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INNOVATIVE METHODS IN TEACHING MATHEMATICS IN ACADEMIC LYCEUMS

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Teaching of mathematics in the class is not only concerned with the computational knowledge 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 pedagogic resources that are much more fruitful in gaining adequate responses from the students than we have ever had in the past. We know that 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.
The teaching can be made more innovative and joyful by using different teaching techniques and methods, strategies and pedagogic resources.

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

2. Mastery Learning Strategy

Teaching Strategy is a generalized plan for a lesson and includes a specific structure to be followed. One has to develop Mastery Learning Strategy. 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 instructions are given to remove the difficulties and attain mastery level by every student. This strategy plays an important role for learning the basics and fundamentals .

3. **Methods**

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

Inducto -Deductive Method

(Inductive method is to move from specific examples to generalization and deductive method is to move from generalization to specific examples). In the 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 the majority of the students. Formulas, theorems, examples, results are derived, proved and used. But I start with specific examples and concrete things and then move to generalizations and abstract things. Then one can show how generalization can be derived and it holds true through specific examples. This method helps students for better understanding, students don't have to cram the things and will have a long lasting effect.

Analytico-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 methods are used, to prove something unknown we start with a certain known thing, but that leaves doubt in mind of students

why we have started with that step and using this particular known thing. We use combinations in order to explain and relate each step logically.

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 consists of continuous meaningful well-integrated activity.one can choose a problem and give it to students and engage them without spending time in going over the things. As they struggle with the problem to get solution, meanwhile it helps them in developing divergent thinking.

Play-Way Method

It helps students to use the activities that include a sort of fun or play and give joy to the students in classroom teaching . As the students don't realize that they are learning but in a way they are gaining knowledge through participating in different activities. This way helps to develop interest in mathematics, motivates them to learn more and reduces the abstract nature of the subject to some extent inherently.

Example: Mathematical games and puzzles.

Laboratory Method

This method is taught in class through the way of "learning by doing" and "learning by observation" and proceeding from concrete to abstract. All students do not just listen to the information given but do something practically also. They learn through hands-on experience. This way leads them to discover mathematical facts. After discovering something by their own efforts, they start taking pride in their achievement, it gives them in return happiness, mental satisfaction and encourages them towards further achievements.

Example: Making and observing models, construction work in geometry, PPT etc.

4. Pedagogic Resources

Pedagogic resources in teaching practice to integrate in a method for the transaction of a particular content and draw upon to advance the students' learning.

Teaching Aids

Teaching aids are the materials 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 are used in teaching mathematics like Charts, Manipulatives , Programmed Learning Material (PLM), computers etc.

Activities

Activities here include all such work where students play an active role, Have to interact with different resources and generate knowledge. It includes Quiz competition, Projects, Role play, Seminars, Discussion, Mathematics club, Assignment, Field trips, etc.

In any curriculum, content and presentation of content are the two most important and inseparable components. It is difficult to say anything definite 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 is research 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.

Guidelines for a Teacher in Incorporating Innovations in Teaching Mathematics

For effective transaction of the curriculum and achievement of curricular objectives appropriate methods and pedagogic resources should be used in providing learning experiences to the students.

- A number of factors need to be considered while making use of a particular method and pedagogic resource: learners' capabilities, availability of resources, entry behavior, college environment, objectives to be achieved, the nature of content and the teacher's own preparation and mastery.
- Decide on and plan in advance the innovative idea that the teacher would be incorporating to transact a particular concept so that loss of instructional time is prevented or minimized.
- The immediate environment of the learner both natural and human should be used when and where possible for making learning concrete and meaningful.
- Involve the students in the process of learning by taking them beyond the process of listening to that of thinking, reasoning and doing.
- In order to promote self-study skills, use of libraries and resource centers needs to be encouraged.
- Receiving regular feedback for teaching and learning should be an inbuilt component of the teaching-learning process. Continuous and comprehensive evaluation has to be ensured as it plays an important role for the required modification in the teaching-learning process.
- Mathematics-teachers' organizations at different levels should be formed where sharing of ideas and experiences, developing resources in a collaborative manner and the mechanisms that enable teachers to carry out innovations is being discussed. Mathematics-teachers' organizations can be instrumental in establishing a climate of confidence in carrying out innovations and a positive attitude to new approaches in teaching mathematics.
- Properly instruct and guide the students for carrying out different activities and precautionary measures should be taken so that students are not misguided.
- Study mathematical journals and modern books of professional interest. Any facilities of in-service training should be availed of for improving teaching of mathematics.

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