# CHAPTER: 1

# INTRODUCTION

## 1.0. INTRODUCTION

School plays the crucial part to impart the education. It is the formal institution of education. It enables student to play his role in appropriate way. School education is mostly divided in to three stages primary, secondary and higher secondary. In this all, after secondary stage majority of the students will go into the world of work. Scientific attitudes and skills developed at this stage would become base for more growth. Mathematics is the key for the intellectual development of the students. From the beginning, Mathematics is a part of the educational system. Mostly students feel that Mathematics is the difficult subject. NCF (2005) has mentioned some problems in Mathematics education such as a majority of children have a sense of fear and failure regarding Mathematics. The current curriculum does not address this problem. Exercises and methods of evaluation are mechanical and laystoo much emphasis on computation. But, actually Mathematics is an easy subject when understood properly.

Mathematics considered as one of the most difficult subjects in every stage of school learning because intention of teaching Mathematics is more oriented to prepare only for examination and achievement in Mathematics. In this situation, some studentsare considered as under achievers or average achievers as their weaknesses are accumulated. Gradually students develop lack of interest in the subject.

Every stage of education has its own significance. Successful achievement of secondary stage is prerequisite for admission into various vocational coursesas well as the world of work. Primary education lays the basic foundation of all type of education. The school performs the function of selection and segregation among students on the basis of their academic achievement. Mathematics is the core necessity for many professions. The secondary stage marks a beginning for the transition from the upper primary stage to the study of Mathematics as a discipline. More students from primary education with learning difficulties attend secondary stage. They cannot maintain pace between two stages. There seems hierarchy in Mathematics learning. Hence, student's achievement in Mathematics at any level of

the study seems to be influenced by his/her weaknesses in the previously attained basic knowledge, skill and understanding regarding the subject.Students with different social-economical status, mental abilities, aptitude, emotional characteristics, motivation, attitudes, diversified interest and values in classroom are reality. Less or more these all variables affect the achievement of students. These variables generally referred to as correlates of achievement. Principals, teachers and others who are involved in the task of helping students to achieve better would like to have knowledge of the extent of influence these correlates exert on achievement.

So, the present study is an attempt to find out the relationship of selected variables with achievement in Mathematics for students of standard VII. The outcomes of the study will be equally useful for school authorities particularly in the field of educational guidance and for diagnosis, whenever required.

## 1.1. Importance of Mathematics

Mathematics is more than the art of computation. In the real sense, it is a science of space and quantity that helps us in solving the problems of life needing numeration and calculations. It is powerful implementation to help individual think critically, solve problems mathematically and satisfy the needs for their daily life rather than hinder their learning.

Mathematics is the best way to express our views exactly. One can share his/her views with less effort with the help of Mathematics. For example, I need some sugar in this tea. I need one teaspoon sugar in this tea. Both are same but the expression is accurate in the second statement. Every one of us uses Mathematics in some form or the other in our everyday life. Subject like physics is growing with speed because it utilizes Mathematics. Each and every technology utilizes Mathematics very well.

The study of Mathematics prepares individual for various occupations like engineering, accountancy, auditing, taxation, banking, trade, designing, construction, computer application. The knowledge of Mathematics is helpful in achieving vocational competence in many spheres. Almost every occupation can be better managed with the help of mathematical knowledge and understanding. So, one can say Mathematics is the foundation stone for every profession.

Mathematics is very useful in the study of various sciences. This era is of science and technology. Further study of science and technology requires knowledge of Mathematics. In biological researches also bio-statistics is used. The advancement of knowledge in economics, psychology and social sciences depends on the use of Mathematics. Thus, the knowledge of Mathematics is indispensable for the study of all other subjects.

Mathematics is a part of our everyday lives. The utility of Mathematics starts right from the very beginning of the day. There are so many activities for the day that are to be carried out precisely on time. A house wife uses the knowledge of Mathematics for preparing her family budgetand in the preparation of food for the family members. The test in the food depends on the quantity of the raw materials used. All such things need measurement, which is possible only through Mathematics. According to Framework of the curriculum for ten year schooling (1975) the first ten years of schooling are to provide general education to all the students. No diversification of courses is envisaged in class IX and X. Therefore, Mathematics should be compulsory for all students up to class X.

## 1.2.Nature of Mathematics

Mathematics is useful and Mathematics disciplines the mind. Mathematics is the science of number and space. Mathematics is the science of spatial and numerical relationship. Mathematical knowledge is always logical and systematic. Mathematics is the science of logical reasoning. Mathematics involves inductive and deductive reasoning. Most of the basic Mathematics taught in school involves the study of numbers, quantity, form and relations. Arithmetic concerns problems with numbers. Algebra involves solving equations in which letters represent unknown quantities. Geometry concerns the properties and relationships of figures in space. Mathematics is studied as Pure Mathematics and Applied Mathematics at higher level. Pure Mathematics involves systematic reasoning, concerns only to theories and principles without regards to their application. While Applied Mathematics is the application of pure Mathematics in the service of a specific purpose. It considers those parts of mathematical theories that have certain direct or practical application in the material world. For example, the theory of complex numbers was developed from the point of view of pure Mathematics but now it finds demanding applications in electricity,

radio, related fields of physics and engineering. Mathematics has its own language. It means that mathematical terms, concepts, symbols and notations, formula and principles are peculiar which develop a specific language. Mathematical language cut short the lengthy statements through symbols. It provides opportunity for the intellectual gymnastic of the man's inherent powers. It is an exact science which involves high cognitive abilities and powers.

## 1.3. Objectives of Teaching Mathematics

According to the position paper on teaching of Mathematics (2006) one main goal of Mathematics education is the mathematisation of child's thought process and higher aim that of developing inner resources of growing child.According to Framework of the curriculum for ten year schooling (1975) the objectives of Mathematics Education at school stage should be:

- To enable the students to cultivate a mathematical way of thinking. i.e., in terms of carrying out experiment with numbers and geometric forms, making hypothesis, verifying them with further observations and experiments, generalizing them, trying to find proofs and making abstractions, etc.
- To enable the students to quantify their experience of the world around them and to understand the process of applying Mathematics to real life problems.
- To enable the students to learn the basic structures of Mathematics through unifying concepts and to motivate the learning of structure through applications and concrete situations.
- To stimulate the students to study Mathematics on their own and to develop a taste and feeling for Mathematics.

## 1.4. The Place of Mathematics in the School Curriculum

Everybody needs some knowledge of Mathematics in one way or the other. The knowledge of Mathematics acquired during the primary stage and middle stage is sufficient to deal with day to day life problem. The Education Commission (1964-66) recommended Mathematics as a compulsory subject for all school students. According to NCF (2000) one of the basic aims of teaching Mathematics in school is to inculcate the skill of quantification of experiences around the learners. In the first

two years, the basic number concept related to size, length, mass etc., are introduced to the child. Here one should develop the skills of classification, grouping of different geometrical shapes and numbers. In class III to V, the four fundamental operations and computational skill related to them areintroduced to the students. At this stage student is able to apply his/her knowledge of geometrical forms and figures in the environment. At the upper primary stage, students should acquire knowledge and understanding of concepts, facts and principles of the Mathematics for daily use. Text book of standard VII published by GCERT contain major seven learning areas such as number system, algebra, geometry, statistics, measurement, arithmetic and Mathematics related to daily life. Chapters like integer, decimal integer, power and exponent are the part of arithmetic. Profit and loss, simple interest and compound interestare considered as Mathematics related to daily life. While factorisation, equation, polynomial are included as a part of algebra. Parallel lines and quadrilateral are introduced as the concept of geometry. Basic statistical concept of bar chart and bar-graph also introduced. At the secondary stage, the curriculum has included number system, algebra, geometry, trigonometry, statistics, deductive reasoning. These all stages of learning are hierarchically interrelated.

## 1.5. Defects in Teaching of Mathematics

The teaching of Mathematics in our schools is far from being satisfactory. The studentsmemorize the proofs of theorems mechanically without any understanding. According to Kumar and Ratnalikar (2003)the main defects in its teaching may be mentioned as under:

- Aims of teaching Mathematics are generally ignored by the teachers. Various concepts and terms used are not clear. The teacher generally rushes through important ideas.
- Demonstrative Geometry is started without any concrete base.
- Mathematics is not correlated with life, or other school subjects.
- The teacher use same method for all types of students without taking into
- Consideration the individual differences.
- In most of the cases the subject matter has been organized logically and the psychological approach has been totally neglected.

- Some teachers simply write various steps on black board and take little pains to clarify these steps.

Jain and Burad (1988) have found the causes responsible for low results in secondary Mathematics. In which some were lack of appropriate classrooms and other physical facilities, irregular attendance of students, low standard in the lower classes, non-availability of textbooks, lack of timely correction of homework, overburdened and uninteresting curriculum, lack of child center teaching, insufficient periods for teaching Mathematics, and lack of suitable teaching aids.Zachsriah, Komen, George&George (2012) found that Factors contributing to poor performance include under staffing, inadequate teaching/ learning materials, lack of motivation and poor attitudes by both teachers and students, retrogressive practices.

Any analysis of Mathematics Education in our schools will identify a range of issues as problematic. Subsequent to this the position paper on teaching Mathematics (2006) has given reflection on problems in teaching and learning of Mathematics is as below:

- A sense of fear and failure regarding Mathematics among a majority of children
- A curriculum that disappoints both a talented minority as well as the non-participating majority at the same time
- Crude methods of assessment that encourage perception of Mathematics as mechanical computation.
- Lack of teacher preparation and support in teaching of Mathematics.

## 1.6. Mathematical Weaknesses

Mathematics is hierarchy of knowledge, skills and understanding. Weakness is there when interrelated learning is weak or absent. Rastogi (1983) has found that one of the important causes of backwardness in Mathematics was the poor command over basic arithmetic skills. Sharma (1978) has found that the major defect was lack of knowledge of fundamentals. Jain (1979) has significant correlates of high school failures and revealed that knowledge of mathematical concepts was one of them.

The learner exhibits deficiency when the underlying skills are not mastered. Thakor (1980) has found that students of class V did not have clear concept of fraction. They did not understand the place value of respective figures in decimal fractions. They did not understand addition, subtraction, multiplication and division of decimal fractions.

Rawool (1988) studied that students failed to use concepts at the understanding and application levels. Raman (1989) has identified that the errors most students committed were conceptual errors. Wagh (1991) has also found that students committed common error in the basic concepts.

According to Rastogi (1991) some factor responsible for low achievement in Mathematics are as follow:

- Defective teaching
- Defective examination
- Injudicious double promotion
- Lack of guidance
- Negligence of school and home work
- Lack of interest and motivation for the challenging work
- Lack of Diagnostic and remedial teaching

Sharma (1978) studied that all the pupils did not acquire understanding and application of different topics because undue emphasis on the mechanical learning of Mathematics. He has found that major factor responsible for low achievement in Mathematics was the impartation of limited knowledge and absence of the methodological approach of the classroom teaching. Jain and Burad (1922) has found causes responsible for low results and revealed that irregular attendance of students and lack of child centered teaching. Hariharan (1992) has found that the attitude of high school students towards homework was related to their achievement level in Mathematics. Lalithama (1975) has found that interest in Mathematics is one of the factors which affect achievement in Mathematics. Pal (1989) has found significant correlation between self concept in Mathematics and academic motivation. So, these all factors are potent deterrents in the normal or expected achievement of students.

## 1.7. Correlates of Mathematics Achievement

School has a unique role to develop different capabilities in students with changing field of education and in making necessary change in the instructional process. As the educational institutes are on the way to improving their quality, so naturally more concern to the quality of performance or academic achievement. Academic achievement is the prime concern of any educational institution because it ensures that

students have acquired the basic competency. It helps to know the learning difficulties of the students in the content area. On the basis of academic achievement we can select and discriminate the students for further learning.

Mathematics occupies a very significant role in student learning and ignorance of Mathematics will stop the progress of one's study in many other subjects. The subject Mathematics plays an important role in the school curriculum to develop thinking, reasoning and problem solving abilities of students which will enable them to become good citizen of the present cybernetic world. So achievement in Mathematics is the prime concern of students, teacher and school. Researchers have come out with variables which promote achievement in Mathematics and what are deterrents to it. It has been such indicated that a good number of variables, such as personality characteristics of the learners, socio-economic status from which they hail, attitude towards Mathematics, intelligence, higher cognitive abilities etc. to mention a few, influences achievement in varying degrees. Lalithama (1975), Jain (1979), Sarala (1990), Kasat (1991), Setia (1992), Sumangala (1995), Srivastava (1993), and Patel (1997) have found that the higher level of intelligence, higher will be the achievement in Mathematics.Jain (1979), Patel (1984), Nagailiankin (1991), Hariharan (1992), Rosaly(1992) have shown that attitude is also one of the factors which greatly affect the achievement in Mathematics. Lalithama (1975), Sarala (1990), Setia (1992), Nagalaksmi (1996) andPatel (1997) have found that socio-economic level of parents had a large impact on the achievement. Therefore principal, teacher and others who are involved in the task of helping students in maximise their achievement need to have knowledge of factors affecting achievement like attitude, SES, intelligence.

## 1.8. Rationale of the Study

Mathematics has always occupied an important place in school curriculum. The Education Commission (1964-66) recommended Mathematics as compulsory subject for students at school level. In the teaching of Mathematics emphasis should be more on the understanding of basic principles than on the mechanical teaching of numerical computation. Later the National Policy on Education (1986) also considered the importance of Mathematics in general education and suggested that Mathematics should be visualized as the vehicle to train a child to think, reason, analyze and to

articulate logically. Apart from being a specific subject it should be treated as concomitant to any subject involving analysis and reasoning.

Primary stage is very crucial stage at school level. It is the base of students' comprehensive development. So, it is foundation for secondary and higher education too. Mathematics helps to develop accuracy, rational and analytical thinking, reasoning and positive attitude. In primary stage, standard VII plays very important role. It is transition phase between primary and secondary stages. These stages of learning are hierarchically interrelated. Without clarity of basic concept one cannot move for further information and application of the concept. Sashidharan (1992)has investigated that, the prevailing promotion policy gives opportunities to children to attain tenth class even though they cannot perform basic operations in mathematics. The initial deficiencies have a long term damaging effect because the content of education is organized in such a way that learning in each class is dependent on prior learning.

It is observed that in the average school, instruction still conform to a mechanical routine. So, it remains as dull and uninspiring. That makes Mathematics as one of the most difficult subject in school. Datta (1990) has found the disabilities were there because there were no experiment to strengthen the teaching of geometry; and the relation of geometry and physical space is not explored. Even Rawool (1988) has found that students fail at 'understanding' and 'application' levels. Raman (1989) has also identified that the errors most students committed were conceptual errors and he has developed remedial package which reduces errors significantly. Also there exists a relation between the concepts learnt at every stage. Mathematics is a core requirement for many professions. Most of the students enter in standard X without proper clarity of concepts and hence find themselves incapable to share well in Mathematics.

In this era of 21$^{st}$ century competition makes students more anxious and the eagerness of whether they can pass exam or not. In the present educational system more importance is given to academic achievement. Reviews show that researches have found certain factors like intelligence, study habits, attitude of pupil towards mathematics, different aspect of their personality, SES which influences achievement

in mathematics. Knowledge of factor affecting achievement in Mathematics will help the teachers to provide proper condition for enhancing achievement in Mathematics.

Review of related literature shows that many studies have been conducted in the area of correlates of achievement in Mathematics. Research centeringon student's attitudes towards Mathematics study has received increasing attention. Jain (1979), Patel (1984), Rosaly (1992) and Nagailiankin(1991) have revealed that attitude has impacted student's achievement. While Lalithama(1975), Jain(1979) and Sarala(1990) have found that intelligence is one of the correlates of Mathematics achievement. But investigator did not come across any such study which has been conducted on Gujarati medium school for standard VII even after introduction of new textbook. Even there wasno any researcher has standardised the attitude scale for standard VII to measure attitude towards Mathematics. So, the purpose of this study is to construct and standardise attitude scale for standard VII. Sarala(1990), Lalithama (1975), Nagalakshmi (1996), Patel(1997) have found that SES is positively related with Mathematics achievement. But Srinivasan(1999) did not find any such relation. So, researcher has taken SES is one of the variable to check its relation with Mathematics achievement. As standard VII is the transition period between two stages of education, it is essential to identify correlates of achievement and to make the base of Mathematics sound. So, this is worthwhile to find out relationship between selected variables (Attitude, Intelligence, SES, and Mathematical weaknesse) and achievement in Mathematics of standard VII in Gujarati medium school. Thus, it is expected that the present study will not only provide basis for further research but also give tool in the hands of teacher in improving the mathematical achievement of students under their care.

## 1.9. Statement of the Problem

A Study of Correlates of Achievement in Mathematics of Students of Class VII with Respect to Certain Variables in SuratCity

## 1.10. Objectives of the Study

1. To study achievement in Mathematics of class VII students.
2. To construct and standardise an attitude scale to measure attitude towards Mathematics for standard VII students.

3. To construct a test of mathematical weaknesses to measure weaknesses in Mathematics for standard VII students.
4. To study the Achievement in Mathematics with respect to,
   I. Attitude towards Mathematics
   II. Intelligence
   III. Socio Economic Status (SES)
   IV. Mathematical Weaknesses
5. To study the interaction effect of selected variables,
   I. Attitude towards Mathematics
   II. Intelligence
   III. Socio Economic Status (SES)
   IV. Mathematical Weaknesses

on Achievement in Mathematics

**1.12. Hypotheses**

HO 1: There will be no significant difference in the mean achievement of Mathematics class VII with respect to attitude towards Mathematics.

HO 2: There will be no significant difference in the mean achievement of Mathematics class VII with respect to intelligence.

HO 3: There will be no significant difference in the mean achievement of Mathematics class VII with respect to Socio Economic Status (SES).

HO 4: There will be no significant difference in the mean achievement of Mathematics class VII with respect to mathematical weaknesses.

HO 5: There will be no significant interaction effect between attitude towards Mathematics and intelligence on achievement in Mathematics.

HO 6: There will be no significant interaction effect between attitude towards Mathematics and SES on achievement in Mathematics.

HO 7: There will be no significant interaction effect between attitude towards Mathematics and mathematical weaknesses on achievement in Mathematics.

HO 8:There will be no significant interaction effect between intelligence and SES on achievement in Mathematics.

HO 9: There will be no significant interaction effect between intelligence and mathematical weaknesses on achievement in Mathematics.

HO10: There will be no significant interaction effect between mathematical weaknesses and SES on achievement in Mathematics.

HO11: There will be no significant interaction effect between attitude towards Mathematics, intelligence and mathematical weaknesses on achievement in Mathematics.

HO12: There will be no significant interaction effect between attitude towards Mathematics, intelligence and SES on achievement in Mathematics.

HO13: There will be no significant interaction effect between attitude towards Mathematics, mathematical weaknesses and SES on achievement in Mathematics.

HO14: There will be no significant interaction effect between intelligence, mathematical weaknesses and SES on achievement in Mathematics. .

HO15: There will be no significant interaction effect between attitude towards Mathematics, intelligence, mathematical weaknesses and SES on achievement in Mathematics.

## 1.12. Operationalization of the Terms

### 1.12.1. Achievement in Mathematics

This refers to the average of the total marks obtained by students in Mathematics subject in first term and second term final examination conducted by NagarPrathmikShikshanSamiti, Suratfor the academic year 2012-13 for class VII.

### 1.12.2. Attitude towards Mathematics

This refers to the score obtained by students on an attitude scale which was constructed and standardised by investigator to measure the attitude towards Mathematics of standard VII students.

### 1.12.3. Intelligence of Students

The score obtained by students on an Intelligence Test which was constructed by Shah and Patel (2010) reflect the Intelligence of students.

### 1.12.4. Socio Economic Status (SES)

The score obtained by students on the Socio Economic Status (SES) scale which was designed by Patel and Patel (2005) reflect the SES of students.

### 1.12.5. Mathematical Weaknesses

Mathematical Weaknesses measured by administrating a test constructed by the investigator based on the basic concept of mathematics which students have studied in previous classes (Class I to VI).

## 1.13. Delimitation of the Study

The present study was delimited to the students of VII standard, Gujarati medium schools of SuratCity managed by Nagar PrathmikShikshanSamitiSurat.

The items of Mathematical Weaknesses were delimited to the arithmetic and algebra up to class VI of Gujarati medium textbook published by GCERT.

## 1.14. Scheme of Chapterization

The first chapter describes introduction to study. Conceptual frameworkis built by tracing importance and nature of Mathematics, objectives of teaching Mathematics, the place of Mathematics in the school curriculum, defects in teaching of Mathematics, mathematical weaknesses and correlates of Mathematics achievement followed by rationale, statement of problem, objectives, hypotheses, operationalization of terms and delimitation of the study.

Further, the thesis has been presented objective-wise in the following way.

The second chapter devoted to review of related literature and its implications.The third chapter presents details ofstandardisation of attitude scale and construction of mathematical weaknesses. The fourth chapter at length describes theplan and procedureby giving details of the methodology adopted procedure for data collection, techniques used to analyze data. The fifth chapter describe data analysis and interpretation and conclusion of objectives and testing hypotheses. The sixth chapter is the summary of the entire research work carried out, implication of the study, suggestions for further research and discussion.