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Use of Mnemonics for Teaching Mathematics at the Primary Level

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ABSTRACT

A good understanding of mathematics is necessary not only for academics; rather it is also a fundamental skill which is required in a person's personal, social, and work life. Mathematics today owes a huge debt to the outstanding contributions made by Indian mathematicians over many hundreds of years. However, nowadays Indian students underperform in mathematics. As per the Seventh Annual Survey of Education Report (ASER), 2012, of rural India, school enrolment has risen but there is a decline in attendance, over-reliance on private tuitions and decline in reading and mathematical ability of children in the age group between six and 14. In order to improve performance in mathematics and ensure that our students are equipped with the mathematical skills needed to succeed in a global marketplace, there is a need to start from the basics at primary level. The major reason for the difficulty in comprehending mathematical concepts is their abstract nature, inability to translate mathematical meaning to real -world entities and lack of multi-step problem solving skill. Thus, use of innovative techniques which make the mathematical concepts concrete and help in memorizing the basics along with inculcation of basic mathematical concepts and skills could be useful in improving the mathematical ability. The present paper considers some mnemonic techniques which could be easily incorporated in the regular classroom teaching methodology for enhancing mathematical skills and performance.

Keywords: *Mathematics, Mnemonics, Innovative, Decline, Memorizing.*

Mathematics is the mirror of civilization and queen of all sciences .Mathematics develop intellectual traits like power of thinking, reasoning, induction, analysis, originality, imagination, generalization, discovery and so on. Mathematics is the mental activity which consists in carrying out, one after the other those mental conclusions which are induced and effective. Mathematics is just a huge of calculation in everyday life, mathematics is around in varied form i.e. When we pick the phone, manage money transition, travel to some place , mathematics is involved unintentionally in all these things. Mathematics is used throughout the world as an essential tool in many fields, including natural science, engineering, medicine, finance and the social sciences. Applied mathematics, the branch of mathematics concerned with application of

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mathematical knowledge to other fields, inspires, and makes use of new mathematical discoveries, which has led to the development of entirely new mathematical disciplines, such as statistics and game theory. Mathematicians also engage in pure mathematics, or mathematics for its own sake, without having any application in mind. There is no clear line separating pure and applied mathematics, and practical applications for what began as pure mathematics are often discovered.

Definitions of Mathematics

Aristotle defined mathematics as "The Science of Quantity", and this definition prevailed until the 18th century. Starting in the 19th century, when the study of mathematics increased in rigor and began to address abstract topics such as group theory and projective geometry, which have no clear-cut relation to quantity and measurement, mathematicians, and philosophers began to propose a variety of new definition. Some of these definitions emphasize the deductive character of much of mathematics, some emphasize its abstractness, and some emphasize certain topics within mathematics. Today, no consensus on the definition of mathematics prevails, even among professionals. There is not even consensus on whether mathematics is an art or a science. A great many professional mathematicians take no interest in a definition of mathematics, or consider it indefinable. Some just say, "Mathematics is what mathematicians do."

Applied definition of mathematic

1. Applied Mathematics concerns the application of mathematics in a wide range of disciplines in various areas such as science, technology, business, and commerce. Applied mathematicians are engaged in the creation, study and application of advanced mathematical methods relevant to specific problems. Once this referred mainly to the application of mathematics to such disciplines as mechanics and fluid dynamics but currently, applied mathematics has assumed a much broader meaning and embraces such diverse fields as communication theory, theory of optimization, theory of games and numerical analysis. Indeed, today there is a remarkable range and variety of applications of mathematics in industry and government, involving important real-world problems such as materials processing, design, medical diagnosis, development of financial products, network management and weather prediction.

2. Human beings have innate natural tendencies to count, to quantify, and to apply logic in their attempts at understanding the world. Mathematics is the human endeavor which has come to provide definition and scope to these activities, in terms which employ the utmost precision of thought. A few ancient civilizations developed mathematical systems to some extent, for example some of the Babylonians, but the first great step in the establishment of mathematics was made by the Greeks between 600 and 300 BCE. The contribution of Euclid was to state theorems in geometry and to construct their proofs from a small number of basic statements, called axioms, taken as the starting point of the subject. This showed that new knowledge could be obtained by pure reasoning about the basic axioms. The roots of probably all major divisions of mathematics go back to concern about practical matters or knowledge of the natural world. In

a few situations serious investigation of the natural world has lead directly to the creation of whole areas of mathematics that not only produced methods for formulating and solving important physical problems but lead, by further development, to new advanced mathematical subjects. The most striking example of this is the invention of calculus in the 17th century to solve the problem of motion, particularly the motion of the planets under their mutual gravitational attractions. The development and extension of calculus, along with the construction of a mathematical foundation for it, lead to the subject called analysis, a major part of mathematics. But mathematics itself is not physical theory. The growth of mathematical roots, as mathematics, involves abstraction away from concern with particular objects towards an emphasis on relations among abstract objects, axiomatization, and establishment of the basic characteristics and facts of a subject by rigorous proof. A piece of mathematics developed this way may be considered to stand alone as a coherent logical structure independent of any connections to the physical world that may be possible. Its inherent content often suggests to mathematicians ways for further axiomatization and logical development which lead to new interesting structures, often to ones for which no relation to the physical world seems possible. However, experience has shown that areas of mathematics developed from purely mathematical motivation do find, with surprising frequency, significant application in the real world, sometimes many years after their development. Thus there are two intrinsic connections of mathematics with the real world, the direct one, illustrated by the invention of calculus, and what might at first be called the serendipitous. But the latter is so prevalent that it forces the recognition that any area of mathematics may prove useful.

This is the setting in which the meaning of the term "applied mathematics" is to be understood. Modern applied mathematics is two things. It is the attempt to use mathematics to quantify and solve problems which arise in investigation of the physical world and human enterprise. It is also the study and further development of those areas of mathematics that have proven the most useful in solving real world problems or seem to offer promise for present problems. Thus a distinction between applied and pure mathematics is one of the interest and purpose of the practitioner, it is not a fixed dichotomy or division of the subject areas of mathematics.

Historically, applied mathematics mostly concerned theoretical physics and physical problems. The fundamental laws of physics are formulated as mathematical equations governing the behavior of physical quantities. These provide our deepest understanding of the physical world and our most accurate predictions of physical phenomena. While problems arising from physics and ranging from the study of classical fluids to quantum systems remain a significant part, applied mathematics has grown to include a wide variety of other areas such as bio-mathematics, cryptography, scientific computation, mathematical modeling, economics, financial mathematics.

Mathematical ability

Mathematical ability has been found to be multi-componential, with simple mathematical skills at the structural and technical vocabulary and higher order cognitive abilities at the semantic end

.The smallest unit of processing-numerals and operands are abstract symbols which are assigned an arbitiory meaning by association with a particular concrete unit or process. The association is learnt and the representation of the symbols can be in varied forms such as numerals /verbal, concrete or collection of concrete unit. Single digit numerals are combined to form multi digit numbers where meaning of a digit assumes a different meaning of a digit assumes a different meaning in terms of its position in the digit i.e. tens ,hundred , thousand etc. the digit can further be combined with different operands to give rise to completely different relations and meaning.

Causes of Mathematical disability

Math is often associate with pain and frustration. For instance unpaid bills, unforeseen debts, unbalanced check book.

- Mathematics concept which are abstract in nature.
- Overly procedural thinking in mathematics.
- Lack of ability to translate the Mathematical meaning to real world meaning.
- Lack of ability to make approximation or estimations in mathematics.
- Lack of multi-step problem solving skills.

How to improve Mathematical ability

Use of some innovative idea ideas and technique which make the mathematical concept concrete and skills could be useful in improving the mathematical ability. Now we use some mnemonics technique to improve the mathematical ability. Mnemonics devices are excellent tools for student to remembering important facts. Mnemonics instruction as a strategy that provides a visual or verbal promote for students who may have difficulty retaining information. It is a memory enhancing instructional strategy that involved students that is taught to information they already known.

Mnemonics Technique

Mnemonic device is any learning technique that aids information retention. Mnemonics aim to translate information into a form that the brain can retain better than its original form. Even the process of merely learning this conversion might already aid in the transfer of information to long-term memory. Commonly encountered mnemonics are often used for lists and in auditory form, such as short poems, acronyms, or memorable phrases, but mnemonics can also be used for other types of information and in visual or kinesthetic forms. Their use is based on the observation that the human mind more easily remembers spatial, personal, surprising, physical, sexual, humorous, or otherwise 'relatable' information, rather than more abstract or impersonal forms of information. The word *mnemonic* is derived from the Ancient Greek word (*mnēmonikos*), meaning "of memory, or relating to memory and is related to Mnemosyne ("remembrance"), the name of the goddess of memory in Greek mythology. Both of these words are derived from (*mnēmē*), "remembrance, memory" Mnemonics in antiquity were most often considered in the context of what is today known as the Art of Memory.

Peg word and method of loci

The *peg word* mnemonic technique is typically used for remembering an ordered list of items; it involves two stages. First, the learner memorizes a rhyming scheme for the numbers 1 to 10, which can be used multiple times: Next, the learner creates a mental image of each item on the to-be-learned list interacting with the word that rhymes with the appropriate number.
Learn to count 0 to 10

: *One is a bun, two is a shoe, three is a tree, four is a door, five is a hive, six is bricks, seven is heaven, eight is a plate, nine is wine, ten is a hen.*

.LEARN WRITES TO NUMBER 1 TO 10

Around to the left to find my hero,
Back to the top, I've made a zero.

Downward stroke, (My that's fun),
Now I've made the number one.

Half a heart says, "I love you."
A line -- now I made the number two.

Around the tree, around the tree,
Now I've made the number three.

Down and across and down once more.
Now I've made the number four.

The hat, the back, the belly. It's a five.
Watch out! It might come alive.

Bend down low to pick up sticks.
Now I've made the number six.

Across the sky and down from heaven,
Now I've made the number seven.

Make an S and close the gate.
Now I've made the number eight.

An oval and a line,
Now I've made the number nine.

One (1) egg (0) laid my hen.
Now I've made the number ten.

Song, Rhyme, and Story Mnemonics

This category is a catch-all for several types of semantic-based mnemonic techniques. Learners create a song, rhyme, or story that organizes and/or describes the to-be-learned material.

Van Voorhis (2002) compared statistical concept learning for students who learned and sang "stat jingles" to those who simply read the concept definitions aloud. Students in the jingle condition outperformed those in the read-only condition on short-answer test questions. VanVoorhis argued that music inherently increases chunking, which in turn aids in the transfer from short-term/working memory to long-term memory. She also reported high student enjoyment of the jingles, noting that this is an especially impressive feat in a statistics course.

Some mathematical example through we inhance mathematical ability

Isosceles triangles
Sing the song to the tune of "oh charismas tree"
Oh, isosceles, oh ,isosceles,
Two angles have
Oh, equal degree
Oh, isosceles oh, isoscel
You just like a charismas tree

ROMAN NUMERICALS IN ORDER

Lucy can't drink milk

50(L)
100(C)
500(D)
1000(M)

Mathematical order of operations:-

BEDMAS:-

Brackets/Exponents/Divisions/Multiplications/Addition/Substraction

The Metric System:-

Kilo/Hecto/Deca/Base Desi/Centi/Milli
KING Henry died by drinking chocolate milk.

The present paper considers some mnemonic techniques which could be easily incorporated in the regular classroom teaching methodology for enhancing mathematical skills and performance.

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