

## Teaching methods

### Unit 4a

#### Child centred methods

##### Inductive-Deductive Method

This method of teaching mathematics can be discussed in terms of the two methods that are simultaneously used i.e. Inductive Method and Deductive Method.

**Inductive method:** It is based on the process of induction; it leads from concrete to abstract, particular to general and from examples to the rule. Here we take a few examples and arrive at the rule i.e. it is a method of constructing a formula from a number of concrete examples. Induction means; —to provide the universal truth by showing that if it is true for a particular case, it is true for all such cases. In this method we arrive at a formula or generalization through reasoning and solving problems. E.g. To arrive at the generalization that; —The sum of all the angles of triangle is  $180^\circ$ . The teacher draws different types of triangles and asks the students to measure all the angles of the triangles and state the sum of the three angles in each case. Every time the students realize that the three angles measure up to  $180^\circ$ . The triangles may be as shown below; They observe the results and can make the generalization that —The sum of all the angles of triangle is  $180^\circ$  degree.

##### Merits:

- It is a psychological method and the interest of the student is sustained throughout.
- Helps in development of understanding of the students concerning the formula.
- It is a natural method of making discoveries.
- It is a logical method and thus suits the purpose of mathematics.
- Encourages active pupil participation.
- Discourages cramming and reduces homework.
- Based on actual observation, thinking and experimentation.
- Found most suitable in the initial stage of the lesson.
- Helps in increasing pupil-teacher contacts.

##### De-merits:

- Limited in range and not suitable for all topics.
- All formulae cannot be generalized in this method.
- Time consuming and laborious
- Inductive reasoning is not always conclusive.
- A complete topic cannot be covered by this method.

**Deductive Method:** It is the exact opposite of the inductive method. Over here we proceed from general to particular, abstract to concrete. In this method the rule or generalization or formula is given at the very beginning. Thus the students are expected to apply these rules or formulae to solve the sums. The formula or rule is accepted as the universal truth and the student uses them to solve the problems. E.g. the teacher states that; —The sum of all the angles of triangle is  $180^\circ$ . The

teacher draws different types of triangles along with the measures. The teacher asks the student to state the sum of the angles in each case. The triangles may be as shown below; The student then with the help of this property solved different types of sums such as; • In triangle PQR, measure of angle P is  $50^\circ$ , the measure of angle Q is  $75^\circ$ . Find the measure of angle R? • In triangle XYZ measure of angle Z is  $57^\circ$  the measure of angle X is  $97^\circ$ . Find the measure of angle Y?

**Merits:**

- Short and time saving method.
- Method suits all types of students.
- Suitable for all topics.
- Provides sufficient examples for practice.
- Speed and efficiency of doing sums increases.

**Demerits:**

- It is not a psychological method.
- It encourages cramming.
- Taxes the pupil's mind.
- Students are passive learners and thus lose interest.
- It puts more emphasis on memory.
- Not suitable for the development of thinking, reasoning and discovery.

Thus we have seen that both the inductive as well as deductive methods by themselves have merits and demerits. These demerits can be negated when both methods are used together in the form of —**INDUCTODEDUCTIVE METHOD**. Induction and deduction are complementary to one another. So in the beginning inductive method must be used to elicit the rule or generalization and then this must be followed by sufficient practice using the deductive method. This will promote better understanding of mathematics and speed, accuracy and command over the subject increases.

## **B. Analytic – Synthetic Method**

**Analytical Method:**

The meaning of the word analysis is to —separate things that are together. In this method we start from what is to be found or proved. Thorndike says that, Analysis is the highest intellectual performance of the mind. Analysis also means, —Breaking up of a given problem, so that it connects with what is already known. In analysis we proceed from, Unknown to Known. Analysis is, Unfolding of a problem to find its hidden aspect. This method is used under the given conditions: When we have to prove any theorem. Can be used for construction problems. To find out solutions of new arithmetical problems.

**Merits::**

- Logical, leaves no doubt.
- Facilitates understanding, as we discover facts.
- Each step has reason and justification.
- Student gains confidence and understanding.

- Method suits the learner and the subject.

**Demerits of this method :**

- Lengthy method and also time consuming.
- Difficult to acquire efficiency and speed.
- Not applicable to all topics.
- Not suitable for students with weak conceptual knowledge.

**Synthetic Method:**

The word synthesis simply means, —To place things together or to join separate parts. In this method we proceed from —known to unknown. It is the process of relating known bits of data to a point where the unknown becomes true. It is the method of formulation, recording and presenting concisely the solution without any trial and errors.

**Merits:**

- Short and precise method.
- Saves time and labor.
- Suits the needs of majority of the students.
- Can be applied to a majority of topics in mathematics.
- Omits trial and error as in analysis method.

**Demerits :**

- Teacher-centered method, students are passive listeners.
- Students rely on rote memory.
- No opportunity to develop the skills of thinking and reasoning, as understanding is hampered. Students lack confidence to do other type of sums
- From the above discussion we can see that both the methods of analysis and synthesis by themselves have their advantages and disadvantages.
- In order to ensure the complete understanding of mathematics in the learners that both the methods be used together to teach mathematics.
- By using a combination of these two methods the teacher can ensure that effecting teaching learning takes place.

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