

Study of Effective Teaching Methods in Mathematics

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Abstract: *Mathematics is one of the subjects that has attracted considerable concern due to the methods and approaches employed by some mathematics teachers at various levels of education, including primary, secondary, and tertiary institutions. Many students develop negative attitudes toward the subject because they perceive it as difficult, abstract, and uninteresting. This study examines effective teaching methods and strategies that mathematics teachers can adopt to improve the teaching and learning of mathematics. The research emphasizes learner-centered and engaging instructional approaches that can make mathematics more interesting, meaningful, and motivating for students. Furthermore, the study highlights the importance of eliminating fear, anxiety, and negative perceptions associated with mathematics in order to enhance students' understanding, confidence, and academic performance in the subject.*

Keywords: Method, Teaching, Approach, Process, Problem

1. Introduction

Teaching has been defined in various ways by different scholars and educators. To some, teaching is the art of imparting knowledge to learners, while others describe it as the process of giving knowledge, skills, or training on how to perform certain tasks. Some scholars also view teaching as both a formal and informal process through which individuals acquire new facts, ideas, values, and experiences.

According to Farrant, teaching is a process in which a group of learners is guided by a teacher who helps them acquire knowledge, skills, attitudes, and values considered essential for life. Similarly, Saidu described teaching as an activity in which the teacher, learners, and instructional materials interact closely for the purpose of effective learning. Although scholars differ in their definitions of teaching, they generally agree that teaching is an intentional process aimed at changing the behavior of individuals and facilitating the acquisition of knowledge, skills, abilities, habits, and competencies necessary for effective living in a dynamic society.

Method, on the other hand, refers to an organized and systematic plan used for presenting instructional content or learning experiences to a particular group of learners. According to the Active Dictionary, a method is simply a way of doing something. In the field of education, however, a method can be understood as a strategy or approach employed by teachers to deliver subject matter effectively to students. The choice of teaching method depends on several factors, including the nature of the content, the characteristics of the learners, and the level of competence or learning outcomes expected (1-3).

Instructional Methods

Every instructional method used by a teacher has its own advantages and disadvantages. In many cases, one teaching method naturally flows into another within the same lesson, and effective teachers develop the skills necessary to make this transition seamless for students. The choice of the most

appropriate instructional method for a particular lesson depends on several factors, including the age and developmental level of the students, their prior knowledge, and the knowledge and skills they need to acquire for successful learning. Other important considerations include the subject matter, the objectives of the lesson, the availability of people, time, space, and instructional materials, as well as the physical learning environment.

Another important challenge for teachers is selecting an instructional method that best suits their teaching style and the specific classroom situation. There is no single "best" method for teaching every lesson, as different methods are appropriate for different levels of education and subject content areas.

An instructional method refers to the principles and strategies used by teachers to facilitate learning. Commonly used teaching methods in mathematics include the problem-solving method, lecture method, questioning method, discovery method, or a combination of these approaches.

Teaching Methods for Mathematics

In the teaching process, both the questions "What?" and "How?" should be addressed. Knowledge of appropriate teaching methods that make learning more effective is essential. The choice of teaching method or methods largely depends on the type of information or skill being taught, and it may also be influenced by the aptitude, interest, and enthusiasm of the students.

It is important for teachers to use a variety of teaching methodologies in order to meet the diverse learning needs and requirements present in most mathematics classrooms. This paper explores different teaching methodologies used in mathematics education and outlines their various advantages and disadvantages.

Some of the prominent methods for effective instruction in mathematics include the problem-solving method, lecture method, questioning method, and discovery method.

2. Problem Solving Method

The problem-solving method is one of the most independent learning approaches used in the teaching of mathematics, as it empowers students to initiate and direct their own learning. In this method, the teacher determines the content of the questions and the expected answers, while the responsibility for arranging the steps leading to the correct solution is placed in the hands of the learners (4). Therefore, the teacher assumes the role of a facilitator and provides guidance and feedback rather than direct solutions (5).

Positive reinforcement is an important element of the problem-solving process, as it encourages students to express their ideas freely, thereby enhancing their motivation, confidence, and independent thinking abilities (6). In this approach, the teacher presents a problem to the students and allows them to solve it independently.

Problem solving is a process through which students investigate problems, issues, and situations in order to arrive at conclusions and recommendations. This process involves probing, discovery, critical thinking, analysis, inquiry, and finding solutions to problems. Suleiman also defined the problem-solving method as a process that begins with the identification of a problem and ends when the obtained solution is reviewed in light of the available information (7-8).

The problem-solving approach involves identifying and selecting mathematical problems that arise from the experiences and interests of individual students. Mathematics teachers are encouraged to apply this method in the classroom by engaging students in practical activities, such as investigating the probability of an event and presenting their findings in class for discussion and necessary corrections.

Advantages

The problem-solving method in mathematics has many educational values, some of which are listed below:

- 1) It encourages students to develop independent thinking skills in their life.
- 2) It promotes a deeper understanding of mathematical concepts and study materials.
- 3) It helps students organize, arrange, and classify facts or data systematically.
- 4) It inculcates in students the habit of seeking logical explanations and identifying appropriate patterns for solving problems.
- 5) It motivates students to think critically and make decisions independently.
- 6) It stimulates learners to discover solutions to mathematical problems through exploration and reasoning.
- 7) It encourages learners to analyze situations, apply reasoning, and make sound judgments in order to arrive at meaningful and reasonable solutions to problems.

3. Lecture Method

This is an approach where the mathematics teachers deliver his lecture while the students remain dormant or passive

listeners. This approach is suitable for senior students. This method of teaching is by giving spoken explanations of the subject that is to be learned. Bligh defines lecturing as “more or less continuous exposition by a speaker who wants the audience to learn something,” and notes that its use is not restricted to the formal educational setting, but is used in arenas such as politics (speeches) and religion (sermons). To Bello (7) lecture method is a process whereby the teacher would come to the class fully armed with a mass of facts probably gathered from books and would start to pour out the facts, perhaps pausing at intervals to ask a few questions, or, if he liked, might leave the asking of such questions to the very end of his lecture. Students are either listening attentively to him or taking down some notes. Other educators referred to the lecture method as a teacher centered method because it is the teacher alone who invariably does most of the talking while the pupils remain passive for most of the period. A lecture can be used to provide a broad-based overview or introduction of a topic, particularly where the educational goal is for the learner to acquire a background familiarity with the subject, as opposed to a working knowledge. Nearly almost of all higher learning institutions using some form of the lecture method to teach students that is why their teachers are called lecturers. Although the usefulness of other teaching strategies is being widely examined today, the lecture still remains an important way to communicate information in the institutions of higher learning.

Advantages

The lecture method in mathematics has the following advantages:

- 1) It enables the mathematics teacher to cover a large amount of content within a short period.
- 2) It is economical, as the teacher requires fewer teaching aids and instructional materials.
- 3) It provides opportunities for students to participate through questions, discussions, and classroom interactions.
- 4) It saves time and effort, especially when teaching mathematics topics that involve extensive content.
- 5) It can be effectively used for teaching large classes.
- 6) It encourages students to read widely and engage in independent study, since they may not be able to record every detail during the lecture and may need to supplement their notes through additional reading.

4. Questioning Method

The questioning method of teaching is widely regarded as an effective instructional approach because of its interactive nature. In this method, the teacher asks questions to assess what students have learned from previous lessons and discussions. It also helps the teacher determine the level of students' understanding and identify areas that require further explanation in mathematics.

The questioning method encourages active participation and helps develop student's critical thinking, reasoning, and problem-solving abilities. Teachers should create a positive and supportive learning environment that motivates students to respond confidently and express their ideas freely. This

approach enhances students' understanding of mathematical concepts and promotes meaningful learning.

Mathematics teachers can effectively apply the questioning method while teaching topics such as the lengths of arcs of circles and other related mathematical concepts (7).

Advantages

Questioning method in mathematics have many advantages some of which are stated by;

- 1) Questioning method has wide applicability to all types of methods of teaching mathematics;
- 2) They encourage critical thinking abilities.
- 3) They are useful in diagnosing the learning difficulties of students in mathematics.
- 4) They can be used effectively in catering for individual differences in mathematics class.
- 5) It helps the student judge how adequate his responses are and also encourage him to think.
- 6) They lead the learner to the boundaries of his previous knowledge.

5. Discovery Method

The discovery method is a teaching method in which students arrive at new knowledge through their own observations and investigations. This approach to teaching provides students with an opportunity to use existing and established rules or principles to discover concepts for themselves.

In applying this method to the teaching of mathematics, teachers should formulate the structure and content of their lessons in a manner that encourages students to discover the solutions to various problems independently. The role of the teacher in this approach is to guide and facilitate student learning in order to promote discovery, continuous experimentation, and active participation.

Mathematics teachers can use the discovery approach in teaching mathematical topics such as algebraic expressions and the factorization of quadratic expressions (9).

Advantages

The following are the advantages of the discovery method of teaching in mathematics:

- 1) It develops mathematical skills through independent research.
- 2) It encourages the development of patience, cooperation, and decision-making skills.
- 3) It inculcates attitudes, values, skills, and knowledge that enable mathematics students to become thoughtful inquirers about their environment.
- 4) It fosters students' participation in mathematical activities and stimulates action both within and outside the mathematics classroom.
- 5) It helps students understand mathematical processes, concepts, and relationships.
- 6) It promotes critical and logical thinking about mathematical ideas, issues, and problems.
- 7) It helps students become more interested in mathematics and improves their retention of knowledge.

- 8) It provides new insights into areas of mathematics that are not taught effectively.

6. Conclusion

Mathematics teachers should be free to use methods they consider suitable for their particular students under particular conditions. To be effective, the mathematics teacher must have a thorough understanding of a number of methods, their strengths, weaknesses, and the particular conditions under which they operate best. A number of different teaching methods can be used in the classroom setting. The method selected will depend on the learning objectives, the technological resources available, the overall course design, and the instructor's training.

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