CHAPTER - I

INTRODUCTION
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## INTRODUCTION

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Importance of Mathematics Education</td>
<td>3</td>
</tr>
<tr>
<td>1.3 Aims and Objectives of teaching Mathematics</td>
<td>6</td>
</tr>
<tr>
<td>1.4 Present status of teaching Mathematics</td>
<td>8</td>
</tr>
<tr>
<td>1.5 Need for innovative approach in teaching</td>
<td>10</td>
</tr>
<tr>
<td>1.6 Need for the co-operative learning approach</td>
<td>13</td>
</tr>
<tr>
<td>1.7 Need and significance of the study</td>
<td>14</td>
</tr>
<tr>
<td>1.8 Scope of the study</td>
<td>16</td>
</tr>
<tr>
<td>1.9 Statement of the problem</td>
<td>17</td>
</tr>
</tbody>
</table>
CHAPTER - I

INTRODUCTION

1.1. INTRODUCTION:-

According to the world book Encyclopaedia (1988), "Education is a process by which people acquire knowledge, skills, habits, values or attitudes. Education helps people adjust to change. This benefit has become increasingly important because social changes today take place with increasing speed and affect the lives of more and more people. Education can help a person understand these changes and provide the skills for adjusting to them".

Hence there is a pertinent need to develop skills among students. By "Education" Thomson (1971) means "the influence of the environment upon the individual to produce a permanent change in his habits, behaviour, thought and attitude".

Education is expected to train the individual into a good, intelligent, hard-working citizen. Also education is expected to give to the individual a strong and healthy body, help him in building up his character and creative thinking. These views are reflected in the secondary education commission.

According to Kothari (1964-66) "The very aim of Education has to be viewed differently, it is no longer taken as concerned primarily with the
imparting of knowledge or the preparation of a finished product, but with the awakening of curiosity, the development of proper interests, attitudes and values and the building up of such essential skills as independent study, and the capacity to think, and judge for oneself without which it is not possible to become a responsible member of a democratic society”.

The purpose of education is to develop society through development of science and technology.

The National Policy on Education (NPE) (1986) (1992) has emphasized the need for qualitative improvement of school education, particularly in the area of science and technology. Education is a social process and it has a greater influence on every individual enabling him to grow and develop better and higher quality of life.

The economic prosperity and development of society is based on science and technology and its impact on society. The development of society goes parallel, and interdependent. Hence the role of science is of utmost importance in the process of development and transformation of society.

Mathematics is the Queen of all science as it influences all branches of knowledge and branches of sciences in particular. A study of Mathematics plays an important role in the development of personality of a
child. The study of Mathematics promotes and facilitates the way of logical thinking, reasoning, accuracy, creative expression and also it helps the child to develop mathematical Skills and attitudes to meet the demands of daily life. According to National Education policy (1986) “Mathematics should be the means to develop the child for thinking analytically with consciousness and reasoning”.

1.2. IMPORTANCE OF MATHEMATICS EDUCATION:

Mathematics is for everyone. Today’s class rooms are crowded with future accountants, business executives, economists, engineers, scientists, politicians etc. They all need mathematics which is the practical tool for every-day life. It is the most accurate expression of all scientific thoughts that have emerged in the past and that would emerge in the future. The National Policy on Education (NPE - 1986) has justifiably emphasized the need for qualitative improvement in school education in science and mathematics and according to NPE.

“Mathematics should be visualized as the vehicle to train a child to think, reason, analyse and articulate logically. Apart from being a specific subject it should be treated as concomitant to any subject involving analysis and reasoning”. (8.16)
According to the Oxford Dictionary, Mathematics means that “abstract science which investigates deductively the conclusions implicit in the elementary conceptions of spatial and numerical relations”. It has also been defined as the science of numbers and space. It is the numerical and calculation part of man’s life and knowledge. Mathematics helps Man to give exact interpretation to his ideas and calculations. Further it enables Man to study various phenomenon in space and establish various relationships between them. So, Mathematics is a science which is a by-product of man’s empirical knowledge from the past. That is why Lindsay puts, “Mathematics is the language of physical sciences and certainly no more marvellous language was ever created by the mind of man”.

Mathematics is a subject which is of great importance for the personal development of a student, in general and for the development of the power of logical reasoning, in particular.

Mathematics is a way to settle in mind a habit of reasoning. The practice in original thinking helps the students to solve new problems and to face situations with confidence in life.

Mathematics has an artistic dimension also. In the word of L.F White (1902),
"The beautiful has its place in Mathematics, for here are triumphs of the creative imagination, beautiful theorems, proofs and processes whose perfection of form has made them classic. He must be a 'practical' man who can see no poetry in Mathematics", (p.208) The improvement of any country depends upon the scientific and technological knowledge of its people. It can be concluded that the development of a country or society is reflected in the development of their all round "Mathematical knowledge". In this context the Secondary Education commission (1964-66) has pointed out,

"We can not overstress the importance of Mathematics about science education and research. This has always been so, but never has the significance of mathematics been greater than today. It is important that deliberate effort is made to place India on the world map of Mathematics within the next two decades or so".

Recent applications of Mathematics prove that Mathematics can deliver the goods in our life, if we study and teach it creatively, if we work with determination and zeal to solve our social and industrial problems and if we develop new approaches in Mathematics that may be necessary for solving these problems.
The nature of Mathematics has been a way of interest not only to Mathematicians, but also to all those who have been using Mathematics as a tool for their investigations.

1.3. AIMS AND OBJECTIVES OF TEACHING MATHEMATICS

The three major objectives of learning Mathematics are,

1. Knowledge
2. Understanding
3. Application

The National Policy of Education (NPE) (1986) makes the following statement on Mathematics Education.

With recent introduction of computers in schools, educational computing and the emergence of learning through the understanding of cause effect relationships and the interplay of variables, the teaching of mathematics will be suitably re-designed to bring it in line with modern technological devices.

Excellence in Mathematics depends upon the students ability to integrate and apply basic mathematical concepts to solve problems and constantly practise at gaining a high level of proficiency in the subject.

A student of Mathematics is expected to solve and face multi-dimensional and challenging situations in the days to come. Keeping all
these in mind the specific objectives of teaching mathematics are given below.

1. To develop a good understanding of basic Mathematical concepts and their interrelationships.

2. To give the individual an understanding of ideas and operations in number and in quantity needed in daily life by the citizens of our country as individuals.

3. To provide a suitable type of discipline in the mind of the learner.

4. To develop in the individual an awareness of the Mathematical principles and operations which will enable the individual to understand and participate in the general, social and economic life of his community.

5. To develop the ability to discover patterns.

6. To provide, through Mathematical ideas, aesthetic and intellectual enjoyment and satisfactions and to give an opportunity for creative expression.

7. To provide the basis of Mathematical skills and processes which will be needed for vocational purposes.

8. To prepare the child for a few technical professions and for economic purposeful, productive, creative and constructive living.
9. To make Mathematical models of social and physical importance.

10. To create an awareness that Mathematics can play an important role.

11. To create an excitement and interest in Mathematics.

12. To stress problem solving techniques rather than abstract formulae and theorems.

1.4. PRESENT STATUS OF TEACHING MATHEMATICS

Formal education is mere rote learning and memorizing. Little importance is given to the formation of concepts and understanding. Teaching techniques have scaled down to mere question and answer.

The Indian Education Commission Report (1960) had pointed out that quality of Mathematics teaching is to be raised considerably so as to achieve its objectives and purposes, to promote the understanding of the basic principles, to develop problem solving and analytical skills and the ability to apply them to problems of material environment and social living and to promote the spirit of inquiry and experimentation.

Even now Mathematics is considered a problematic subject by many students. Mathematics is disliked by students in general. It is also not taught effectively by teachers in the classroom. Students’ achievement
level is very low in Mathematics. Also majority of pupils feel that Mathematics is a difficult subject and it can be understood and followed only by exceptionally intelligent students.

There are many problems that affect mathematics teaching and as a result learners are not attracted to the subject Mathematics.

The students of Mathematics do not find sufficient motivation and inspiration.

In many institutions the number of teachers is inadequate also. Only one or two teachers are compelled to teach all classes.

About the Mathematics Teaching, teachers complain of excessive work load and lack of facilities. Head masters and managements complain about the teachers. The Mathematics teachers point out the following problems

1. Teacher burden
2. Teacher attitude
3. Lack of purpose
4. Method of teaching
5. Large classes
6. The students disinterest
7. Heavy syllabus and many like this.
What is emphasized here is that there are many problems that affect Mathematics teaching in schools. Since India's scientific and technological development largely depend on mathematical ability of learners, it is essential to identify these problems and initiate appropriate measures for the elimination of such problems.

1.5 NEED FOR INNOVATIVE APPROACH IN TEACHING MATHEMATICS

There are numerous obstacles between the dedicated teacher and students in the classroom. Exceptional students should be made aware that they can do some thing fast but other may take effort and time. Therefore the teaching should be in such a way as to cater the needs of each category of students well. No lesson can be effective unless there is pupils' effective participation in it.

According to Amrik Singh (1996) "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."

The National Policy of Education (NPE 1986) also 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, coupled with dynamism. Each individual’s growth presents a different range of problems and requirements at every stage from the womb to 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 “Theory of Education” says, for each student the classroom experience should be exciting and joyful because of good understanding. The meaning should be discovered by the learner in the classroom. The teacher and the learner should cooperate so that they conquer the monster of meaninglessness in learning.

The Kothari Commission Report (1960) states, “if science is poorly taught and badly learnt, it is little more than burdening the mind with dead information and it could degenerate even into new superstitions”.

Mathematics is an interesting subject for gifted and interested students. But at the sometime it is very boring - in fact dull for those who do not have any aptitude for Mathematics.

With the advancement of science and technology, new content in mathematics has been introduced into school and higher education curriculum by National council of Educational Research and Training (NCERT) at National level, by State Council of Educational Research and Training (SCERT) at state level and by universities at higher level. Even though the content was upgraded, the teachers in general follow the usual
lecture method and hence it does not fulfil the goals and objectives of Mathematics teaching. Hence there is a need to improve the quality of instruction which necessitates the introduction of new innovative approaches in teaching and learning mathematics.

Generally speaking, when a group is small in size, learning will be more effective. According to Hare (1962)

1. Members are more satisfied.
2. The individual relationship increases
3. Members will feel neither threatened nor inhibited.
4. As members are small in size, the resources of the group will decrease.
5. In this the goal is achieved at the cost of higher efficiency per individual members.
6. The difficulty of gaining agreement may decrease.
7. Communication problems do not arise.
8. The amount of time each member has to communicate with other members increases.

In the case of Mathematics in the small group situation during the sense making process of constructing relationship between the new and existing knowledge, individuals often analyze the problem to identify what the problem is all about, refer to specific strategies, tactics or principles that
are already in memory and compare the problem at hand with problems that have been solved before. The fact that knowledge construction relates to prior knowledge makes the learning in small groups particularly beneficial because the diversity in student’s prior knowledge can be utilized during the interaction so that each team member’s contribution is accumulated to provide a larger base of resources for the group’s knowledge construction.

1.6. NEED FOR THE CO-OPERATIVE LEARNING APPROACH

The teacher divides the class into heterogeneous groups with each group consisting of 4 to 6 students, if he wants to use the co-operative learning approach. Each group must contain average, above average, below average students. A team-leader should organise the co-operative learning.

Individual persons are completely responsible for the efforts of co-operative learning but every one should take part in it. To achieve learning everybody should help in the coordination. The childhood education or primary education points out the essentialities of co-operation in play and learning. It also enhances the overall development of the child. In childhood programming, co-operative learning plays a vital role. It also gives responsibilities of learning to the learners. The learners can exchange their views and ideas in simple language. In the co-operative learning the learners are able to get clear ideas to solve the sums quickly and correctly.
1.7. NEED AND SIGNIFICANCE OF THE STUDY

National Policy on Education (1986) (1992) of the Government of India emphasised universal enrolment and universal retention of children and substantial improvement in the quality of education. Revised National Policy on Education (1996) also envisaged launching of National Mission for achieving universalisation of education and quality of education. They have ensured all the facilities, for curriculum enrichment, infrastructure facilities, provision for using instructional aids, supply of audio-visual aids etc., for quality improvement of learning process. But these facilities are not utilised properly. Also there is failure to inculcate scientific temper and scientific literacy among the learners. Achievement levels are low and the wastage is considerable. The inculcation of science education fails to meet and satisfy the consequences of technological challenges, communication and cognitive revolution.

The National Policy on Education also emphasised the need for change in the teachers’ outlook on teaching and dissemination of instruction. It also emphasised the necessity to identify the problems of the learners and plan the learning activities before teaching and using innovative methods for effective dissemination of instruction. Thus there is a growing need for appropriate Mathematics education at the school level. The most important purpose of the teaching of Mathematics is the
development of the problem solving ability in the pupils as well as ability to
meet and solve the problems in daily life.

One of the most effective methods of generating an interest in
mathematics and the mathematical way of thinking is to teach through
problem solving. Problem solving is a very ancient art, not alien to our
culture. But somehow during the past two centuries education has
centered around the art of reproduction rather than creation. The western
countries like Hungary, Romania, Czechoslovakia and Poland have
systematic programmes of training the youngsters in problem solving.

Reasoning occurs when the individual is confronted with a problem.
By a problem we understand a situation for which the individual has no
ready-made response. The ability to solve problems requires some degree
of independence, judgment, originality and creativity.

Various studies have been conducted to determine the factors
affecting and influencing achievement. They are intelligence, health, socio­
economic status of the family, sex, distance from the institution, leisure
time activities etc., In the case of scholastic achievement intelligence,
socio-economic status of parents, study habits, interests, levels of
aspiration, ect., are proved to be influencing factors. The investigator has
been teaching Mathematics in the Higher Secondary School for the last 15
years. He has noted that the achievement of students in Mathematics is not
up to the expected level. There is high percentage of failure in Mathematics in the Higher Secondary Examination. It is assumed that low achievement is not only due to the lack of intelligence but also due to the inability to perform well as a result of the influence of certain external factors. Identification of the factors that influence achievement in Mathematics would benefit teachers and students of Mathematics to a greater extent. Hence this problem has been selected by the investigator for a detailed study.

1.8. SCOPE OF THE STUDY

The aim of the study is to find the problem-solving strategies in mathematics. In this competitive world, the students have to improve their problem-solving skills, with different methods of approach to solve any problem. Development of problem-solving ability will enhance the educational achievement of the students.

As proposed by the National Policy on Education - (1986), there is an urgent need to modify curricula and methodologies of learning through appropriate research and development to incorporate elements of problem solving, creativity and relevance. This study is attempted in these lines.
1.9. STATEMENT OF THE PROBLEM

Mathematics and science are the key subjects that pave the way for national development. Hence the development is basically dependent upon the curriculum innovation, methodological perspective, effective delivery of information, transformation in the real classroom setting. So in the present investigation, the investigator intends to develop new innovative and effective instructional strategies for teaching Mathematics in the classroom through experimental study in order to enhance the level of achievement of students in Mathematics.

Hence the problem for the present study is stated as follow:

"EFFECT OF PROBLEM SOLVING MODELING IN ENHANCING STUDENTS ACHIEVEMENT IN MATHEMATICS".