LEARNING OF MATHEMATICS: PROBLEMS AND ISSUES

Dr. Lalima
Assistant Professor,
Department of Education,
Babasaheb Bhimrao Ambedkar University.

ABSTRACT

The proposed paper is focusing on Mathematics as subject, its relevance and the present scenario of Mathematics teaching. The aiuthor has discussed various problems related to mathematics learning, the hindrances for students to comprehend and apply mathematical knowledge and limitations of teaching learning process. With the help of review of related literature paper is also reflecting that how innovative and creative initiatives in teaching can improve the motivational level, achievement and interest of students in Mathematics

The word Mathematics comes from a Greek word Mathematikos meaning "**inclined to learn**". As expressed by Indian mathematician "Ganit" means the "**science of calculation**". The oxford dictionary explains Mathematics as **"science of number, quantities and measurement"**. The term Mathematics is defined in different ways by different writers. To Locke Mathematics was ***"a way to settle in mind the habit of reasoning."*** Locke visualized Mathematics as the vehicle to train child's ability to reason and analyze. Whitehead also defined Mathematics in similar way stating that "***mathematics in its widest sense is development of all type of deductive reasoning."*** (*Wango (2004), page no. 1-3).* According to Galileo "***mathematics is the language in which God has written the universe"***. (*Kulshrestha (2003), 13*).

When we subject all these definitions to analysis we find that mathematics is a very broad term and it touches various aspects of human knowledge and learning. It is the numerical and calculation part of man's life and knowledge. It is the study of numbers, set of points and various abstract elements together, study of relation between them and operation performed on them.

Mathematics is considered

A Language: it is considered as language used to explain size and order. Equations and statements of inequality are mathematical sentences.

An Art: mathematical ideas fit together in a harmonious manner. A beauty exists in the patterns, relationship and symmetry in arithmetic and geometry.

A Science: Mathematics is the science of logical reasoning; it involves a search for truth. It is rigorous and precise. Mathematics continues to change and develop.

A Tool: mathematics equips pupil with a uniquely powerful set of tools to understand and change. It is a tool that contains skill for problem solving, organizing, simplifying and interpreting data and performing calculations that are necessary in other subjects.

A Game: the individual can create a set of consistent rules and regulations and proceed by logical reasoning to invent and play game. (*Lexicon Universal Encyclopaedia, 221-222*)

Aims of teaching Mathematics

The general aims, which apply to teaching of any branch of mathematics, are expressed below-

1)   Abilities

- ♦ To express thoughts clearly and accurately.
- ♦ To systematically organize and interpret the given data.
- ♦ To reach correct conclusions by accurate & logical thinking.
- ♦ To analyze a problem discovering fundamental relationships.
- ♦ To perform original thinking & investigation.
- ♦ To accurately generalize special concepts.
- ♦ To exercise intuitive powers & common sense.

2) Appreciation

- ♦ To contributions of mathematics to other subject.
- ♦ Of the influence of mathematics upon human progress.
- ♦ Of the vocational values of mathematics.
- ♦ Of the rigor and power of mathematical progress.
- ♦ Of cultural values of mathematics.
- ♦ Of mathematics for leisure time activity.

3) Attitudes

- ♦ To cultivate proper habits of study and power of concentration.
- ♦ To train the mind in scientific thinking.
- ♦ To attain the power of clear and accurate expression.
- ♦ To seek ability to do independent & original thinking.

♦ To build self confidence & reserve powers which constitute a strong personality.

To seek knowledge with an open mind for the sake of its possible usefulness.

Mathematics was part of education in most ancient civilization including Ancient Greece, the Roman Empire, Vedic society and Ancient Egypt. In Plato's division of liberal arts into trivium and quadrivium, the quadrivium

included the mathematics as arithmetic and geometry. By the twentieth century mathematics was the part of the core-curriculum in nearly all the countries.

India also has a long history of teaching and learning mathematics dating back to Vedic age (1500 to 200 B.C.). During the period A.D.200 to 400 several works on mathematics were composed. Most notable of this period is contribution of Jaina mathematician. The Jaina text prescribed arithmetic as one of the most essential requirement for children's first education.

In post independent India great emphasis is laid on mathematics teaching and learning. Kothari Commission (1964-66) recommended that the curriculum of primary stage should include one language, mathematics, and study of environment, health education and creative education.

Mathematics has always been a prominent and core subjects in the primary as well secondary level because of its values in profession, practical and personal life of the student.

Values of mathematics

) **Practical value**: Mathematics has entered in our life and daily activities so much that our existence would become impossible without it. It has become the basis of world's entire business and commercial system. Ignorance of Mathematics in the masses can work as a formidable obstacle in way of country's progress. Counting, addition, notation, multiplication are fundamental process of mathematics which have got an immense practical value in life.

National curriculum for elementary and secondary education a framework of 1988 prepared by N.C.E.R.T. decided to spend 75% of total school time on mathematics at primary stage. Napoleon said "*the progress and improvement of mathematics are linked to prosperity of state"* (*Sidhu (2002),4*)

Mathematics is also required to study other school subject, especially science subjects. It is the base of all essential knowledge and progress in science and technology. Bacon says- *"mathematics is the gate and key to all science"*

According to mathematician Young J.W.A *"whenever we turn in these days of iron, steam and electricity we find that mathematics has been the pioneer, were its backbone removed, our material civilization would inevitably collapse."* (*Gakar, 2002. 4*)

2) **Disciplinary value**: mathematics is the subject whose knowledge develops the habit of hard work, concentration, punctuality, neatness and orderliness of work. Mathematics possesses certain characteristics which are suitable for training of learner's mind. These characteristics are simplicity, accuracy, certainty of results etc. If properly taught mathematics develops reasoning and thinking power and discourages memorization on the part of students.

 3) **Intellectual value**: Hubsch has rightly said – *"mathematics sharpens the mind of the people in the same way as some stone sharpens the tool."* (The great value of mathematics is that it has introduced us to new way of thinking and reasoning. It teaches people to sharpen their intellect and makes them more careful and systematic. The views of mathematician Schultze is worth mentioning *" mathematics is primarily taught on account of*

mental training it affords and secondarily on account of the knowledge fact it imparts." (*Gakhar (2002) , 6).* Every mathematical problem poses an intellectual challenge and is unique mental exercise. The subject is taught for the development of power rather than knowledge. It develops our power of acquiring knowledge, thinking, reasoning, judgment and generalization.

4) **Cultural value**: mathematics has played an important role in determining the culture and civilization of a country from time to time. Hogben stated – "*the development of mathematics at any time in any country is true mirror of its civilization and progress at that time".* Prosperity of man and his cultural advancement have dependent considerably upon the advancement of mathematics. The welfare of our civilization is dependent upon scientific as well as on mathematical progress.

5) **Moral value**: mathematics develops morality by teaching truthfulness, honesty, patience, self control and self confidence. It helps in developing proper moral attitudes as there is no place for prejudiced feeling. The Greek philosopher Dutton rightly remarked that "….*gossip, flattery, slander, deceit- all speak from a slovenly mind that has not been trained by mathematics*."

6) **Vocational value**: a sound and productive vocational life demands a sound mathematical background. The study of mathematics prepares for various occupations, agriculture, and trade and computer application.

Considering above stated values of mathematics there is no doubt that the place of mathematics in education is a central one. By virtue of its exclusive practical application it has long held a prominent place in education. This prominence has generated long and serious concern about how one learns the facts, concepts and reasoning processes central to mathematical analysis and what are the appropriate methods of teaching and learning mathematics.

The teachers employ various methods to teach Mathematics. The common methods which are used in classroom teaching are Lecture method, Dogmatic method, Inductive-deductive method, heuristic method, project method and laboratory method etc.

These methods are generally used in the Indian schools and the problem in all the above stated methods is that they are teacher centered; teachers play a vital role especially in lecture and dogmatic method. Students are passive participant in teaching learning process. Although in inductive deductive method lesson is developed with the help of students but it is not able to cater individual differences. So with advancement of psychological theories new child centered methods are coming in use these are project method, heuristic method, problem solving method etc.

As stated above methods which are generally employed by teachers for teaching Mathematics, are generally teacher centered where students' individual capacity and interest find no place. In our classroom the pupil teacher ratio is continuously increasing due to which it is more difficult for the teachers to give individual attention to students, there is no facility for providing proper remedial and diagnostic teaching which ultimately leads to low achievements.   In her talk with several secondary students author understood that many of the

students disliked mathematics and find problem solving in Mathematics too complicated. They lack interest in Mathematics learning. Nearly seventy percents of students were not benefitted by the classroom instruction in Mathematics and were depending on tuitions or coaching where they get individualized attention. . Sharma (1978) in his study reported causes of low achievements in Mathematics as defective text books, insufficient drill work and absence of suitable methods. Indira Chacko in his study surveyed primary students regarding the three subjects they like and dislike most. Nearly 69.5% (89 out of 128) listed mathematics as one of the subjects they dislike and their reasons of this disliking include poor teaching, negative attitude of teachers and lack of proper materials other than textbooks. All the above discussion gives us the picture that environment in our classrooms is not favourable for learning of Mathematics. Ganal Nicette N and Guiab Marissa R (2014).studied the problems and difficulties encountered by elementary students in mastering competency in Mathematics. Among others problems this study pointed out on the problems related to teachers and Methodology of teaching, the students were not finding the methods of teaching motivating and they reported lack of creativity in teachers to adapt to individual learners capability. Singha Gopal Krishna, Goswami Mrinmoy and Bharali, Ranju (2012) studied the problems and difficulties faced by teachers and students in learning and teaching of mathematics .the study adopted descriptive survey design. Almost 60percent students reported that they find mathematics too complex to understand, 30 percent students reported that basics of Mathematics are not clear to them. Eighty percent of teachers reported that most students come to classroom with negative attitude and 70 percent teachers were of the view that many students do not study mathematics willingly.

The studies discussed above clearly indicate that Mathematics learning is not motivating and enjoyable for students . They find subject as too complex to comprehend. One of the main reasons for this is use of inappropriate methods , lack of creativity on part of teachers, lack of interesting teaching learning materials, dearth of individualized learning, diagnostic and remedial teaching.

Mathematics knowledge is propositional, abstract, conceptual, skill based and explicit. The teaching learning situations for Mathematics have to be designed considering its nature, its applicability and needs of learners. The learning situations for Mathematics should have following characteristics-

- Help each child to move with his own pace
- Have scope for diagnosis of student's problems and rectifying it before it accumulates and cause hindrance in further learning
- Should place students in a role of knowledge constructor
- Give students sufficient practice so that the skills of solving Mathematical problems can be solved accurately and rapidly
- They should focus more on mental mathematics
- promote reflective thinking and developing in students logical reasoning , analytical thinking and creativity
- should make learning Mathematics a fun activity

- Based on principle of correlation and focus on practical applicability of Mathematical concepts.
- provide reinforcement whenever needed and creating cordial and motivating atmosphere
- stimulating researching abilities in students by keeping them in place of discoverers

Many of the child centred methods like play way method, heuristic methods, laboratory methods, problem solving , inductive methods , programmed leaning material and computer instructed instruction, field work and methods based on constructivism and cooperative learning approach if utilized in a well planned way have all the above stated characteristics. We need to come out from traditional concept of schools and classrooms where student sit in a disciplined way and try to grasp the concepts taught by teachers and reshape our classrooms and school campus as a learning laboratory where students enjoy learning in a stress free environment , comprehend and practice concepts in a way that facilitate transfer of learning.   Many researchers studied the effect of innovative methods for teaching of Mathematics. The objective of the study of Verma (2003) were to develop the understanding of two digit number effectively in students of class one by developing teaching material and making learning a pleasurable task for students. The study reflected a major improvement in the performance of students. In pre-test only eighteen percent girls and twenty percent boys secured above 80% marks but in post test eighty one percent girls and eight percent boys secured above 80%. Caton (2002) studied the effectiveness of multimedia instruction, the mathematical videos on the achievement and learning behaviour of fourth grade learners learning perimeter and area, results of the study shows that video viewing prior to instruction affected self initiated class participation , it was effective for maintaining student's attention, interest and for enhancing students understanding of the concepts. Nalayini (1991) studied the effectiveness of using number games to teach Mathematics at primary level. The study was conducted on students of primary level in Coimbatore. Results showed that number games motivated children to develop the computational skills and they showed significant improvement. Michael(2001) studied the role of stories in Mathematics instruction. The main objective of the study was to investigate whether use of stories in Mathematics instruction can facilitate student's initial construction of higher order mathematical concepts. Sample consist of twenty fifth grade students, student read stories containing implied problems on requiring mathematical concepts. Results showed improvement in post test.

All the studies clearly reflect that innovative pedagogical approach is positively related to student's attention , interest and achievement in mathematics. The teachers and management should cooperatively try to revamp the mathematics classroom as dynamic place that work as flipped classroom , mathematical laboratory , play area , discussion area or tutorial space as per the requirement of learners .

Conclusion- we have a very strong theoretical base of appropriate methods that can make Mathematics learning an interesting task for students, we need a strong willingness on part of educationist and specially teachers to bring these methods from the theoretical framework to application platform . We need motivated and creative teachers who are willing to appropriately modify the principles of the methods to meet the needs of their learners

and design the leaning situation in which every child feels as it is designed keeping in mind his capabilities, his learning style and his needs.

REFERENCES

- Bhatia, Kamala and Bhatia, B.D.(1992). The Principles and methods of teaching. New Delhi: Doaba House.

- Caton, Joan (2002). Multimedia Mathematics instruction what are the achievements on different samples of 4th grade learners. Dissertation abstracts International of Humanities and social sciences. 63(01).

- Chacko, Indira.Mathematics-As seen by pupil & teachers: a way forward. Retrieved from http://math.unipa.it/-grim/chacko.pdf

- Dev, P,Vimpa.(2004). Achievement of class II students in Mathematics. EduTrack. 13(10).

- Ediger, Marlow and Rao, Digumarti Bhaskara.(2000). Teaching Mathematics Successfully. New Delhi: Discovery Publishing house

- **Encyclopedia of Educational Learning and Teaching Technology** (1997). 1, The essentials of Teaching and Learning. Kaushik, Vijay Kumar and Sharma, S.R. (eds). New Delhi: Anmol Publications Pvt Ltd

- Encyclopedia of Modern Methods of Teaching and Leaning. (2000). III. Rao, V.K. (ed). New Delhi: Anmol Publications

- Encyclopedia of Educational Learning and Teaching Technology.(1997)/ 1. The essential of teaching and learning. Kaushik, Vijay Kumar and Sharma, sr(eds). New Delhi: Anmol Publications.

- Gakhar, S.C.(2002). Teaching of Mathematics.: Haryana: N M Publications.

- Ganal Nicette N and Guiab Marissa R (2014).Problems and difficulties encountered by students towards mastering learning competencies in mathematics. Researchers world-journal of Arts, Science and Commerce. V(4). 25-37 retrieved from http://www.researchersworld.com /vol5/issue4/Paper_03.pdf.

- Gupta, Fatah Singh. (2004).Learning Mathematics while Playing . Primary Shikshak. New Delhi: NCERT.

- James Annie and Balsubramaniam, P.S(2007). Teaching of Mathematics. New Delhi: Neelkamal Publicatons.

- Kulshrestha, Arn Kumar.(2003). Teaching of Mathematics. Meerut: Surya Publication.

- Lexicon Universal Encycoledia.(1983). 13M. New York: Lexicon Publication Inc. 221-227

- Maurya, rajendra Prasad.(2003). History of Mathematics Teaching and Place of Mathematics in Curriculum. Prathmik Shiksha. Vol-4. New Delhi: NCERT.

- Michael, Brook.(2000). The roe of stories in mathematics Instruction. Dissertation Abstract International of Humanistic and social sciences. 61(8).

- Nooriafshar, Mehryar. The use of innoavative teaching methods for maximizing the enjoyement fro learning mathematical concept. Retrieved from http:/www.ex.ac.uk/cimt'ijmtt/nooriafshar1.pdf.

- Reichmann, W J(1967). The spell of Mathematics. London: Methuen & co Ltd.

- Shah Payal.(2002).Strategies for Teaching of word problems in Mathemtics. The Primary Teacher. XXVII(2). New Delhi: NCERT. 13-20.

- Sidhu, Kulbir Singh (2003). The teaching of Mathematics. New Delhi: Sterling Publishers.

- Singha Gopal Krishna, Goswami Mrinmoy and Bharali Ranju (2012) **.** Study of various problems faced by the students and teachers in learning & teaching mathematics and their suggestive measures. International Journal of Advanced research in Management and Social Sciences .1(2). 195-201. Retrieved from https://www.academia.edu/5450756

- Verma, bharti(2003). Development of learning material to make teaching of two digt numbers effectively and actively in class 1 and to test its utility. Primary Teachger. 225-32. New Delhi: NCERT

- Wangoo, M.L. and Singh, arvinder Preet. (2004). Tecahing of Mathemtics. Ludhiana: Tandon Publications.