form the concept by using illustrations, word cards or specimens called examples. Also this model ensures that teacher starts from the student's previous knowledge. In this approach students go beyond merely associating a key term with a definition. Hence the concept is learned more thoroughly and retention is improved. This approach can be used effectively for teaching Mathematics, as the study of Mathematics involves the study of many concepts.

Following steps help us use this model effectively in the class room:

1. Select a concept and analyze the attributes
2. Develop examples and non examples for each of the attributes
3. Introduce the process to the students
4. Present the examples sequentially
5. Allow children to create hypothesis and verify their hypothesis by themselves
6. Develop a concept definition
7. Ask for additional examples
8. Discuss the process with the class
9. Evaluate

Here's an example of how this will actually transpire in a classroom:

1. Teacher chooses a concept to be developed, for e.g. Prime numbers.
2. Teacher identifies and defines the attributes – A number divisible only by itself and 1.
3. Teacher develops examples and non examples for the concept; writes them on flash cards. Examples are 2, 3, 7, 11 etc.

   Non examples are 4, 6, 12, 25, 9, 15 etc.
4. Teacher designates an area for writing examples and non examples or use a chart paper with two columns and have two columns YES and NO.
5. The teacher instructs the students, "I have a concept in my mind. I will present examples of the concepts and also non-examples of the concepts one by one. The examples are written under YES column and the non-examples are written under NO column. Look at the examples under the YES column and discuss in your groups what do they have in common. You will have to find out the concept in my mind". Such an engagement soon turns into an investigative game for the students.
6. Teacher presents the first card by saying "this is YES". Place it under 'YES' column. Eg 2.
7. The teacher then presents the next card and says "This is NO". Place under 'NO' column, eg 9.
8. Similarly present two more examples and non examples, each time one example and one non example are presented by the teacher
9. The students compare and contrast those that are in the same group and those that are in the different groups, attempting to determine the rationale that was used for the classification. As the students are comparing and contrasting, they will develop different hypotheses by discussing in their small groups.
10. Teacher asks the students to share their guess. (You may get responses like – even numbers, multiples of two etc). Teacher just accepts their response, does not comment on them at this stage.
11. Now teacher presents next example and non example, 3 and 7 respectively. This will provide students opportunities to test their hypotheses by further examination of the examples.
12. A few more examples are presented and the students are asked to guess. Teacher does not provide any clues, she only presents as many examples until they are able to identify the attribute of the concept.
13. Once students identify all the attributes of the concept they will be in a position to define the concept. Teacher asks them to share it aloud with the whole class. (Students may respond - the number in your mind is not divisible by other numbers.)
14. The teacher can help them arrive at right definition with the help of further questioning and names the concept.
15. Teacher asks students to generate additional sets of examples for the concept.
16. Once this is done, the teacher questions the students on the thinking process they followed. What was the hypothesis they generated? What was the rationale behind it? What were the hypotheses they eliminated and why?
17. Now evaluate the concept attainment by children. The teacher may ask them to classify a given set of numbers into Prime numbers and non prime numbers.

Here are some hints to following CAM:

1. Examples and non examples presented in the initial stage should be such that they lead to many different hypotheses. This will make students check their own hypothesis against the examples presented in the later stage and eliminate their own hypothesis.
2. Sequencing of these examples keeping the above in mind is crucial.
3. Examples can be presented using power point or OHP or flash cards or on the black board.
4. Students can work individually or in groups while working on the examples given by the teacher. CAM can be an individual activity or can also be done in small groups.
5. It is important that the students identify the concept attributes and not the name of the concept.
6. Don't discourage or respond saying 'yes/no' to the guesses children make in the initial stage. Let them

develop their own hypothesis and eliminate the wrong ones based on the examples presented at the later stage.

7. If a concept is defined by sub concepts (for example, polygon is defined in terms of - plane figure, closed figure, many sided etc), using this model may prove to be very tedious. It is good to couple it with a guided discovery.
8. While students are at work, the teacher should meander through the classroom. During this time, the teacher could make anecdotal records or fill in checklists of student actions.
9. Give the students enough time to develop their definitions for each category/formulate the hypothesis.
10. The teacher can even label your examples as YES or NO.

Conclusion

The Concept Attainment Model has many advantages over traditional methods of teaching. It develops information processing skills in children. Students become better analytical thinkers, their critical thinking sharpens as they have to describe their thinking, and students also become more articulate in their descriptions (of their thinking). If used judiciously this model can help children learn Mathematics with joy, with more clarity.

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