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Learning of Mathematical Concepts/Exploring & Promoting Learners

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ABSTRACT

Mathematical thinking is a mindset that is crucial for school as it plays a role in guiding and organizing the thought processes necessary for understanding concepts. Educators in the field of mathematics unanimously agree that conceptual learning is a challenging yet fundamental aspect of mathematics education. Piaget identified four distinct stages of conceptual learning that evolve over time. Regardless of age, developing mathematical concepts is a gradual process that advances through stages, with each stage requiring specific mathematical thinking skills to grasp the related concepts. This article delves into the interconnected nature of these mathematical thinking stages, focusing on Piaget's stages rather than chronological age.It emphasizes that individuals can be in the initial stage of understanding a concept if they lack a basic understanding of it, regardless of their age. The key take away from this discussion is the transition from a passive to active approach in learning, emphasizing the importance of mastering mathematical thinking skills at each stage.

Keywords: Chronological, Knowledge , Education, Real-life

Introduction:

Concepts involve developing perception towards a particular subject. If the suffix of mathematics is discussed, its history is very old. Mathematics is considered to have started from Rigveda. In ancient times, the purpose of teaching mathematics in India was that it helped in calculating the prices of goods and keeping accounts. At that time, more emphasis was given on results rather than methodology. Children were reminded of the mountains and the Guru. At that time, mathematics was taught in schools because it was related to religious books, mathematics, astrology, astrology etc. It was needed to calculate the dates of eclipses, festivals etc. Knowledge of mathematics was used in making temples and worship altars. It was used for the development of intelligence. Often, mathematical puzzles were made and solved by students. In this way, they were entertained.

Islamic education also included Mathematics. During that time, a system of primary education for children was present in Maktab. There, in addition to being taught to read and write, they were also instructed in Avajad, which involves calculation using the number of letters and divination ideas. Higher education was provided in madrassas, offering both secular and religious teachings. Secular education included the teaching of Astrology and mathematics. Abul Fazal, in 'Ain-e-Akbari', mentioned that subjects like Ethics, Arithmetic, Problems, Agriculture, Geometry, Astrology, Facial Science, Home Science, Monarchy, Medicine, Logic, Tibi, All knowledge like Riyaji, Ilahi, and History, could be studied. Higher education in mathematics and astrology was also imparted. A madrasa was established in Delhi by Humayun, where astrology and geography were taught.

But still mathematics did not have prestige as a subject in the schools of our country until the eighteenth century. During the British period, a lot of emphasis was given to mathematics. It was compulsory in high school and intermediate classes, and even in middle classes, maximum emphasis was given to mathematics. Question papers were also made difficult, and students who scored good marks in mathematics were given incentives.

There has been a mathematics competition every year at the government school in Etawah, where

prizes are distributed to the students securing first and second positions. Basic education was started in 1937, with mathematics holding an important place, but the teaching method was different, focusing on teaching mathematics based on craft. After the Second World War, the Sargent Scheme was introduced in India, dividing the high school into two parts.

After independence was attained in Uttar Pradesh, arithmetic was separated from geometry and algebra. Arithmetic was made a compulsory subject and Algebra and Geometry were considered optional subjects, but this sequence only continued for three years. In 1950, arithmetic was completely removed from the high school class, but other branches of mathematics were kept as optional subjects. From 1952, another type of mathematics was started by the Uttar Pradesh Education Board for the convenience of children, which was named Elementary Mathematics. This type of mathematics included all three branches of arithmetic, algebra, and geometry, but the syllabus was up to class 8. Now, somehow, the members of the Education Committee had their ears reached and understood that work could not be done without mathematics. Therefore, since 1956, mathematics has been made a compulsory subject for boys in high school classes, but it is still an optional subject for girls.

Structure and Nature Of Mathematics:

The structure and nature of mathematics have their own unique existence, with each subject having a specific structure that determines its permanence or temporariness. Mathematics is considered more stable than other subjects due to its strong structure. Physics, Chemistry, and Biology follow in stability based on their structures. The truth and predictions of a subject are more enduring if the structure is strong, but reduce when the structure weakens. The nature of a subject is determined by its structure, with each subject having a special purpose and unique nature that sets it apart from others in the curriculum.

Suffix formation and suffix assimilation

The subject of mathematics has included the following facts under suffix formation and assimilation in its language:

1. Its own language is defined by terms, concepts, formulas, signs, and principles which give birth to its language, such as length-width, triangle, profit-loss, brackets, numbers, kilogram, etc.
2. Numbers, space, and measurement are studied in mathematics, developed initially from mathematics only after other subjects.
3. Relationships and numerical conclusions are drawn between objects found in the environment in mathematics and these findings can be trusted as they relate to specific numbers.
4. Our sense organs, which can be trusted, are the basis of knowledge in this subject, as this knowledge has a definite basis.
5. The uniformity of mathematics in the universe allows for its truthfulness to be affirmed at any place and time.
6. This knowledge is unaffected by changes in time and place.
7. Mathematics is known for its exact, clear, logical, and systematic nature, making it difficult to forget once understood.
8. Abstract concepts in life can be explained and understood through mathematics, with the ability to represent the abstract in concrete forms.
9. Mathematics is applied in various sciences such as physics, chemistry, biology, and other subjects. Progress in these fields relies on advancements in mathematics, as it serves as the foundation for all subjects and provides a structured and strong base.
10. Metaphysical knowledge is illuminated through mathematics, with definitive answers being possible without any doubt. This knowledge only allows for a simple 'yes' or 'no' response.
11. In mathematics, a sufficient limit for generalization, induction, and deduction is found.

Mathematics Laboratory:

The word laboratory has been considered very useful in teaching mathematics. A room is used as a laboratory in which experiments are conducted by a group of students. It is essential for the subject of mathematics to have laboratories provided in schools. Each laboratory is constructed according to the requirements of the subject.

The importance of the mathematics laboratory is

as follows:

1. Teaching mathematics becomes fun and interesting with its use.
2. Knowledge is easily acquired by students.
3. Students' attention is focused through teaching with various devices.
4. Activity among students is generated by helpful laboratory materials.

The equipment's of the mathematics laboratory include:

1. Abacus- Verbal and mental mathematics is taught to students using this. Its use has been considered good since ancient times. Mathematics is quickly taught to students with its use.
2. Measurements related to mathematics, scales, and scales of volume are included in the equipment. Sometimes in teaching mathematics, a subject comes up that needs to be presented in its original form before students to make it clear. For this, divisions of kilogram, 500 grams, 200 grams, 100 grams, 50 grams, 20 gram In the laboratory, items such as s, 10 grams, and * grams are kept. For volume, vessels such as liter and half liter are kept.
3. Additionally, various instruments such as screw gauges, vernier callipers and scales are kept. Other items such as scale, compasses, protractor, meter, tape measure, decimeter, and cubical pieces are also stored.

Problem Solving

This popular method of teaching mathematics involves problems being presented to the students by the teacher, and the solutions being found by the students in the class with the help of learned rules, principles, and concepts. Teaching is conducted through problems in arithmetic, algebra, and geometry. Problems related to each sub-subject are compiled in mathematics books, allowing students to find solutions and learn the subject through this process. Problems are compiled with various facts and circumstances, taking into consideration their level of difficulty. The novelty in each problem inspires students to find the solution. The success of this method depends on the novelty of the problems and the ability to formulate them. The facts are collected and problems are formulated by a skilled teacher, considering the abilities of the students and presented to be solved in the class. The situation given in the problem is studied by students, calculations, measurements etc. are done as per requirement, and the answer is obtained. New experiences are provided to the students and they are given the ability to solve the problems that come in the subsequent sub-topics by the successful solution of each problem.

The successful operation of this method is not helped by the traditional problems given in textbooks because there is no novelty and truth in their facts and situations. Solutions are not encouraged to be found by students and these traditional problems do not prove to be very helpful to them in learning mathematics. When the situation involved in the problem is successfully related to the student's own environment a student becomes motivated to solve the problem and is motivated to find the solution to the problem. The problems printed in most of the mathematics books cannot be considered based on the facts of life because these facts are not related to the life of the student.

Example

If the area of a field needs to be found, given that the length and breadth are 300 meters and 180 meters respectively. The area of the field can be calculated by multiplying the length and breadth. The need to find the area in this situation could be explained by the teacher in a real-life context that the students are familiar with. Real-life examples could be used to demonstrate the importance of finding the area in everyday tasks. In such situations, the students would naturally be curious to find the solutions to the problems presented to them.

Rules of Problem Presentation

The problem should be analyzed after it is presented in the class, using the question and answer method. With the help of the students, it should be made clear what the relationship is between the facts given in the problem and their significance in the entire situation.

1. The importance of the facts should be understood by the students. Students will be able to see which facts are necessary and which are unnecessary. The habit of analyzing the problem, which is essential for successful problem-solving, will be developed by the student in this way. Problems

cannot be solved with confidence by students who do not develop the ability to analyze them.

2. Correct calculations to get the solution are made by students. It has been observed that the correct answer to the problem is not able to be obtained by students, even after knowing the method of solving it. Simple errors in calculations are often made by them.
3. The ability to calculate accurately and quickly is necessary for students. Calculations can be practiced separately by the teacher so that difficulties in doing the calculations are not faced by students. Errors while multiplying and dividing decimals are made by most of the students.
4. The solution to the problem and re-checking are found by every student. After finding the solution to the problem, the answer should be re-checked by every student so that calculation or method-related errors in the solution can be corrected. The habit of re-checking the answers is important for students because without this, it is not possible to find the errors.

Merits Of Problem Solving Method

There are some merits of methods of problem solving

1. Students can be provided with correct information about life-related situations through problems. In this way, the social importance of the mathematics subject can be presented in the class.
2. The ability to analyze problems and differentiate between essential and unnecessary facts is developed by the student. Sometimes, incomplete facts are given in the problem and its solution cannot be found. The information depends on the correct analysis of the problem.
3. Self-confidence and self-reliance are developed by children.
4. The habit of dealing with problems, which is necessary to achieve success in life, is developed by children through the problem-solving method.
5. The habit of correct thinking and proper use of logic is developed by children with this method.6. The study of higher mathematics is helped by this method.

Limitations Of Problem Solving Method

1. It is not possible for every teacher to formulate problems based on life.
2. A collection of traditional problems is mostly contained in books.
3. Sometimes, difficulties are presented to the children by the more difficult and lengthy language of the problems.
4. Compilation of correct facts is not possible due to the rapidly changing circumstances of life.
5. In Algebra and Geometry, there are many sub-subjects in which problems related to life cannot be formulated.

References:

1. Vci, G., & Gümüs, N. (2020). The ffect of outdoor education on the achievement and recall levels of primary school students in social studies course. Review of International Geographical Education Online, 10(1), 171–206, https://doi.org/10.33403/rigeo.638453
2. Blaine, J., & Akhurst, J. (2021). A journey into understanding gendered experiences of outdoor adventure education. Journal of Adventure Education and Outdoor Learning, 23(3), 244–257. https://doi.org/10.1080/14729679.2021.2001759
3. Caruana, E. J., Roman, M., Hernández-Sánchez, J., & Solli, P. (2015). Longitudinal studies. Journal of Thoracic Disease, 7(11), 540–544. https://doi.org/10.3978/j.issn.2072-1439.2015.10.63
4. Clarke, D., & Roche, A. (2018). Using contextualized tasks to engage students in meaningful and worthwhile mathematics learning. The Journal of Mathematical Behavior, 51(9), 95–108. https://doi.org/10.1016/j.jmathb.2017.11.006
5. Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. Applied Developmental Science, 24(2), 97–140.
6. Dyment, J. E., Chick, H. L., Walker, C. T., & Macqueen, T. P. N. (2018). Pedagogical content knowledge and the teaching of outdoor education. Journal of Adventure Education and
7. Arris, B., & Petersen, D. (2019). Developing math skills in early childhood. Mathematica Policy Research, 2(2),

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