Techniques of Mathematics teaching

Maths is all about problem solving using strategies. When teaching, model several strategies for understanding and exploring a concept, encourage students to apply high-level skills when given problems and focus on the thought process involved in the solution. Although maths usually only has one right answer, being able to reason through the steps to find the answer is the most important part of being a successful maths student.

Constructivist Approach

The main tenet of constructivist learning is that people construct their own understanding of the world, and in turn their own knowledge.

Characteristics of Constructivist teachers

1. Encourage and accept student autonomy and initiative.
2. Use raw data and primary sources, along with manipulative, interactive, and physical materials.
3. Use cognitive terminology such "classify," "analyze," "predict," and "create" when framing tasks.
4. Allow student responses to drive lessons, shift instructional strategies, and alter content.

Discovery Approach

Discovering Algebra, Discovering Geometry, Discovering Advanced Algebra textbook series covers the topic offered in traditional algebra, geometry, and advanced algebra courses.

Discovering Mathematics works to have all students reach deep understanding of maths through investing interesting and novel problems in cooperative groups using technology appropriately and practicing skills.

Inductive Approach

Inductive approach is based on the process of induction i.e. reasoning from specific facts to general principles. Therefore, it proceeds from particular to general, from concrete to abstract. It is a method of constructing a formula with the help of a sufficient number of concrete and specific examples.

- Introduction of new topic
- Formulation of rules
- Derivation of formulas
- Generalization

Deductive Approach

Deductive approach is based on deduction. It is just the opposite of inductive approach. It proceeds from abstract to concrete, from general rule to particular or specific instances, and from formula to examples, from unknown to known. This approach is mainly used in Algebra, Geometry and Trigonometry because different relations, laws and formulae are used in these sub branches of Mathematics. It is more useful for teaching Mathematics in higher classes.

Analytic Approach

Analysis is the process of breaking a complex topic or substance into smaller parts in order to gain a better understanding of it. The purpose of breaking it into smaller parts is to figure out the hidden aspects of the problem. This method helps learners in discovering the things himself.

Synthetic Approach

Synthesis refers to a combination of two or more entities that together form something new. In this method we move from known to unknown and from hypothesis to conclusion. It is an approach in which we collect and combine various facts to find out the unknown result.

Problem Solving Approach

Mathematics is best taught by helping learners to solve problems drawn from their own experience. Real-life problems are not always closed, nor do they necessarily have only one solution. The solutions to problems which are worth solving seldom involve only one item of mathematical understanding or only one skill. In teaching through problem solving, teacher will setup the context and explain the problem. Now, learners work on the problem and the teacher monitors their progress.

Laboratory Method

- Laboratory method is based on the maxim "learning by doing".
- This is an activity method and it leads the students to discover mathematics facts.
- In it we proceed from concrete to abstract.
- Laboratory method is a procedure for stimulating the activities of the students and to encourage them to make discoveries.

PROJECT METHOD

Project method is of American origin and is an outcome of Dewey's philosophy or pragmatism. However, this method is developed and advocated by Dr. Kilpatrick. Project is a plan of action (oxford's advanced learner's dictionary). Project is a bit of real life that has been imported into school. A project is a unit of wholehearted purposeful activity carried on preferably in its natural setting - Dr. Kilpatrick. A project is a problematic act carried to completion in its most natural setting - Stevenson.

Drill and Practice Method

Drill is one of the most essential ways (or methods) of learning in mathematics. The controlling purpose of all teaching activity is to reduce necessary learning to habit. Gaining mastery requires acquisition of habits, hence drill/practice plays an important role in acquiring mastery. The first category of lessons for mastery is of basic subject matter, e.g., multiplication tables, addition combinations, fractional equivalents of decimals and percentages, factorization, construction in geometry, etc.

The second category includes lessons for the mastery of procedures. In Mathematics one has to adhere to a systematic arrangement of steps, follow correct algorithms to scrutinize and check the correctness of each step, label appropriately parts in a diagram, sort out data, translate problems into symbolic form, practice short cuts, etc.

The third category consists of lessons which strive to develop the power of thinking and reasoning, and increase the concentration and interest of the learner. Such lessons include quizzes, puzzles and historical material which does not form part of a regular lesson.

Play Way Method

Play way technique is a child - centered informal method of teaching which suits the interest of the child and improves its academic proficiency effortlessly. This method helps to develop interest in Mathematics, motivates learners to learn more, and reduces the abstract nature of the subject to some extent

Home Work

Homework refers to tasks assigned to learners by their teachers to be completed outside the class. The purpose of home work is to encourage learners to review, apply, practice and integrate what he/she has learnt in the classroom. The fundamental purpose of homework to learners is the same as schooling in general.

Assignments

An assignment is a task or work allotment. In this technique, the learners are provided with the responsibility for his/her own learning. The teacher acts as an advisor and guide in case of any difficulty encountered.

Brainstorming:

Brainstorming is a teaching strategy for releasing ingenuity and for enhancing critical thinking, especially in mathematics where in higher order thinking skills for student should be more developed. Brainstorming is a key tool that applies to most problem – solving and complicated mathematical concepts.

Quiz Technique

Quiz quizzes throughout the day can help teachers assess the effectiveness of their instruction, as well as student understanding of the concept taught.

Discussion Technique

We should aim for 'relational understanding' (knowing why rules work), and 'logical understanding' (being able to explain them to others) rather than the 'instrumental understanding' (using rules without knowing why they work) which results from learning mainly by imitation, as at present.

Scenario building Technique

Scenario building is a method of understanding and planning for outcomes of an uncertain future. In essence, it is a method for envisioning possible futures for complex systems to understand major drivers of future change.