CHAPTER - I

INTRODUCTION AND CONCEPTUAL FRAMEWORK

EDUCATION

Education becomes the basis of personality development in all dimensions – moral, mental and emotional. Therefore one can say that in the long run education forms the foundation on which the castles of peace and prosperity can be built. Since ancient times, it is said, “Sa Vidya Ya Vimuktays”, which means that with education we finally attain salvation.

Education is an activity or a process which transforms the behavior of a person for “instinctive behavior to human behavior”. Vivekananda has a deep and comprehensive conception of education. According to Vivekananda education can be encompassed in following words,

“Education is the manifestation of the divine perfection already in man”- (Nagarajan, 2010). According to him education makes a man and is a man making process. Rabindranath Tagore (1913) defines education as “The process of development of the whole man and not merely the intellectual development of the individual. It should also emphasize the physical, mental and spiritual aspects of human personality”. Education is providing learning experiences to bring desired changes in human behaviour. The changes enable the learner to develop a balanced integrated personality. Mahatma Gandhi (1937) said “By education, I mean an all round drawing out of the best in child and man, body and spirit”.

“Education means all-round drawing out of the best in child and man - body, mind, and spirit” – (Mangal,1995)

Education helps man to make a deliberate and conscious effort to live comfortably and happily in his physical and social environment. Education is a life-long process and it has two aspects, the individual aspect and the social aspect. Education provides the individuals with ample opportunities to develop their in-born physical, mental and emotional qualities to the full, so that they can achieve cosmic unity by their action thought and feeling. In short without education man is as though
in a closed room and with education he finds himself in a room with all its windows open towards outside world.

Education is a bi-polar process in which one personality acts upon another in order to modify the development of the other. This process is not only a conscious one but also a deliberate one. The educator has clearly realized the intention of modifying the development of the education is to obtained by two-folds; (a) The direct application of the educator’s personality to the personality of the educate (b) the use of knowledge in its various forms. “In a world based in science and technology, it is education that determines the level of prosperity, welfare and security of the people” (Kothari, 1964 - 1966).

According to Sarvapalli Radakrishnan (1969) “Education to be complete must be human, it must include not only the training of the intellect but the enforcement of the heart and the discipline of the spirit”.

FUNCTIONS OF EDUCATION

Education plays an important role in human life. The individual’s character, personality, culture, thinking, common sense, skills, habits, attitude, knowledge, experience and even the other insignificant things of life depend on education. The inevitability of education in human life is elucidated with the help of the following functions.

Development of natural abilities

i) Character building.
ii) Development of personality.
iii) Preparation for adult life.
iv) Control and sublimation of basic instincts.
v) Creation of useful citizens.
vi) Development of community consciousness.
vii) Protection and increase of culture and civilization.
viii) Encouragement to social welfare.
SYSTEM OF EDUCATION

For the progress of a country, education to all is important. So in any country, the education shapes the character and develops the intelligence of the individual. In India, formal education is given to individuals through primary, upper primary, secondary, higher secondary and university education.

Primary and Upper Primary Education

Primary education covers standards one to five; whereas upper primary includes standards six, seven and eight. It is at this stage that the child goes to formal institution and receives formal education. About 5.5 lakhs of primary schools and 1.4 lakhs middle schools offer primary and upper primary education in India. Indian Constitution article 45 gives much importance to primary education.

Secondary Education

As primary education is intended to provide the minimum essential to children, secondary education helps children to become full members of a complex modern society. All round development of the child takes place at this stage. Secondary education exposes students to the contribution of science, humanities and social science to the development of nation. This is also a stage where children are provided with sense of history and natural perspective and given opportunities to understand their constitutional duties and rights as citizens. Moreover, for the supply of medium level skills, manpower experts recommend government to concentrate on secondary education as it is a must for several reasons. It facilitates occupational mobility, social mobility and it is the stage of education that is being considered as a minimum level of attainment for people to survive in the modern technological world.

According to Secondary Education Commission, “The secondary school must make itself responsible for equipping students adequately with civic as well as vocational efficiency and qualities of character that go with it, so that they may be able to play their part worthily and competent in the improvement of national life”.

Secondary education is an important stage in the educational ladder. It has well defined objectives and a structure of its own. It aims at achieving
(i) The overall development of the individual and
(ii) The development of the region.

A number of types of regional disparities may exist in the performance of the system. If so, it is imperative to explore the ways and means by which the regional disparities in secondary education can be overcome and also to find out factors which facilitate or inhibit the performance of secondary school system. Such discussion will provide light for future policies in establishment and management of secondary schools.

PSYCHOLOGY OF THE HIGH SCHOOL STUDENTS

Psychology is a behavioral science, especially interested in the study of human behavior. High school students are Adolescents. Adolescence is the period which begins with puberty and ends with the general recession of growth. It emerges from childhood and merges into adulthood. This is also known as the “Teenage period”. Adolescence is the period of transition from childhood to maturity. Its onset and termination are both gradual. The rapid growth the body brings growth in general is slowing down, but at the same time the maturation of the sex function is taking place. In this stage the endocrine glands function. The primary function is to develop the mental and physical growth of the individual. Their secondary function that of reproduction, appears at the onset of puberty. The difference is due to race, sex, climate, individual constitution etc. Puberty occurs among boys between 13 and 18 and among girls between 12 and 16.

The training and learning are planned processes which are organized by the teacher and classroom situations. Therefore, it is essential for him to understand the dimensions of development - Physical and Motor development, Emotional development, Social development and Intellectual development.

Physical Development and Change

During adolescence, the physical growth and development reaches to its peak and human body finds its final shape. The growth and function of all outer and inner reaches to its maximum and almost all the glands become extremely active at this stage. Boys and girls develop the characteristics feature of their respective sexes.
Moral and religious development

The children during this period learn to believe according to the norms of their society and culture. The formation of strong sentiments during this period intensifies the process of the moral development. The impact of religious and religious practices is also felt for the first time at this age in one’s life. The adolescent tries to talk about God and Religion. He often engages himself in the discourse about philosophical concepts like soul, the meaning of life and the question of the death.

Emotional Development

Everything in the world is strange and puzzling to the adolescent. The psychosomatic conditions of the person are disturbed and he is found to be emotionally unstable. He is irritated and moody feelings are always very tender and overwhelming. The adolescent is very touchy and sensitive. He becomes introvert and moves in the inner world. He is generally in the thinking mood. Sometimes he is over confident and sometimes much depressed. He is highly critical. His moodiness, nervousness, instability of behavior, temper tantrums, aggressiveness and hostility may be due to some persisting emotional problems. Emotional make – up of adolescents is empathy, that is, the ability to enter into values and understand the feelings and attitudes of others.

Parents and adults have unsympathetic attitude towards him. He denies the company of both the adults and children. If he behaves like an adult, people call him snobbish. Sometimes he suffers more from a rejection from adults rather than may weakness of his own. He is either intensely excited or deeply depressed. When curiosities are not satisfied he becomes frustrated, introvert from the situation. Thus the difficulty of sex problem arises and leads to any of this sexual behavior such as auto – erotic self-homosexuality.

Social Development

During adolescence the shift of interest from the family to the world outside is continued. The adolescent is now, preparing to be the man of world. His relations with his parents undergo a definite change nut he is also very keen to confirm to the demands of his peers. Actions and options of his parents become now mater of
criticism for him. He does not submit to them uncritically, rather defies their authority and flouts their opinion. He challenges their views and believes. Secondly religious feelings become more important for him. His own age groups offers him greater opportunities for his status. His recognition and his esteem. Now, he is more inclined to accept the leadership of the persons outside family such as teachers. Learned persons, film stars, players. He may have day-dreams. Heterosexual relationship become truly attractive fleeting love-affairs occur.

**Intellectual Development**

As to the intellectual development there is great intellectual awakening but it does not show the same positive acceleration found in physical traits in this period. Development in intelligence is assessed mainly by formal tests of intellectual growth. However, like other aspects of growth. It reaches the final stage late in adolescence. Children of inferior mental ability achieve their ultimate mental maturity at earlier age than those of advanced intellectual capacity.

Adolescents engage in larger and more complex range of activities. Curiosity is at its height. The adolescent may develop a special aptitude for music or language. He may develop mechanical aptitude. He may begin composing poems. He begins to appreciate literature. His vocabulary widens. He enjoys debates and discussions and dramas etc. Urge for self-expression is very great which may result in writing actions, painting etc. The adolescent has a desire for responsibility. He also has a tendency to be irresponsible. He is impatient for results and is very enthusiastic.

**OBJECTIVES OF SECONDARY EDUCATION**

Kothari Commission (1964-1966) has held secondary education to be the backbone of education and its growth. The Commission observed that the most important and urgent reform needed important in education was to transform it to relate to the life, needs and aspiration of the people and thereby make it to a powerful instrument of social economic and cultural transformation necessary for the realization of the national goals.
The objectives of secondary education as defined by the secondary education (1952-53) are as follows

i) development of democratic citizens

ii) development of personality

iii) education for leadership

iv) improvement of vocational capacity and efficiency and the concept of world citizenship.

(i) Development of Democratic Citizenship

India can be a democratic republic if the citizens uphold and practice the values of discipline, tolerance, patriotism, cooperation, equality of thought, speech, and writing. The essence of world citizenship is inculcated and developed through education. According to Mudliar Commission, schools should maintain and develop all these qualities to grow into ideal citizens capable of making and democracy a success.

(ii) Development of Personality

The secondary education must aim at the development of the personality of the students. The creative energy in the students should find proper expressions. They should acquire the culture heritage.

(iii) Education for Leadership

The secondary education must impart education for leadership, students should also be able to own the responsibilities of leadership in various fields of life, namely social, cultural, political, industrial, etc.

(iv) Improvement of Vocational Capability and Efficiency

In all the secondary schools, proper emphasis should be laid on crafts and productive work. This can be achieved through diversification of the courses of study at the secondary level. The students may take up agriculture or some other technical or commercial course to add to the productive capability of the country.
(v) The concept of World Citizenship

The students should not only be encouraged and taught the qualities of patriotism and citizenship, as citizen of the entire world.

In Secondary Education Mathematics is a compulsory subject to all.

MATHEMATICS

Mathematics is the queen of all sciences and has all along held a very honorable place in the curriculum at all levels of study because of its importance and application in the development of science and industry. So, Mathematics has always held out a unique charm and glamour to the scientist and industrialist alike in the quest of scientific truth. Because of its logical approach, there is exactness in character and disciplined way of analysis.

The teaching of Mathematics has the possibility to evolve scientific and social progress to the present level of advancement. It is either the science of number and space or the science of measurement, quantity and magnitude. It is systematized, organized and exact branch of science. It deals with quantitative facts, relationships as well as with problems involving space and form. It is a logical study of shape, arrangement and quantity. Hence, Mathematics is thus defined as the science of quantity, measurement and spatial relations.

Mathematics as an expression of the human mind reflects the active will, the contemplated reason and the desire for aesthetic perfection. Its basic elements are logic, intuition, analysis and construction, generality and individuality. Through different traditions may emphasize different aspects, it is only the interplay of these antithetic forces and the struggle for their synthesis that constitute the life, usefulness and supreme value of mathematical science. Without doubt, all mathematical development has its psychological roots in more or less practical requirements.

Definitions of Mathematics

Locke (1704) says, “Mathematics is a way to settle in the mind a habit of reasoning”.
Bacon (1947) “Mathematics is the gateway and key to all sciences.”

These definitions clearly indicate that Mathematics is an accepted science which deals with the quantitative aspects of one’s life and knowledge. In fact, Mathematics has its own language, its own tools and mode of operations like measuring, counting etc., and helps in proper understanding of the natural work and complicated problem of life by converting them into its language of signs and symbols.

The characteristics of Mathematics are simplicity in reasoning, accuracy of reasoning, certainty of results, originality of thinking, similarity to the reasoning of daily life, verification of the results. To conclude, Mathematics is the science of all sciences and art of all arts.

Mathematics helps to train a child to think, reason, analysis and to act logically.

**GENERAL AIMS OF LEARNING MATHEMATICS**

There are several aims for studying Mathematics. They are:

i) To enable to solve mathematical problems in daily life.

ii) To develop the power of thinking and reasoning.

iii) To prepare for elementary and higher education in Sciences, Economics, Engineering and Psychology.

iv) To prepare for technical professions such as those of accountants, auditors, bankers, surveyors, cashiers, engineers, scientists and statisticians.

v) To provide a suitable type discipline to the mind of the learner.

vi) To develop the habit of regularity, practice patience, self – reliance and hard work.

The teaching of Mathematics should essentially help the students in acquiring essential mathematical knowledge, skills, interest and attitudes for the following purposes:
Utilitarian Aim

To enable the student to make use of the learning in Mathematics in their day-today life.

Intellectual and Disciplinary Aim

To develop their intellectual powers and disciplining their minds.

Aesthetical and Recreational Aim

To develop their aesthetic abilities, meet their varying interest and help them in the task of utilization of their leisure time.

Social and Moral Aim

To help them in imbibing essential social and moral virtues.

Vocational Aim

To prepare for the future vocation or occupation.

Preparation Aim

To help in the study of other subjects and future learning in Mathematics.

Cultural Aim

To make them understand the contribution of Mathematics in the development of culture and civilization.

Interdisciplinary Aim

To give them insight to recognize relationship between different branches and topics of Mathematics.

Self-learning Aim

To help them in becoming self-dependent for mastering new topics and problem in Mathematics.

PLACE OF MATHEMATICS IN THE SCHOOL CURRICULUM

Plato advocated the inclusion of Mathematics in the school education because mathematical reasoning disciplines the mind. He wrote over the portals of his academy ‘Let no one ignorant of geometry enters here’. Butler H.C and wren F.L (1965)
Mathematics is the only subject that encourages and develops logical thinking and the logic employed is simple, exact, accurate, true and useful. It does not require special ability for successful performance, but it needs general intelligence. A teacher of Mathematics can make the learning very interesting and exciting thus changing the attitude and outlook of the students. Mathematics lays the foundation for the study of all other subjects and it is too early for a child to decide about the profession. Mathematics as an optional subject would make the choice of profession very narrow. Even if a child discontinues his education before completing the high school, the Mathematics that he has learnt, opens up a fairly good number of vocations. Even from a purely utilitarian value, Mathematics is immensely useful for an individual in his day-to-day life. It is an essential part of our culture and deserves a place in the curriculum for its own sake. The children must be able to enjoy its elegance and beauty in the same way as they might enjoy fine arts. Thus, the inclusion of Mathematics in the school curriculum as a compulsory subject is very essential for training rational, trustworthy, and useful citizens in a democratic society.

OBJECTIVES OF TEACHING MATHEMATICS AT SECONDARY LEVEL

Objectives of teaching Mathematics may be stated at four levels as given below:

Knowledge and Understanding Objectives

The student acquires the knowledge and understanding of

i) the language of Mathematics (in terms of symbols, formulae, figures, diagram, technical terms and definitions)

ii) the various mathematical concepts (number concept, concept of units and measurement and concept of direction etc.) mathematical ideas, facts, principles, processes and relationship.

iii) the development of the subject and contribution of mathematicians

iv) the basic nature of the subject Mathematics.

Skill Objectives

It is to help students
i) to learn and develop essential skill in the use and understanding of mathematical knowledge.

ii) to develop speed, precision, brevity, accuracy and neatness in the computation and calculation work.

iii) to learn and develop the techniques of problem solving.

iv) to develop the ability to estimate and check results.

v) to develop the ability to think correctly, to draw inferences and to generalize.

vi) to develop the ability to use mathematical apparatus and tools skillfully.

vii) to develop the essential skill in drawing geometrical figures.

Application Objectives

It is to help students

i) to make use of mathematical concepts and processes in everyday life.

ii) to solve the problem of mathematical independently.

iii) to develop the ability to make use of Mathematics learning in the learning of other subjects and equips himself for higher mathematical studies.

iv) to think and express precisely, exactly and systematically by making proper use of mathematical language.

Attitude Objectives

It is to help students

i) to try to analyze the problem.

ii) to understand and appreciate logical, critical and independent thinking in others.

iii) to develop the habits of systematic thinking.

iv) to develop heuristic attitude and try to discover the facts or solve the problems with his own independent efforts.

v) to show originality and creativity.
ACHIEVEMENT IN MATHEMATICS

The teaching of Mathematics that is useful in society. It is said that in the early history of Mathematics practice came first, followed by theory. Since the 19th century, however, theory has been more commonly studied for its own sake. Although it is sometimes said that we can solve certain real-life problems using pure Mathematics, in fact we find that the less pure branches of the subject, for example applied Mathematics or mathematical science, are more useful in real life. There are some distinct differences between the approach of applied Mathematics on the one hand, and the approach of pure Mathematics and the Mathematics taught in schools in that:

i) some concrete problems always exist;
ii) the value of the solution is judged by the results of its application;
iii) importance is attached to ideas rather than to the rigid application of theories;
iv) solutions are always required: the conclusion ‘there is no solution’ is not acceptable;
v) numerical solutions are reached by using a calculator.
vi) there can be more than one solution.

Students’ mathematical achievements in secondary school have an influential effect on their performance in college and their future careers. Having a solid background in Mathematics helps students develop sophisticated perspectives and offers more career options. The importance of mathematical learning has repeatedly been emphasized by educators and politicians (Wilkins & Ma, 2002). Both teachers and parents have paid attention to students’ performance in Mathematics and their progress every year. Politicians have also called for improving students’ overall performances and closing students’ achievement gaps. Until teachers and parents recognize what factors influence their students’ Mathematics achievement and improvement, they will be unable to help them make substantial academic progress.

Achievement in Mathematics is highly regarded in society. Success in Mathematics is viewed as a measure of mental discipline and intelligence. Greater opportunities are offered to students who excel at Mathematics consequently, much emphasis is placed on Mathematics and mother education in society.
Mathematics achievement may be caused by many factors. It may be caused by negative mathematic experience, lack of self-esteem and confidence, classroom environment and teaching approach.

Several research studies have revealed varied internal as well as external factors that could cause problem in learning Mathematics. Very often, the parents find fault with teachers teaching Mathematics for the poor performance of their wards. Moreover, the personal guidance needed for learning Mathematics is not available for most of the children who aspire really for a better achievement. However, one may not lose sight of the fact that the learner himself is greatly responsible for his inability to master Mathematics. The major reason could be the lack of attention or concentration on the part of the learner in learning Mathematics. The bundle of skills involved in Mathematics cannot just be mastered by means of passive learning or not practicing the skills by himself or herself. The active participation, in work, the ability to grasp the instruction or direction, the ability to retain and applying what is learnt, the spirit of challenge to face the new situation etc., are the needed learner behavior to go smoothly with Mathematics. The failure on the part of the learner to maintain a clear mind, clear thinking and clear direction is the major cause for not being competent in Mathematics. In short, the lack of clear mind, unambiguous thinking and weak concentration are the reasons put forth by the experts for not one being successful in Mathematics. Therefore, the investigator being qualified to train the young children in improving the self-regulation that by proper intervention while teaching Mathematics one could improve the self-regulation thereby improving achievement in Mathematics. Thus he has been prompted to take up an experimental study to test the self-regulation on learning Mathematics.

**SELF-REGULATION**

As noted earlier, self-regulation is an integrated learning process, consisting of the development of a set of constructive behaviors that affect one's learning. These processes are planned and adapted to support the pursuit of personal goals in changing learning environments. Learners with high levels of self-regulation have good control over the attainment of their goals. Conscious self-regulation requires a student to focus on the process of how to acquire these skills.

First, self-regulation of behavior involves the active control of the various resources students have available to them, such as their time, their study environment (e.g., the place in which they study), and their use of others such as peers and faculty members to help them (Garcia & Pintrich, 1994; Pintrich, Smith, Garcia, & McKeachie, 1993).

Second, self-regulation of motivation and affect involves controlling and changing motivational beliefs such as self-efficacy and goal orientation, so that students can adapt to the demands of a course. In addition, students can learn how to control their emotions and affect (such as anxiety) in ways that improve their learning.

Third and finally, self-regulation of cognition involves the control of various cognitive strategies for learning, such as the use of deep processing strategies that result in better learning and performance than students showed previously (Garcia & Pintrich, 1994; Pintrich, Smith, Garcia, & McKeachie, 1993).

Many researchers have agreed with the importance of self-regulated learning for students at all academic levels, and remember, self-regulation can be taught, learned and controlled. In fact, Zimmerman (1989, 1990), an expert in this area, has found evidence of many different types of self-regulation that are explained later in this module. In Zimmerman's studies, successful students report that the use of self-regulated learning strategies accounted for most of their success in school.

Self-Regulated learning is described as an active process whereby learners construct goals for learning. Learners monitor, regulate and control their cognition, motivation and behaviour. They are guided and constrained by their own goals and individual characteristics of a particular learning environment. Zimmerman (1989) described self-regulated learners as “meta cognitively, motivationally and behaviourally active participants in their own learning process”. Self-Regulatory activities impact individual students, their level of achievement, and the learning context (Wolters Pintrich & Karabenick, 2005). It is important for students to learn how to learn and take control of their efforts.
Types of Regulation

External Regulation

External regulation is the least autonomous type motivation. It is the classic case of in which behavior is externally regulated like tangible rewards, threats and punishments. These regulations are considered controlling and they have an external perceived locus of causality.

Introjected Regulation

In introjected regulation the regulation are partially internalized by the individual but not accepted as one’s own. These behaviors are performed with a sense of pressure to avoid guilt and shame and to attain a feeling of pride or worth.

Identified Regulation

Identified regulation is more autonomous or self-regulated type of intrinsic motivation. If a regulation or goal is personally valued by the individual and has consciously accepted the goal, the regulation is identified.

Integrated regulation

Integrated regulation is the most autonomous type of extrinsic motivation type of extrinsic motivation. It does not only involve identifying the importance of the behavior, but the regulation is evaluated and brought into harmony with the individuals own personality values, goals and needs that are already a part as the self. The regulation is fully accepted by the individual.

ACADEMIC SELF-REGULATION

Academic self-regulation is a relatively new construct with significant implications for student learning and success. Students with more developed self-regulatory cognitive skills tend to be more academically motivated and learn more than others. Self-regulated learning occurs inside and outside the class room and in concern with students’ goal, may have a substantial role to play in learning and achievement.
Five common instructional practices that have been cited as effective in helping students learn self-regulation are:

**Guided learners' self-beliefs, goal setting, and expectations**

It is to help students to frame new information or feedback in a positive rather than a negative manner, to manage this course successfully and to provide specific cues for using self-regulatory strategies.

**Promote reflective dialogue**

The teacher is modeling of reflective practices and the student is practicing with reflective dialogue. By giving group discussion to think through problems.

**Provide corrective feedback**

It is to performance standards must be clear and perceived as attainable and to phrase feedback as a statement above the task of learning, not about the learner.

**Help learners make connections between abstract concepts**

It is to use case-based instruction or examples that students come up with themselves, to use hands-on learning activities and to help students learn to separate relevant from irrelevant information.

**Help learners link new experiences to prior learning**

It is to use experiential learning activities, to focus on application of knowledge in broader contexts and to integrate real-life examples with classroom.

**STUDY SKILLS**

Study skills are learning strategies that facilitate the processing of information. They help us organize and process information. They help us remember what we have learned. Study skills work best when we are conscious of our own learning process.

A skill is the ability, usually learned and acquired through training to perform actions which achieve a desired outcome. By modeling successful practices in a field, we tend to standardize the successful practices that have produced the desired results.
Such successful practices can be modeled and theorized and norms for practice (John, 2007) study skills is a set learning skills that lasts a life time and bring many rewards. No two people study the same way and the study the skill that works for one person may not work for another. However, there are some general techniques that seem to produce results. For any student success is dependent on his / her ability to study effectively and efficiently. The results of poor study skills are wasted time, frustration and low grades. There is a saying “practice doesn’t make perfection; perfect practice makes perfection”. Effective study skills need to be always practiced.

Study skills encompass a wide range of behavior that students can perform before, during the early years of child hood are very important from the point of view of habit formations. If one really intends to study harder, he should chalk out a definite schedule of hours and subjects and stick to it. It is better not to postpone the process of developing a habit, the next day and so on. Early stage of habit formation must be watched over carefully and every precaution should be taken to make the students learn the things rightly.

Study skill is the effective use of appropriate techniques for completing a learning task. In other words, a student who has good study skills can successfully carry out a learning task by using appropriate techniques in an effective manner. A student with poor study skills may carry out the same learning task using in appropriate techniques or using appropriate techniques in an ineffective manner.

Study skills instruction involves teaching students to utilize a process for thinking about thinking, usually in steps. It requires students to “recognize, recall, and execute” the particular steps in the study skill or strategy. By mastering these skills, students are equipped with the tools to “learn how to learn.” This is called meta cognition.

Study skills encompass the capabilities for acquiring, recording, organizing, synthesizing, remembering and using information and ideas. Study skills include many behaviors that pertain to various school- and home-related situations. These include preparing to learn (e.g., personal discipline, organizational skills, attitude, ability to self-monitor), how learners acquire knowledge (e.g., listening, note taking, outlining,
and organizing), and applying knowledge (e.g., test-taking, writing, remembering, and self-monitoring).

Study skills can be described as ‘learning how to become an effective learner and how to manage your own learning’. There is no minimum age to start learning these skills. In fact, just like learning a language, the earlier the learners are introduced to these skills and strategies, and apply them, the more independent and confident they will become in any learning situation, both within and outside the classroom. Many of the skills are best developed over a period of time, so the materials are deliberately written for different age groups, from 5 through to 18. Good study habits laid down early will provide a strong foundation for the learning that comes later.

**EFFECTIVE STUDY SKILLS INSTRUCTION**

Researchers have developed a number of strategies to help students improve their study skills. These strategies can be applied at three stages of learning: preparing to learn, acquiring knowledge, and applying knowledge.

In addition, teachers can use the principles and tips outlined in this document to help students assess their skills, plan and monitor goals, and develop a system for improving study habits. It is important for teachers to provide explicit instruction regarding learning strategies and study skills to students with learning and behavioral disorders. Such instruction may be woven into content-based lessons. The most effective strategies for these students are general, can apply to a relatively broad spectrum of learning contexts, and are straightforward.

**The value of a schedule**

Before you even begin to think about the process of studying, you must develop a schedule. If you don't have a schedule or plan for studying, then you will not have any way of allocating your valuable time when the unexpected comes up. A good, well thought out schedule can be a lifesaver. It's up to you to learn how to develop a schedule that meets your needs, revise it if necessary, and most important, follow it.
A schedule saves time

All schedules should be made with the idea that they can be revised. A good schedule keeps you from wandering off course. A good schedule, if properly managed, assigns time where time is needed, but you've got to want to do it!

Making every hour count

A schedule should take into account every class, laboratory, lecture, social event, and other work in which you engage. There are givens such as classes and so on that have to be incorporated. You must focus on the other "free time" available and how you will use it. Make a weekly schedule and block off the 24 hour day in one hour increments. Indicate times for classes, labs, lectures, social, and work time. Also block off a period for sleeping each day. With what is left over, plan time for study. This gives you a rough road map of the time available. Of course, you can revise your schedule as circumstances warrant.

Study time

The problem of when to study is critical. A good rule of thumb is that studying should be carried out only when you are rested, alert, and have planned for it. Last minute studying just before a class is usually a waste of time.

Studying for lecture courses

If your study period is before the lecture class, be sure you have read all the assignments and made notes on what you don't understand. If the study period is after the lecture class, review the notes you took during class while the information is still fresh.

Studying for recitation courses

For classes that require recitation, such as foreign language, be sure to schedule a study period just before the class. Use the time to practice. Sometimes, practice with others can help sharpen your skills in a before-class study period.
SQ4R METHOD OF STUDY

SQ4R is a method of studying, not reading, a textbook. Contrary to popular myth, reading material once is not enough for learning. The keys to learning are organization and repetition, both of which are included in the SQ4R method. "SQ4R" is an acronym for the steps in the method: Survey, Question, Read, Recite, Record, and Review. Information from George Washington University, Academic Success Center http://gwired.gwu.edu/counsel/asc/

Survey

Survey the entire chapter by reading the headings and subheadings, observing charts and graphs, reading summaries, and skimming any questions at the end. The survey step provides an organizational overview of the chapter, gives a "mind set" for the job and ultimately saves time.

Question

Question makes the person an effective reader. It helps one understand the difficult concepts and correlate the ideas with each other. It helps us stay alert through the complicated reading. Question and answer will make sense of the material and help remembering it more easily because the process will make an impression. Ask questions based on the survey. Becoming actively curious about the material aids in concentration, comprehension, and memory.

Read

To read the material closely and actively the appropriate method will be the reading part by part. Not to read the whole assignment at once. The part can be short as a paragraph or as long as a section under a major heading. The next section is to be started only when we comprehend the first. Read everything including tables, graphs and illustrations.

Record

This refers to writing answers to all the questions that we have formulated. We need to write just enough information to answer the questions. Also we have to record what we have grasped through our reading.
Recite

Reciting is the most powerful techniques, students can use. In fact specialists do say that half of our study time should be spent in recitation. This technique helps us transfer the content/ideas from short term to long term memory.

Review

After all sections have been read, recited, and recorded, an overall review of the chapter is needed. This is best accomplished by rereading all notes for the chapter, followed by a deliberate effort to recall the material. This review reminds the student of all material covered, reorganizes the separate sections back into a united whole, allows a check on any material that remains unclear, and helps with retention.

Note taking

Like reading, note taking is a skill, which must be learned and refined. Deficiency of note taking is a constant problem in the study method of school students. The students can take notes during the course of instruction in the class.

TYPES OF STUDY SKILLS

i) Preparing to learn
ii) Acquiring processing and retaining information
iii) Applying what has been learned
iv) Monitoring and evaluating strategy use and learning - (Anderson, 2002)

Preparing to Learn

Preparing and planning for learning encompasses both physical and mental, aspects. Skills that help students prepare to learn include: Organizing one’s work by using agenda books, homework planners, and notebooks.

Managing time by developing schedules prioritizing tasks and using checklists. Arranging the physical environment, including finding a place that is free of distractions and choosing a time of day that works best for the individual.
Acquiring, Processing, and Retaining Information

Effective learners systematically obtain, organize, and retain information, beginning with good library and Internet search skills (EMSTAC, 2001). Because individuals have different learning styles, teachers should offer a variety of the following strategies for students to explore and discover which work best for them.

Effective reading is critical to acquiring information. The Word Identification Strategy (Bremer et al., 2002) is a technique that helps readers decode and identify unfamiliar words.

The SQ3R (Survey, Question, Read, Recite, Review) method is a systematic approach that helps students discover and retain the important ideas in texts.

Effective listening in class is equally important.

Taking good notes enables review and retention of material covered in class. Note taking tips begin with active listening and describe the use of keywords and graphic symbols to make notes personally meaningful.

Outlining and summarizing help learners see relationships between concepts. Graphic organizers such as concept maps, story maps, and relationship charts are strategies that visual learners might prefer to remember content.

Applying Learning

Students demonstrate and apply what they have learned in writing assignments, oral presentations, and tests. Successful test-taking requires both content knowledge understanding of the material being covered) and procedural knowledge (how to take tests). The test-taking strategies known as PIRATES and ANSWER are described by EMSTAC (2001). NCTN gives tips for taking different kinds of exams, such as essay and multiple choice. Learning is also demonstrated through problem solving. Solve It! is an example of a strategic approach to mathematical problem solving (Warger, 2002).
Monitoring and Evaluating

A key meta cognitive process is self-monitoring. Anderson (2002) suggests that, while using study strategies, students periodically ask themselves: MARKER, MURDER, and LEARN are monitoring and planning strategies described in EMSTAC (2001).

IMPORTANCE OF STUDY SKILLS

Study skills are learning strategies that help students organize process and use information effectively. These skills are a very important part of not only doing well on examinations, but also actually understanding the material.

Study skills help reinforce understanding of the topic, which is a lot stronger than simple memorization. These skills are important not just for academic learning but also for everyday life.

“When students attribute failure to internal factors such as lack of ability, or external factors, such as bad luck, their self-confidence suffers and they see efforts as futile” (Peirce, 2004)

Mastering the study skills for studying and learning increases their self-efficacy and empowers them to change their approach and try different strategies if one fails.

SIGNIFICANCE OF THE STUDY

Education should confirm and be capable of fulfilling the mental and physical emotional and other needs of the student. The school is the major socialization institution for any child. It is the child’s first contract with the world outside the house. For nearly 12 years a child spends 5 to 7 hours a day in a school. School is one of the most important foundation pillars on which the child’s personality develops. Children learns proficiencies in various abilities like, learning process and homework, develop the study skills, academic self-regulation, social communication, handling emotion of day to day interaction at home and school.
An important component of academic success is students’ motivation and ability to take responsibility for their own learning. One way to increase academic performance is to teach students how to become self-regulated to identify 6 dimensions like learning motivation, method of learning, use of time, control of one’s physical and social environment and performance.

The academic pressure mounts high during the last two years of the high school study. The students are invariably imposed with various academic self-regulation which is often incompatible with the holistic development of the students. Students engage in an activity because they are motivated and value the activity or because there is strong external coercion. Comparison between people whose motivation authentic (literally, self-authored or endorsed) and those who are merely externally controlled for an action typically reveal that the former, relative to the later, have more interest, excitement and confidence which in turn is manifest both as encased performance, persistence and creatively, self-esteem and general well-being (Ryan, Deei & Grohick, 1995).

Study skill is an important factor in the achievement of the students. Some students have good study skills some students may have poor study skills which may be due to several factors such as family background, economic status, size of the family, education of the parents, etc. Individual differences also play a vital role in study skills of children. These study skills may be different from child to child and they also differ in case of high, average, and low achievers. These study skills also differ from school to school, management to management, locality to locality etc. Hence this special study would be of help in understanding level of study skills possessed by the student and to find out whether there is any relationship between study skills and achievement. Based on these findings, remedial programmes could be implemented for the development of the students studying high school.

Hence the researcher has decided to select the topic “Achievement in Mathematics of high school students in relation to their academic self-regulation and study skills”.

**STATEMENT OF THE PROBLEM**

“ACHIEVEMENT IN MATHEMATICS OF HIGH SCHOOL STUDENTS IN RELATION TO THEIR ACADEMIC SELF-REGULATION AND STUDY SKILLS”
DEFINITION OF THE TERMS

Achievement in Mathematics

Achievement in Mathematics is the refers to the aggregate marks scored by the high school students in Mathematics in the test conducted by the investigator.

High School Students

According to the investigator high school students are those students who are studying in standard IX and X.

Academic Self-Regulation

Academic self-regulation is an active and constructive process whereby the learners, teachers and the school environment self-goals for the learning of the students and attempt to monitor, regulate and control the cognition, motivation and behavior of the students.

Study Skills

It refers to the abilities of the students in time scheduling for learning, concentration, listening, note-taking, preparing for examination, reading and writing.

OBJECTIVES OF THE STUDY

GENERAL OBJECTIVES

1. To find out the level of achievement in Mathematics of high school students.

2. To find out the level of Academic Self-Regulation of high school students.

3. To find out the level of Study Skills of high school students.

4. a) To find out the relationship between Achievement in Mathematics and Academic Self-Regulation of high school students.

   b) To find out the relationship between Achievement in Mathematics and Study Skills of high school students.

5. To find out the influence of Academic Self-Regulation and Study Skills on Achievement in Mathematics of high school students.
6. To find out significant factors with positive loading of the variables namely Achievement in Mathematics, Academic Self-Regulation and Study Skills of high school students.

SPECIFIC OBJECTIVES

I. Achievement in Mathematics of high school students

1.1 To find out whether there is any significant difference between high school students of
   i) rural and urban
   ii) male and female
   iii) IX and X standard
   iv) Tamil and English medium and their attainment of knowledge, understanding, skill objectives and achievement of Mathematics.

1.2 To find out whether there is any significant difference among high school students of
   i) Tirunelveli, Thoothukudi and Kanyakumari districts
   ii) Hindu, Christian and Muslims
   iii) SC/ST, MBC, BC and OC.
   iv) Boys, girls and co-education
   v) Government, aided and matriculation and their attainment of knowledge, understanding, skill objectives and achievement of Mathematics.

1.3 To find out whether there is any significant association between
   i) father’s education
   ii) mother’s education
   iii) father’s occupation
   iv) mother’s occupation
   v) parent’s annual income
   vi) order of birth and their attainment of knowledge, understanding, skill objectives and achievement in Mathematics of the high school students.
2. **Academic Self-Regulation of high school students**

2.1 To find out whether there is any significant difference between high school students of
   
i) rural and urban
ii) boys and girls
iii) IX and X standard
iv) Tamil and English medium and their external regulation, introjected regulation, identified regulation, intrinsic motivation and academic self-regulation.

2.2 To find out whether there is any significant difference among high school students of
   
i) Tirunelveli, Thoothukudi and Kanyakumari districts
ii) Hindu, Christian and Muslims
iii) SC/ST, MBC, BC and OC.
iv) Boys, girls and co-education
v) Government, aided and matriculation and their external regulation, introjected regulation, identified regulation, intrinsic motivation and academic self-regulation.

2.3 To find out whether there is any significant association between high school students of
   
i) father’s education
ii) mother’s education
iii) father’s occupation
iv) mother’s occupation
v) parent’s annual income
vi) order of birth and their external regulation, introjected regulation, identified regulation, intrinsic motivation and academic self-regulation.
3. Study Skills of high school students

3.1 To find out whether there is any significant difference between high school students of
   i) rural and urban
   ii) boys and girls
   iii) IX and X standard
   iv) Tamil and English medium and their time scheduling, concentration, listening and note-taking, reading skills, preparing of the examination skills, writing skills and study skills.

3.2 To find out whether there is any significant difference among high school students of
   i) Tirunelveli, Thoothukudi and Kanyakumari districts
   ii) Hindu, Christian and Muslims
   iii) SC/ST, MBC, BC and OC.
   iv) Boys, girls and co-education
   v) Government, aided and matriculation and their time scheduling, concentration, listening and note-taking, reading skills, preparing of the examination skills writing skills and study skills.

3.3 To find out whether there is any significant association between
   i) father’s education
   ii) mother’s education
   iii) father’s occupation
   iv) mother’s occupation
   v) parent’s annual income
   vi) order of birth and their time scheduling, concentration, listening and note-taking, reading skills, preparing of the examination skills, writing skills and study skills.
4. **Relationship between Academic Self-Regulation and study skills of high school students**

4.1 To find out whether there is any significant relationship between Achievement in Mathematics and Academic Self-Regulation of high school students.

4.2 To find out whether there is any significant relationship between Achievement in Mathematics and Study Skills of high school students.

4.3 To find out whether there is any significant relationship between Academic Self-Regulation and Study Skills of high school students.

5. **Influence of Academic Self-Regulation and study skills**

5.1 To find out whether there is any significant influence of academic self-regulation and study skills of high school students.

5.2 To find out whether there is any significant influence of academic self-regulation and study skills of male high school students.

5.3 To find out whether there is any significant influence of academic self-regulation and study skills of female high school students.

6. To find out Significant factors with positive loading of the variables namely Achievement in Mathematics, Academic Self-Regulation and Study Skills of high school students.

**NULL HYPOTHESES**

1. **Achievement in Mathematics of high school students**

   1. There is no significant difference between high school students of
      
      i) rural and urban
      
      ii) boys and girls
      
      iii) IX and X standard
      
      iv) Tamil and English medium and their attainment of knowledge, understanding, skill objectives and achievement in Mathematics.
1.2 There is no significant difference among high school students of
i) Tirunelveli, Thoothukudi and Kanyakumari districts
ii) Hindu, Christian and Muslims
iii) SC/ST, MBC, BC and OC.
iv) Boys, girls and co-education
v) Government, aided and matriculation and their attainment of knowledge, understanding, skill objectives and achievement in Mathematics.

1.3 There is no significant association between
i) father’s education
ii) mother’s education
iii) father’s occupation
iv) mother’s occupation
v) parent’s annual income
vi) order of birth of the high school students and their attainment of knowledge, understanding, skill objectives and achievement in Mathematics

2. Academic Self – Regulation of high school students

2.1 There is no significant difference between high school students of
i) rural and urban
ii) boys and girls
iii) IX and X standard
iv) Tamil and English medium
   and their external regulation, introjected regulation, identified regulation, intrinsic motivation and academic self-regulation.

2.2 There is no significant difference among high school students of
i) Hindu, Christian and Muslims
ii) SC/ST, MBC, BC and OC.
iii) boys, girls and co-education
iv) Government, aided and matriculation
and their external regulation, introjected regulation, identified regulation, intrinsic motivation and academic self-regulation.

2.3 There is no significant association between

i) father’s education
ii) mother’s education
iii) father’s occupation
iv) mother’s occupation
v) parent’s annual income
vi) order of birth

of the high school students and their external regulation, introjected regulation, identified regulation, intrinsic motivation and academic self-regulation.

3. Study Skills

3.1 There is no significant difference between

i) rural and urban
ii) boys and girls
iii) IX and X standard
iv) Tamil and English medium

of high school students and their time scheduling, concentration, listening and note-taking, reading skills, preparing of the examination skills, writing skills and study skills.

3.2 There is no significant difference among

i) Hindu, Christian and Muslims
ii) SC/ST, MBC, BC and OC.
iii) boys, girls and co-education
iv) Government, aided and matriculation

of high school students and their time scheduling, concentration, listening and note-taking, reading skills, preparing of the examination skills writing skills and study skills.

3.3 There is no significant association between
i) father’s education
ii) mother’s education
iii) father’s occupation
iv) mother’s occupation
v) parent’s annual income
vi) order of birth

of high school students and their time scheduling, concentration, listening and note-taking, reading skills, preparing of the examination skills writing skills and study skills.

4. Relationship between Academic Self–Regulation and Study Skills of high school students

4.01. There is no significant relationship between the achievement in Mathematics and academic self - regulation of high school students.

4.02. There is no significant relationship between achievement in Mathematics and study skills of high school students.

4.03. There is no significant relationship between the academic self – regulation and study skills of high school students.

5. Influence of Academic Self–Regulation and Study Skills on Achievement in Mathematics of high school students

5.01 There is no significant influence of academic self-regulation and study skills on achievement in mathematics of high school students.

5.02 There is no significant influence of academic self-regulation and study skills on achievement in mathematics of high school students.

5.03 There is no significant influence of academic self-regulation and study skills on achievement in mathematics of girls.

6. There is no Significant factors with positive loading of the variables namely Achievement in Mathematics, Academic Self-Regulation and Study Skills of high school students.
DELIMITATIONS OF THE STUDY

Delimitations are those conditions that can be controlled by the investigator during the research.

i) 7.02 The study deals with IX and X standard students only.

ii) 7.03 The study is limited to schools located in Tirunelveli, Tuticorin and Kanyakumari districts only.

iii) 7.04 In studying the study skills of high school students, the investigator has used a study skills scale having six dimensions: time scheduling, concentration, listening, and note-taking, reading skill, preparing for the examination and writing skill.

iv) 7.05 The dimensions included in the academic self-regulation are extrinsic motivation, introjected regulation, identified regulation and intrinsic motivation.

v) Achievement in Mathematics is measured in terms of the marks obtained by the students in IX and X standard in achievement test developed by the investigator (2012).