Chapter - I

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Mathematics plays a very important role in the life of human beings. Without the knowledge of mathematics, it is difficult to learn other school subjects, more importantly science subjects. In the modern scientific world, mathematics occupies important place in the school curriculum. Hence the achievement in mathematics is crucial for every pupil, studying in the schools. If the teacher teaches in a planned and methodical way it is expected that achievement of children is certainly going to be satisfactory.

Teachers awareness of teaching methodologies and techniques of teaching are vital not only for an effective transaction of curriculum in the classroom but also for the improvement in standard of achievement of children. The Delors' international commission on Education for the 21st century stated in its Report,

"Improving the quantity of education depends on first improving the recruitment, training, social status and conditions of working teachers. They need the appropriate Knowledge and skills, personal characteristics, professional prospects and motivation, if they are to meet the expectations placed upon them". (Delors, 1996:142)

In the study of mathematics, the emphasis should be more on the development of general problem-solving ability rather than on finding a solution to a particular problem. Knowledge is useful, only when one is able to apply it effectively. The ability to apply it, in turn, needs power to think effectively. Therefore the pupil should attack problems logically in the spirit of discoverer.

The progress and improvement of scientific method and mathematics are linked to the prosperity of whole human civilization. To arouse and maintain the interest of students in mathematics, therefore, the elements of
curiosity, motivation, imagination, novelty, originality, newness and usefulness are required. 'Interest' is a motivating force that arouses, sustains and regulates concentrated efforts. There is a need and accountability on the part of the teacher to arouse this 'interest' in pupils.

1.1 Meaning and Definitions of Education

There have been a lot of controversial statements about the meaning of education, beginning from Socrates and Plato to Dewey and Gandhi. If it is not completely impossible, it is rather very difficult to assess the real value of the term 'Education'.

Education is nothing but a process, through which a child can have free, spontaneous and individual development. Education awakens those innate powers, which are there in a child. This process of awakening is nothing but 'Education'.

Education is a bipolar process in which one personality acts on another to modify the development of other. It is a process of development from cradle to grave. In this, we find all sorts of influences, like home, friendship, recreations, hobbies etc. Education is a long process, which is never ending.

Here under, we analize the various view points of various thinkers about the word 'Education'.

Education is a process through which a child makes its internal, external.

**Frobel**

The analysis of the word 'Education' clarifies the fact that a child possesses various internal capacities but these capacities are made external through the weapon of 'Education'.

When Education works on a noble mind, it draws out to view every latent virtue and perfection

**Addison.**
Education means bringing out the ideas of universal validity which are latent in every human being.

Socrates

"By Education, I mean an all round drawing out of the best in child and man-body, mind and spirit"

Mahatma Gandhi

Education is complete development of individuality of child, so that it can make an original contribution to human life according to the best of its capacity.

T.P. Nunn

Education is defined as natural, harmonious and progressive development of one's innate powers.

Pestalazzi

Education is the creation of a sound mind in a sound body.

Aristotle

"Plants are developed by cultivation and men by Education"

Locke (1969)

In a world based on science and Technology, it is the Education that determines the level of prosperity, welfare and security of people.

Kothari Commission (1964-66)

1.2 Importance of Education in human life

The importance of Education in human life can best be seen from Educational values. The Educational values are individual as well as social.

The Educational values have the following advantages for individuals' social life. They are:

- Development of a healthy and balanced personality
- Capacity to earn livelihood and acquire material prosperity
• Development of Vocational efficiency
• Creation of good citizenship
• Development of good character
• Adjustment with environment and its’ modification
• Fulfillment of needs
• National integration and national development
• Promotion of social efficiency
• Preserving cultural values
• Utilization of leisure time

The above Educational values play an important role in human life. Through them one is able to lead his personal and social life successfully.

The overall development of a nation depends on the proper utilization of its natural as well as human resources. The opinion of the planning commission in the 7th five year plan (1985-90) may be mentioned in this context. “Human resources development has necessarily to be assigned a key role in any development strategy particularly, in a country with a large population. Trained and educated on sound lines, a large population can itself become an asset in accelerating economic growth and in ensuring social change in designed directions. Education develops basic skills and abilities and fosters a value system conducive to and in support of national development goals, both long term and immediate”.

Hence the development of human resource is a must for any modern society. As M.S. Swaminathan remarks “Human resource is the most valuable global resource and any short or long term development strategy should be oriented towards the continued well being of human race”.

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Education plays a significant role in the development of human resources. "If this change on a grand scale is to be achieved without violent revolution, there is one instrument only that is: Education".

Other agencies may help and indeed some times have a more apparent impact. But the national system of education is the only instrument that can reach all the people.

The school can help in manpower planning though, it has no direct role in the matter. It is a social agency and it has social accountability. Education is a social process and so it has a significant role in manpower planning in the light of individual as well as social needs.

In all the countries of the world, it may be seen that high per-capita incomes are associated with high rates of literacy. Education is valued because, it contributes to a better life. Alfred Marshall emphasized the importance of education as a national investment – it is the most valuable of all capital, invested in human beings. Economic growth in any society is dependent on the existence of a high level need, for achievement among people in that society.

In a democratic country, education can be used for giving training in a good citizenship. It can produce leaders who are capable of independent thought, Judgment, self expression, originality and initiative emphasizing the importance of education. The Kothari commission's report on Indian Education (1964-66) says, "In a world based on science and technology, it is the education that determines the level of prosperity, welfare and security of the people and the quality and number of persons coming out of our schools and colleges, will depend on our success in a great enterprise of national reconstruction, whose principal objective is to raise the standards of living of our people".

The development of a country is primarily determined by the quality of its human resources, which depend on the level of knowledge, skills, attitudes
etc. Therefore, creating the right minds through the right process of education requires the top-most priority.

From the above discussion, it is clear that Education leads to the overall personality development (Spiritual, moral social, cultural, mental and economic etc). Therefore ‘Education’ is a must for any individual and for the development of one’s country.

1.3 Mathematics – Different Views

What is mathematics?. The term ‘Mathematics’ may be defined in a number of ways. It is an exact science which is related to measurements, calculations, discovering relationships and dealing with problems of space.

According to new English Dictionary ‘mathematics- in a strict sense-is the abstract science which investigates deductively, the conclusions implicit in the elementary conception of spatial and numerical relations’.

In Hindi we call mathematics as “Ganita” which means the science of calculations. It is a systematized, organized and exact branch of science. It arises out of practical applications. We form certain intuitive ideas or notions known as axioms and postulates. These are self evident truths.

Mathematics is also called the science of reasoning. According to Locke, ‘Mathematics is a way to settle in mind a habit of reasoning’

Mathematics is an expression of human mind, reflects the active will, the contemplative reasoning and the desire for aesthetic perfection. It’s basic elements are logic and intuition, analysis and construction and generality and individuality.

Mathematics has always been regarded as a tool for sharpening the intellect. For this purpose one has to think systematically, logically and precisely.
Bramhagupta, the great Indian mathematician of eighth century said “if you want to shine in the company of learned, propose mathematical problems and solve them”.

Dr. Maria Montessori, T.P. Nunn etc have advocated the importance of mathematics. In their view, the intellectual and cultural development of a person is not possible, without the study of mathematics.

Mathematics has its own language and symbols. The symbols in mathematics have, their own meanings and their own significance.

Mathematics is the creation of man, for his needs. It has been rightly said that “Mathematics is the mirror of civilization”. Natural phenomena follow mathematical principles.

As we move into the 21st century, there is consensus among the experts about the necessity for all the students to have string of mathematical ability. Majority of eminent educationists of the past as well as of the present including Herbert Froebel, Pestalozzi, Dr Maria Montessori etc. have advocated, the importance of mathematics. In their opinion, the intellectual and cultural development of a person is not possible without the study of mathematics.

In several fields centered round human activity such as Accountancy, Banking, shop-keeping, business, Tailoring, Carpentry, taxation, Insurance., post and Telegraphs and so on, there is the use of mathematics. It has become, the basis of the world’s entire business and commercial system. Thus mathematics is an inseparable part of human activity.

Many a phenomenon of the universe can be predicted through mathematical calculations. There has been explosion of knowledge in every field of human endeavour including science and technology. Extension of research in science and technology resulting in several discoveries and inventions has changed the face of human society by providing things that
make modern life happier and more comfortable than ever before. At the root cause of all these, we can not ignore the role of mathematics. Hence it is imperative that our educational environment provides opportunities to all students to do worthwhile and purposeful mathematical work.

1.4 Historical Development of mathematics

Mathematics is a study of relationships among quantities, magnitudes, and properties of logical operations by which unknown quantities, magnitudes and properties may be deduced. In the past mathematics was regarded as the science of quantity, whether of magnitudes, as in geometry, or of numbers as in arithmetic or the generalization of these two fields, as in algebra. Towards the middle of 19th century, mathematics came to be regarded increasingly as the science of relations, or as science that draws necessary conclusions. This latter view encompasses mathematical or symbolic logic-the science of using symbols to provide an exact theory of logical deduction and inference, based on definitions, axioms, postulates, and rules for transforming primitive elements into more complex relations and the theorems.

This brief history of mathematics traces the evolution of mathematical ideas and concepts, beginning in pre-history.

Indeed mathematics is nearly as old as humanity itself. Evidence of a sense of geometry and interest, geometric patterns, has been found in the design of pre-history pottery and textiles and in cave paintings. Primitive counting systems were almost certainly based on using the fingers of one or both hands, as evidenced by the predominance of numbers 5 and 10 as the bases, for most number systems today.

Throughout the centuries, mathematics has been recognized as one of the central stands of intellectual activity. From the very beginning, mathematics has been a living and growing intellectual pursuit. It has its roots in every day activities and forms the basic structure of our highly advanced technological developments.
Mathematics, like every thing else, has been created by man, exists to fulfill certain human needs and desires. It is very difficult to say at what point of time in the history of mankind; and in which part of the world, mathematics had its birth. The fact that it has been steadily pursued for so many centuries, that it has attracted ever-increasing attention and that it is now the dominant intellectual interest of mankind, shows that it appeals powerfully to mankind. This conclusion is borne out by every thing that we know about the origin of mathematics. More than 2000 years before beginning of Christian era, both Babylonians and Egyptians were in possession of systematic methods of measuring space and time. They had the Knowledge of rudimentary geometry and astronomy. This rudimentary mathematics was formulated to meet the practical needs of agricultural population.

Mathematics is something that man himself has created, to meet the cultural demands of the time. Nearly every primitive tribe invented words to represent numbers. But it was only when ancient civilizations such as the Summerian, Babylonian, the Chinese and May on developed trade, architecture, taxation and other civilized contracts that the number systems were developed. Thus mathematics has grown into one of the most important cultural components of society. Our modern way of life would not hardly have been possible, without mathematics.

Since the times immemorial, Indians have been contributing significantly for the development of mathematics. The system of numeration and the concept of zero are a gift of Indians, to the world of mathematics.

1.5 Importance of Mathematics

Mathematics has been made a compulsory subject of study at the secondary level, with the hope that it will inculcate some minimum basic skills to every future citizen of the country to ensure their future, a happy life.

But at present none of the consumer, the dispenser, or the producers of Knowledge of mathematics education is satisfied with the students'
achievements in mathematics. So we are directly or indirectly responsible for
maiming our future generation by not providing them with proper
mathematical knowledge at the secondary level. Jean Piagets (1973)
revolutionary finding “Every normal Child is capable of learning
mathematics” has put a greater responsibility on dispensers of knowledge of
mathematics education, which they can not escape by passing the buck to the
poor mathematical ability of the students.

Plato advocated the inclusion of mathematics in school education
because mathematical reasoning disciplines the mind. He wrote over the
portals of his academy.

“Let no one ignorant of geometry enter here”

The Kothari commission (1964-66) emphasised the significance of
mathematics in the school curriculum by stating:

“One of the outstanding characteristics of scientific culture is
quantification. Mathematics, therefore, assumes a prominent position in
modern education. The advent of automation and cybernetics in this century,
marks the beginning of scientific and industrial revolution and makes it all
imperative to devote a special attention to the study of mathematics. Proper
foundation in the knowledge of the subject should be laid at the school level
itself”.

Mathematics has been considered as mother of all sciences. If our
students are to function effectively at this time of extraordinarily and
accelerating global changes, they must understand the fundamental and basic
concepts and be able to use them in their personal and professional lives.
There has never been a greater need to be mathematically literate than any
other thing these days. Those who understand and are proficient in
mathematics have, significantly enhanced their opportunities and options to
open doors to productivity. Those who lack mathematical competence will
find such doors and options closed.
Mathematics at the secondary level is the basic structure on which the whole super structure of mathematics, mathematical sciences and technology in technical institutions, rests. To quote Professor K.E. Brown ‘mathematics has become the basic fabric of our social order. The strength of that fabric, in fact, the very survival of our nation may well depend upon the amount and kind of mathematics taught in our secondary schools. This is a great sobering responsibility for those who design and administer the programmes. If we take the responsibility lightly, our children will suffer the consequences of our foolish action’

In several fields centered round human activity, such as banking, accountancy, shop keeping, tailoring, carpentry, taxation, post and telegraphs etc there is maximum use of mathematics, without the use of which, they can not survive. The career and financial prospects of every individual depend heavily on his mathematical knowledge and learning.

Some of science subjects like physics, chemistry and even biology can not be studied without making use of the fundamental principles of mathematics. Thus mathematics continues to occupy a prominent place in human life.

In this complex world passing through scientific, technological and rapidly moving towards computerization age, the importance of mathematics is going to be increasingly felt and recognized.

1.6 Mathematics- Its relevance in secondary school Curriculum:

Mathematics is living and flourishing branch of our culture. It is both a discipline in its own right and a service subject used in all the facets of life. It is a universal means of communication. It is a discipline that seeks understanding of patterns and structures of constructs of human mind. There is no end for its depth. As a subject, it is of great value-aesthetic, utilitarian and social. It plays an indispensable role in shaping our natural phenomena with human behaviour.
Many Education commissions appointed by Govt. of India have stressed the need for strengthening mathematics teaching at the secondary level, leading to the introduction of mathematics as one of the compulsory subjects of study up to the secondary level, inspite of some criticism.

Inspite of playing such a vital role in our cultural development as well as for individuals’ progress, mathematics is not a subject of choice for so many students. Majority of students are afraid of mathematics and develop a phobia for mathematics. Our broad results of past few years, tell us the real story. Failures in mathematics are increasing day by day. Inspite of its great importance, students avoid mathematics. Students are getting irrationally impulsive and have started things at face value.

Mathematics is taught like a mechanical subject with no creativity and imagination. Students are trained to develop mathematical skills of calculation and construction. They are not encouraged to develop mathematical thinking, mathematical aptitude and problem solving approach.

Problem solving in mathematics requires an ability to understand mathematical ideas and apply them in a variety of situations. It also requires a positive attitude towards mathematics, including confidence, enjoyment and perseverance. This is possible only when, mathematics is presented as a progressive body of knowledge as a whole and not as a fragmented set of skills. Students should be made aware of the wider relevance of mathematics including its aesthetic and humanistic role in the society. Teaching of mathematics should concentrate more on developing attitude, self esteem and confidence. School mathematics should not be considered as a tool for vocational aspirations but it must be considered as a subject, which is useful for all human beings, of all vocations and as a subject which has vide applications in other subjects, like physics, chemistry, commerce and even social studies. It is for the mathematics teachers to see that students at school level, realize the importance of mathematics applications for the scientific and technological development.
Kothari commission (1964-66) has rightly observed, "Special attention should be given for the study of mathematics in view of the importance of quantification and advent of automation and cybernetics. The curriculum in mathematics need be modernized and brought up-to-date at all stages with necessary emphasis on laws and principles of mathematics and logical thinking. Methods of teaching mathematics should be modernized laying stress, on the investigatory approach and understanding of basic principles. The curriculum should be flexible that special needs of the gifted children may be catered".

There is a view that everybody needs some knowledge of mathematics in one way or other. But it is believed that mathematics is exceptionally a difficult subject, the study of which requires some special ability and intelligence. Hence everybody should not be burdened with the study of this tough subject. References are made to the low pass percentage in this subject.

But contrary to this view, educationists began to feel that at such an early age, it is difficult to know who is going to opt for mathematics in higher education and who is going to stop his education at secondary level. While making mathematics a compulsory subject of study, the interests of both types of students are to be safeguarded.

Hence while framing the mathematics curriculum at the secondary level a great deal of clear thinking and careful planning is necessary in which, school teachers, university professors and educational administrators, have a significant role to play. Our object should be not to change the curriculum but to strengthen it and improve significantly, keeping in view, the present day needs and technological developments.

1.7 Role of Teachers

The role of a teacher is extremely crucial in the context of education being the best instrument of change and Nation building.
Teachers play an important role in moulding the lives and careers of students and through them the destinies of the Nation. It is they who develop in their pupils, the qualities to lead disciplined lives with a spirit of service. Reverence for teachers is a part of our tradition. Their responsibility is beyond imparting the knowledge and training the mind. A complete human being is the product of a good education, both in home and in school.

Teachers are saviours of the society and redeemers of the race. It is in this respect, the role of the teachers, acquires significance in shaping the society and in bringing revolutionary changes in the development of the country. So the teachers are held in high esteem and respect.

Dr Radha Krishnan, himself as a teacher said 'An ordinary teacher teaches; An average teacher explains; A good teacher demonstrates, but A great Teacher inspires’

Dr Radha Krishnan's life as a teacher inspired every one and he has been a shining example to prove that a teacher can rise to the expected heights in life. A teacher should love his profession and develop right type of attitude and zeal towards the profession. Half hearted teachers are as bad as half baked bread. The paramount duty of a teacher is to disseminate learning and impart correct information to the students.

According to Louis Raths, a researcher, the main functions of a good teacher are explaining, informing, initiating, directing, administering, unifying the group, clarifying, diagnosing, learning problems, evaluating, recording, reporting, participating in school activities and in professional and civic life.

Another researcher Arthur W.Comb, says that a good teacher can be characterized typically in the light of knowledge of his subject, his frame of reference for approaching problems; his perception of others; his perception of self; his perception of purpose and process of learning and his perception of appropriate methods of teaching.
1.8 Mathematics Teacher.

In this age of enormous growth of science and unexpected development of Technology, the role of a mathematics teacher in a secondary school is very crucial and important.

All knowledge acquired, skills developed and attitudes formed at the secondary level forms the basis for the student's growth at the higher level and be useful in his life. Every teacher has to acquire professional growth, during the entire period of his tenure as a teacher.

Professional growth, as given in the Dictionary of Education by Carter V. Good, means, "increase in the subject matter. Knowledge, teaching skills, efficiency and insight into the educational problems with a concomitant increase in success as a teacher."

This means knowledge of subject matter, insight into the educational problems or subject area should increase with expertise in teaching skills too, is called the professional development.

A genuine teacher of mathematics must be interested in knowing why should everybody learn mathematics, why should this subject be taught at all at secondary level. He must know the importance of this subject, in life and in school curriculum. He must be aware of the advantages of devoting so much of effort, time and money in teaching mathematics. He must feel convinced about the utility of this subject, so that he may be able to convince his students likewise. He should be able to explain to the learner why he needs to read this subject, that he will profit by its knowledge; and ignorance of this subject will keep him handicapped in several ways. Some thing in the personality of the child will certainly remain unrealized in the absence of study of mathematics. The knowledge of its values and aims will stimulate and guide the teacher to adopt effective methods, devices and illustrative materials. Adherence to these values and aims will make the teaching of
mathematics purposeful. Mathematics learning results, in the development of
a number of fruitful values for the students. However these values can not be
attained automatically by learning mathematics. Only a resourceful teacher of
mathematics with his deliberate efforts and planning makes it possible for the
students to attain these values. Hence the mathematics teacher plays a crucial
role in making the students, realize the values of mathematics in life, and how
useful it is in learning other subjects also.

1.9 Values of Teaching Mathematics at secondary level

Those who teach any subject are confronted at the very out-set by the
question "what is the real purpose of and value of teaching this subject" A
good mathematics teacher should know, not merely what to teach and how to
teach but also why he teaches. It is the duty of every teacher to know as to
why his subject is a part of the school curriculum.

According to Lim and Ernest (1997) there are at least six categories
of values of teaching mathematics. However, these values of teaching
mathematics can broadly be classified as:

1. Practical values

2. Cultural values

3. Social values

4. Disciplinary values

Mathematical facts have the same validity and truthfulness in any
culture and civilization.

The service function of Mathematics can not be ignored as some of
the subjects like, physics and chemistry in the curriculum of secondary
school, require the use of some basic principles of mathematics both in theory
and practicals.
Only a resourceful and dedicated mathematics-teacher, with his deliberate efforts and planning makes it possible for the students to attain these values.

Problem solving in mathematics is a fruitful exercise for the development of one's mental faculties, as the process of problem solving involves the scientific method of thinking and reasoning. It emphasizes the originality of thought and reasoning rather than a mere reproduction of rules and formulae from memory.

The study of mathematics also helps the students to lead a well disciplined life, as it helps the students to imbibe the values like honesty, truthfulness, open mindedness, objectivity, self confidence, self reliance, patience, will power, and it trains the students in systematic and orderly habits, namely concentration, punctuality, neatness, hard work, orderliness, regularity and so on.

Mathematics has got other values like ability to form and use a symbolic language, ability to make independent discovery and forming the habit of self scrutiny.

From the above discussion, it is clear that it is important for every mathematics teacher to know the values of teaching mathematics at secondary level. Then only he can make the student to realize the importance and values of mathematics.

1.10 Attitude of students and Teachers towards mathematics

Why do students dislike mathematics? Is it because of apathy, frustration, lack of motivation or aptitude, hostility, scare due to difficulty and abstraction of this subject?

Obviously, different factors such as physiological, social, emotional, intellectual and pedagogical, may cause 'maths-aversion' in the students and it is the duty of the mathematics teacher to identify and isolate these factors.
Once the disease is diagnosed, the remedy might be easy and often it may require lot of effort, on the part of the teacher, in order to make the subject more fascinating, provide him with intellectual food to satisfy his curiosity and induce him to develop the habit of thinking, which is very essential for problem solving in his future life. Solving problem through mathematical games could be helpful in this area.

It is sad to observe that even today, educational system in India, remains essentially, examination oriented. Under this system, learners do not receive mathematics education. They mostly prepare themselves for passing the examinations. Such a situation not only damages the purpose of all education but also proves ruinous for mathematical education. If we want to make mathematical education more meaningful, this situation will have to be changed and the entire system of education will have to be reviewed and reoriented.

If we observe carefully mathematics classes, we find that the rate of progress is decreasing at all stages of school education.

Mathematics is also presented from a wrong point of view. It is presented as a matter of dead facts and techniques and not in terms of its true nature, which involves processes that demand thought and creativity.

Making students aware of strategies or principles, relevant to the problem solving, is one the goals of National Council of Teachers of Mathematics (NCTM). This can be best noticed while observing students do proofs in geometry, on basis of the model proofs presented by the teachers. Often this is done with a little thinking or no thinking on the part of the student.

It is, therefore necessary that only correct mathematics should be taught correctly at the secondary school stage.

There are some adverse comments on mathematics as follows:
"It is too remote from life to interest the students."

"Mathematics has outlived its usefulness as a subject of secondary school instruction."

"Mathematics is completely taught on theoretical grounds."

"It is more abstract in nature."

"Teaching is confined to the class-room and not related to pupils' life."

Obviously, the teachers assume monopolized responsibility to solve problems, one after the other and as many as could, in order to complete or 'cover' the heavy syllabus and examination requirements.

A dominant trend of 'haste' to proceed as fast as or as much as they could has been quite transparent and evident. Such an accelerated style, would, by implication, hamper sustained effort of the problem-solving stages and processes. With the result the students would acquire, rapid, but, mechanical drill type skills, resulting in the total loss of the thrill and creative problem solving processes.

Mathematics is not merely a 'product' but a process. It is not only a 'knowledge'; it is an activity also. Its 'static' part is important, its 'dynamic' part is even more vital. Not only mathematical facts are to be taught, method of arriving at these facts are also to be communicated. All these require a rethinking about the goals of mathematics education.

The progress and improvement of scientific method and mathematics are linked to the prosperity of whole human civilization. To arouse and maintain the interest of the students in mathematics, therefore, elements of curiosity, motivation, imagination, novelty, originality and usefulness are required. Actually interest is the motivating force that arouses, sustains and regulates concentrated efforts.
One old saying is—"we can take a Horse to the water; but we can not make it drink". This old saying can suitably be changed to suit the present day technological world as—"First make a Horse feel thirsty; then it drinks".

Therefore the mathematics teachers should make the students realize the present day importance of mathematics, motivate and inspire for learning the subject- then the students tend to learn, which reduces the burden of the teachers.

1.11 Academic achievement

Academic achievement has been playing an important role, since formal education decides the level of learning of different students in different subjects all classes. Achievement can be defined as total marks or score obtained by a student in a particular subject. Achievement differs from student to student and from subject to subject. Factors for this difference also vary from person to person. Various factors play their role for this difference in the achievement. It has been observed that in subjects like mathematics, science and English, the achievement is considerably low; when compared to the other subjects, in the case of majority of students at secondary level, due to various factors.

Academic achievement is a multi-dimensional phenomenon and may be effected by three main types of factors viz. Subjective, objective and personality factors. Subjective factors are related to the individual himself, his intelligence, learning ability, aptitude, self-concept, perception of school, study habits and level of aspiration; Objective factors lie with in the environment, socio-economic status, family traits, education system, system of evaluation, school situation, type of the school, number of students in the class etc. Personality Factors are related to the individuals' adjustment with the school environment, his attitude towards the subject, attitude towards the teachers, adjustment with his peers and emotional adjustment.
Academic achievement has raised several important questions for educational researchers. What factors promote achievement in students? How far do the different factors contribute towards academic achievement? Many factors have been hypothesized and researched upon.

Scholastic/academic achievement is of paramount importance, particularly in the present socio-economic and cultural contexts. Great emphasis is placed on achievement right from the beginning of formal education. A considerable number of students from schools go to the colleges and institutions of higher learning. It is very important to ensure that such students acquire the requisite competence so as to benefit more out of higher education. Setting the stage for achievement of youth is thus a fundamental obligation of the educational system.

In schools/colleges, great emphasis is placed on the achievement right from the beginning of the formal education. The school has its own systematic hierarchy, which is largely based on achievement and performance rather than ascription. The school/college performs, the function of selection and differentiation among students on the basis of their scholastic and other attainments and open out avenues for advancement, primarily in terms of achievement.

The central aim of all formal educational efforts is academic achievement, on the part of the students. Even though, it is desirable to have around development as a goal of educational process, where academic achievement would be just one of the dimensions; but in most of the educational institutions, academic achievement continues to be the exclusive concern, narrowing down the very concept of educational process. Nevertheless it is important to note that achievement in curricular subjects is not an independent phenomenon. Rather, it is directly influenced by a number of factors, some of which are personal to the individual while many others are located in the environment in which learning process takes place. Thus in order to fully understand the concept, as well as, the process of academic
achievement, it is imperative to identify and explore various factors related to
the academic achievement

1.12 Need for the present study

Scholastic achievement continues to be one of the most important
variables held in high esteem, in all cultures, countries and times. Hence the
research related to the area of academic achievement is an ever growing
concern of the researchers, educationists and administrators. Any enquiry into
the previous works suggested that studies related to this area may be broadly
classified into three categories.

1. Studies with sociological base.

2. Studies with psychological base.

3. Studies relating to both sociological and psychological areas.

Some outstanding studies conducted by curry (1962), Chopra (1966,
1967, 1982), Gupta (1968, 1982) and Raymand (1977) have focused their
attention mainly on sociological factors related to the academic achievement.
The main emphasis on those studies, were on the variables, like socio-
economic status, parental aspirations, family environment and so on.

In contrast, some of the prominent researches by Entwistle Kundu
and Chakravarthy (1997) and Pande (1978) have in their own right, laid
emphasis on psychological factors like personality, intelligence, adjustment,
anxiety, self concept, motivation and so on in relation to the academic
achievement.

"The destiny of India is being shaped is her class rooms" (Education
commission 1964-66). So there is a dire need for teachers to reflect, visualize,
plan and act accordingly, so that the children of today can become world class
citizens of tomorrow. The cognitive growth and academic development of the
individual has become a matter of concern for the psychologists, sociologists
and educationists. Day-by-day achievement related problems are increasing. There is growing awareness of developing ways and approaches for improving children’s scholastic achievement. (Pathak 2007)

Though there are considerable number of studies related to the sociological and psychological factors at primary and secondary levels, very few studies were found, particularly in the subject “Mathematics” and more particularly at “X class” level.

The achievement in mathematics, particularly at Xth class level has been chosen, keeping in view the fact that mathematics is a compulsory subject of study upto Xth class only and after Xth class, it is an optional subject. Those who develop interest and aptitude for mathematics will, only opt for mathematics after Xth class. Hence it is felt that there is a need for research study to find out the influence of various psycho-sociological and personal factors on the achievement in mathematics, at 10th class level.

It is observed, more percentage of failures in mathematics than in other subjects in 10th class public examination. Majority of the students are not opting mathematics at higher education level. Hence the investigator felt that there is a need to know various psychosocial and personal factors contributing for mathematics achievement at 10th class level, so that proper and suitable suggestions can be offered for mathematics teachers, working in secondary schools.

1.13 Resume of succeeding chapters

Chapter II deals with an analytical presentation of research work conducted so far in the area, in which the investigator is interested to investigate further.

Chapter III deals with present study, which includes: Statement of the problems, Need for the present study, Operational Definitions of various
terms, Objectives of Study, Hypotheses to be tested, Variables included and limitations of the present study

Chapter IV deals with tools employed, methods of collecting data, and statistical techniques employed in the analysis of data.

Chapter-V deals with analysis of data, and a detailed discussion of results of the present study.

Chapter VI deals with summary of investigation, major findings, conclusions, Educational implications, recommendations and suggestions for further research.
Chapter - II

REVIEW OF RELATED LITERATURE