

NEW INNOVATIONS IN TEACHING OF MATHEMATICS

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ABSTRACT

Though Mathematics being so important subject and occupying a central positions since the Ancient period still it has not been the interest of many students. The gaps are found between aspiration and achievement. Mathematics is highly abstract. It is concerned with ideas rather than objects; with the manipulation of symbols rather than the manipulation of object. It is a consely-knit structure in which ideas are interrelated. Mathematical concepts are hierarchical and interconnected, much like a house of cards. Unless lower-level concepts are mastered, higher-level concepts cannot be understood. Students, who discover some of the structures of mathematics, are often impressed by its beauty. They not the lack of contradiction, and they see how a new technique can be derived from one that has already been learned.

Keywords: Mathematics, Methods. Mastery Learning Strategy, Mathphobia, algebra,Analytic-Synthetic Method, Problem-Solving Method, Play-Way Method, solution,Laboratory Method, Teaching Aid, Charts, Manipulatives.

INTRODUCTION

Teaching of mathematics is not only concerned with the computational know how of the subject but is also concerned with the selection of the mathematical content and communication leading to its understanding and application. So while teaching mathematics one should use the teaching methods,strategies and pedagogicresources that are much more fruitful in gaining adequate responses from the students we have ever had in the past.

The teaching and learning of mathematics is a complex activity and many factors determine the success of this activity. The nature and quality of instructional material, the presentation of content, the pedagogic skills of the teacher, the learning environment, the motivation of the students are all important and must be kept in view in any effort to ensure quality in teaching-learning of mathematics.

In this paper the presenter has made an effort to discuss innovations and innovative practices in teaching mathematics, under teaching methods,strategies and pedagogic

resources. The process of innovation is generally described as consisting of three essential steps, starting with the conception of an idea, which is then proposed and finally adopted. Though many ideas have been conceived to bring about change in the teaching of mathematics, it is yet to be proposed and adopted. So, the innovations discussed may not be new in terms of the idea but is new in terms of practice.

METHODOLOGY

Looking to the aims of teaching mathematics it can be seen that more focus is laid to the higher level of objectives underlying the mathematics subject, like critical thinking, analytical thinking, logical reasoning, decision-making, problem-solving. Such objectives are difficult to be achieved only through verbal and mechanical methods that are usually used in the class of mathematics. The verbal methods of instruction give all importance to speech and texts, to the book and to the teacher. From an historical point of view this method was majorly used until the end of the nineteenth century.

In one of these verbal methods teachers are simply satisfied with giving the mathematical rules to pupils and having them memorize it. They justify this method by saying pupils would not understand explanations. Their task is to transmit to their pupils the knowledge which has accumulated over centuries, to stuff their memory while asking them to work exercises, e.g.

The rule of signs and formulas in algebra, students memorize this and remember it! Another verbal method involves explanation. Teachers who use this method assume that the mental structure of the child is same as the adult's. But a developmental stage according to Piaget is a period of years or months during which certain developments take place. Teachers think teaching must imply logic, and logic being linked to language, or at least to verbal thought, verbal teaching is supposed to be sufficient to constitute this logic. This method leads to series of explanations transmitted by teacher and received by student which lead to the poor understanding on part of students and they develop a fear of the subject: Mathphobia. The Education Commission(1964-66) points out that “In the teaching of Mathematics emphasis should be more on the understanding of basic principles than on the mechanical teaching of mathematical computations”. Commenting on the prevailing situation in schools, it is observed that in the average school today instruction still conforms to a mechanical routine, continues to be dominated by the old besetting evil of verbalism and therefore remains dull and uninspiring.

RESULTS AND DISCUSSION

Innovations in teaching of mathematics can be diversified in terms of Methods, Pedagogic Resources and Mastery Learning Strategy used in teaching-learning process.

1. Mastery Learning Strategy.

Teaching Strategy is a generalized plan for a lesson and includes a specific structure to be followed.

B. S. Bloom has developed Mastery Learning Strategy. It is a new instructional strategy that is used for developing mastery learning and objectives of curriculum can be realized. It consists of different steps: division of content into units, formulation of objectives related to each unit, teaching and instruction are organized for realizing objectives of each unit, administering unit test to evaluate the mastery level and diagnose the learning difficulties, remedial instruction are given to remove the difficulties and attain mastery level by every student. This strategy plays an important role for learning of basics and fundamentals e.g. operations in different number systems-Natural numbers, Integers, Rational numbers, Real numbers.

2. Methods. Method is a style of the presentation of content in classroom. The following are the innovative methods that can be used to make teaching-learning process of Mathematics effective.

1) Inductive -Deductive Method. It is a combination of inductive and deductive method. Inductive method is to move from specific examples to generalization and deductive method is to move from generalization to specific examples. In classroom usually the instructions directly start with the abstract concepts and are being taught in a way that does not bring understanding on the part of majority of the students. Formulas, theorems, examples, results are derived, proved and used. But teacher needs to start with specific examples and concrete things and then move to generalizations and abstract things. Then teacher again needs to show how generalization can be derived and it holds true through specific examples. This method will help students for better understanding, students don't have to cram the things and will have long lasting effect. Example: Pythagoras Theorem – In a rightangle ABC right angled at B, $2AB+2BC=2AC$ (Considering right angle triangles of different measurement leading to generalization and then establishing it through the theoretical proof).

2) Analytic-Synthetic Method. It is a combination of Analytic and Synthetic method. Analytic is breaking down and moving from unknown to known and Synthetic is putting together known bits of information and moving from known to unknown. These methods are basically used in proving the results and solving sums. In

textbooks mostly synthetic method is used, to prove something unknown we start with a certain known thing, but that step and using this particular known thing.

3)Problem-Solving Method. This method aims at presenting the knowledge to be learnt in the form of a problem. It begins with a problematic situation and consist of continuous meaningful well-integrated activity. Choose a problem that uses the knowledge that students already have i.e. you as a teacher should be able to give them the problem and engage them without spending time in going over the things that you think they should know.After students have struggled with problem to get solution, have them share their solution. This method will help them in developing divergent thinking. Example: Put a problem of finding the amount of water in a given container instead of deriving the formula of volume (cylinder filled with water).

4)Play-Way Method. This method consists of the activities that include a sort of fun or play and give joy to the students. Students don't realize that they are different activities. This method helps to develop interests in mathematics, some extent. Example: Mathematical games and puzzles.

Teaching aids are the material used for effective teaching and enhancing the learning of students. It can be anything ready-made or made by the teacher or made by students. Different teaching aids should be used in teaching mathematics like Charts, Manipulatives, Programmed Learning Material(PLM), computers and television.

Charts- It can be used to display formulae, symbols, mathematical and geometrical figures. Charts can be used for making students familiar to the symbols and for memorization of basic formulae. Even it can be used to bring to the students two-dimension geometry and the graphical representation in a better way.

Manipulatives – They are objects or materials that involve mathematics concepts, appealing to several senses, that can be touched and moved around by the students (not demonstrations of materials by the teacher). Each student needs material to manipulate independently. With students actively involved in manipulating materials, interest in mathematics will be aroused. Canny (1984) has shown that mathematics instruction and students mathematics understanding will be more effective if manipulative materials are used. Models can be used to make things concrete like three dimensions figures in geometry.

Computers and Televisions – Computer canbeused for multimedia presentation for the concepts that requires visualization and imagination. Computer can also be used for providing Computer Assistant Instruction(CAI), it is similar to

PLM i.e. it is a computerized PLM. Television can be used to show some good mathematics education show.

CONCLUSION

Activities here include all such work where in students play an active role has to interact with different resources and generate knowledge. In any curriculum, content and presentation of content are the two most important and inseparable components. It is difficult to say anything definitely about which method and pedagogic resource is going to be most effective for presentation of a particular type of content. Selection of method and pedagogic resource depends on many factors like type of content, objectives to be achieved, level of the students, entry behavior, availability of resources. Also acceptance of innovative methods and positive attitude of teachers towards it, is an important factor for the selection of method and pedagogic resource. The things included under innovations are existing in books, also there are researches which shows that some innovations are carried out in the classroom and has shown the positive effect on teaching learning process but their practical usage and implementation in classroom is not seen to the expected level.

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