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Address:-Ashok Yakkaldevi 258/34, Raviwar Peth, Solapur - 413 005 Maharashtra, India
Cell : 9595 359 435, Ph No: 02172372010 Email: ayisrj@yahoo.in Website: www.aygrt.isrj.org

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TEACHING IN MATHEMATICS

S. Leo Stanly
Associate Professor

Short Profile

S. Leo Stanly is working as an Associate Professor . He has completed of M.Sc., M.Ed., M.Phil., Ph.D., NET. He has professional experience of 18 Years.

ABSTRACT:

Mathematics is a logical science. It is also an exact science with a highly organized and systematized body of knowledge. Its processes involve encoding and decoding of many concepts and abstractions. It is a "vehicle to train a child to think, reason and analyze and to articulate logically" (Ministry of Human Resource Development, 1986). Mathematics is taught for the training of the mind. Mathematics helps in developing the different faculties of mind like analytical thinking, divergent thinking, reasoning ability, observation capacity, rational thinking, judgment, precision, concentration, expression, and so on.

KEYWORDS
Mathematics, Teaching.

INTRODUCTION

DEFINITION OF MATHEMATICS

"What science can there be, more noble, more excellent, more useful for men, more admirable, high and demonstrative than that of mathematics" – Benjamin Franklin.

A knowledge of mathematics not only helps a student to acquire a great many mathematical facts, but also to apply these facts intelligently to discover new facts through efficient reasoning. Moreover, knowledge is of use only when one is able to apply it in new situations. The ability to apply one's knowledge requires power to think effectively. The subject of mathematics offers this knowledge profusely. Mathematics can be taken as a creative activity for students since it involves graphs, analysis, and formula writing. To solve a problem in mathematics, students need time to explore ideas and to see the relationship between concepts. Thus, finding a solution to a problem will further motivate the students to practice more by doing the exercises from their textbooks.

The general aims of teaching Mathematics are as follows:

1. Utilitarian aims: The students are enabled to apply mathematical knowledge in day-to-day life.
2. Disciplinary aims: Mathematics helps in disciplining the minds of the children.
3. Cultural aims: This aim helps the students to understand the role of mathematics in the development of civilization and culture.
4. Social aims: It helps the learners to imbibe social virtues.
5. Intellectual aims: It helps in developing the intellectual faculties of the mind.
6. Moral aims: It leads the students to imbibe the attributes of morality.
7. Aesthetic aims: It develops their aesthetic sensibilities.
8. Vocational aims: It helps them to prepare for future vocations.
9. Inter disciplinary aims: It helps them to gain insight into the application of mathematics in other subjects.

IMPORTANCE OF MATHEMATICS IN THE SECONDARY SCHOOL CURRICULUM

Kothari Commission, a most significant commission of Indian education, wisely remarked that, "Science and mathematics should be taught as compulsory basis to all students as a part of general education during the first 10 years of schooling. In addition, there should be provision for special courses in these subjects at the secondary stage for students of more than average".

The teacher-education commission for secondary school states that a teacher is also modified by giving importance to Activity-Oriented Approaches and a Child-Centered Approach of teaching. DIETs were established in all the districts of Tamilnadu and Central Board of Secondary education all over India to help the states to give training to their teachers. Funds were allotted to improve the infrastructural facilities of the schools. In spite of all this, universalisation of quality education has not been fully achieved so far. The level of achievement in Mathematics also remains poor.

The commission at the secondary stage primarily aims at enhancing the capacity of the students to employ mathematics to solve day-to-day problems confronting our life and to study the subject as a

separate discipline.

APPROACHES TO TEACHING OF MATHEMATICS

There are number of approaches to the teaching of mathematics. Some of the methods are

1.Conventional Method
2.Peer tutoring
3.Problem-based learning
4.Co-operative learning
5.Inquiry based learning
6.Laboratory approach
7.Computer Assisted Instruction
8.Activity oriented approach etc.

PROBLEMS IN TEACHING MATHEMATICS

Some of the problems in teaching Mathematics are

- Cumulative backwardness
- Abstractness of the subject
- Special language with symbols
- Involves high cognitive functions which makes learning challenging
- Absence of Mathematical Laboratories at the lower level makes the understanding of the concept difficult.

Students feel that the syllabus does not give proper importance to everyday life situations, and it is not possible to learn the whole syllabus within the given time. Students are sometimes not satisfied with the assignments and practical work given in the textbook.

With regard to workload, the number of periods allotted to learn Mathematics is not sufficient. They learn mathematics by reading, guessing, without knowing the concepts, and they do not have the freedom to learn mathematics. They do not get individual attention and teacher's co-operation. With regard to teaching aids and other facilities, the students do not have enough audio visual aids, like projectors, computers, video cassettes, etc., in their respective schools for learning mathematics.

NEED FOR INNOVATIVE TEACHING IN MATHEMATICS

According to Rabindranath Tagore, the main objective of teaching is not to explain the meaning but to knock the door of the mind. In his opinion, the name TEACHER refers to a person who is Truthful (T), Energetic (E), Affectionate (A), Co-operative (C), Humble (H), Efficient (E), and Resourceful (R).

A teacher should bear in mind that nothing is taught till it is learnt. So a conscientious and responsible teacher should ensure that what has been communicated has been grasped by the students. Further, it should be his aim not only to make the students think, but to make them think

right.

In the opinion of retired Air Vice Marshal, J. Mariadass (The Hindu, Feb.1997), the word education itself can be considered as an acronym of E-Enlightenment, D-Dedication, U-Understanding, C-Curiosity, A-Affection, T-Tolerance, I-Intelligence. O-Organization, and N-Nobility.

The National Policy on Education (1986) states that " In the Indian way of thinking , a human being is a positive asset and a precious national resource which needs to be cherished, nurtured, and developed with tenderness and care completed with dynamism". Each individual's growth presents a different range of problems and requires attention at every stage from the womb to the tomb. The catalytic action of education in this complex and dynamic growth process needs to be planned meticulously and executed with great sensitivity. Gowin, the author of the "The Theory of Education" says that for each student, classroom experience should be titillating and joyful, because of good understanding. The meaning should be discovered by the learner in the classroom.

The Kothari Commission report (1960) states,"If science is partly taught and badly learnt, it is little more than burdening the mind with dead information and it could degenerate into new superstitions".

MATHEMATICS - SWEET AND SOUR

Mathematics is the queen of all sciences. It is a subject which is sweet and sour, sweet for those who are either gifted with numerical ability or who develop an interest for numbers over a period of time and sour for those who do not have any aptitude for the subject. Unfortunately, the former are very few and the latter a majority. These overwhelming numbers of students are those who yearn for a certificate to enter the "world of work", while all the other subjects are found to be general in nature and easy to learn, it is only mathematics which is the Waterloo for many. This may be due to the nature of the subject mathematics which is based on the number concepts which itself is abstract.

With the advent of science and technology, new content in mathematics was introduced into school and higher education curriculum by NCERT at the National level, SCERT at the state level, and by universities at the higher level. Though the context was upgraded, it was observed that teachers adopted the traditional teaching method in the classroom to cover the content. This, hence, did not help achieve the goals and objectives of mathematics teaching. In fact, it has failed to meet the challenges of the twenty-first century and the knowledge explosion, resulting in low quality of instruction and incompetent learners. The increase in the teacher-pupil ratio, the amount of educational material, and the curriculum have created problems both for teachers and pupils in achieving their goals and objectives.

Decline in the quality of instruction is one of the serious problems being faced by many third world countries and to check this erosion of quality, there is need to improve the quality of instructions which necessitates the introduction of new innovations to be applied in the teaching of mathematics.

Researchers have shown that the mental status of teachers and students plays an important role in the learning process, and by image construction and verbal representation, the learner liberally transforms information into knowledge. However, the learning process is not so easy. In such circumstances, instead of meaningful learning, the students are tempted to follow rote learning. This necessitates an innovative approach to be followed in mathematics education.

E – LEARNING MODULES IN MATHEMATICS

The National Minimum Curriculum (NMC, 1999) emphasizes what has long been recognized: that practical activity, discussion, and focused teaching are the triple key to understanding mathematics. Providing the right equipment is not enough on its own. Children learn mathematics best if it is presented in an enjoyable way and discussed with skilled and informed questioning from the teacher.

Herbert Baskaran S. (2011) opined that crisp E-learning content is the need of the day, and further remarked that e-content development involves different roles, such as content writers, subject matter experts, instructional designers, interface designers, and graphic designers. Unlike traditional content writing, E-learning content development is a matter of a mute-step process which requires deep expertise and quality control at every step. The e-content writer must be thorough with the basics of content writing and language used in E-learning, like coherence cohesion, accuracy, brevity, clarity, etc., He must also be thorough with interactive architecture and technical skills like flowcharting and other organization tools. First, the raw content built by the subject experts is vetted with the requirement of the client. Then, storyboarding is done by the experts in instructional design, graphics and animation. The flow of the story board is then checked to see whether it is amenable to imparting instruction. The content is then transformed into rich media. Where required, voice over is given to the presentation. A final check is done before the module is packaged.

The various uses of E-learning modules in mathematics are

- Teaching
- Diagnostic Testing
- Remedial Teaching
- Evaluation
- Development of Virtual Laboratory
- Online Tutoring
- Instructional Material Development

In teaching, along with giving information, the other objectives are

- Developing understanding and application of the concepts
- Developing expression power
- Developing reasoning and thinking power
- Developing judgment and the decision-making ability
- Improving comprehension, speed, and problem solving
- Developing proper study habits
- Developing tolerance and ambiguity, risk taking capacity, scientific temper, etc.

It is a well-known fact that not a single teacher is capable of giving up-to-date and complete information in his own subject. The E-learning modules can fill this gap.

Samson Gunga (2010) studied the challenges of the implementation of E-learning in mathematics education in African schools. The primary objective of this study was to study the difficulty posed by challenges of communicating the principles of understanding the structure of

mathematics. In his research, he established the manner in which E-learning technology could be appropriate for understanding and communicating the structures of mathematics.

Odd Bringslid and Anne Norstein (2008) did a research on teaching mathematics using Steplets. The main objective of this study was to evaluate online mathematical content used for teaching mathematics in engineering classes and in distance education for teacher training students. Online computer algebra modules (Steplets) for undergraduate students have been designed and it was found that the E-learning modules (Steplets) helped more in the understanding of the mathematics subject.

Norngainy Mohd Tawil, et al. (2011) conducted a study on E-learning versus the traditional method in teaching mathematics and statistics courses for engineering students in the University of Kebangsaan, Malaysia. The main objectives of this study were to test whether there is any difference between these two methods, and to identify which method is more important and agreeable to the students. The study revealed that E-learning was found to be more effective that the traditional method.

E-learning has gives education a new dimension, taking classroom learning to the next level through the creation of virtual communities of learners and teachers who interact online. E-learning is more than distance education where resources are simply put online. E-learning is a virtual campus that involves rich, instructional, and social interaction; it could improve the flexibility, quality, and focus of education. Hence, the most abstract concepts of mathematics can be taught effectively to students with the help of E-learning modules.

CONCLUSION:

Mathematics is taught for the training of the mind. Mathematics helps in developing the different faculties of mind like analytical thinking, divergent thinking, reasoning ability, observation capacity, rational thinking, judgment, precision, concentration, expression, and so on. A knowledge of mathematics not only helps a student to acquire a great many mathematical facts, but also to apply these facts intelligently to discover new facts through efficient reasoning. Moreover, knowledge is of use only when one is able to apply it in new situations. Mathematics can be taken as a creative activity for students since it involves graphs, analysis, and formula writing. To solve a problem in mathematics, students need time to explore ideas and to see the relationship between concepts. Cultural aims: This aim helps the students to understand the role of mathematics in the development of civilization and culture. Kothari Commission, a most significant commission of Indian education, wisely remarked that, Science and mathematics should be taught as compulsory basis to all students as a part of general education during the first 10 years of schooling. In addition, there should be provision for special courses in these subjects at the secondary stage for students of more than average.

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