1.0 INTRODUCTION

Heaven and Earth proclaim the Glory of God. All the creations show some regularity among themselves. Nature tells the systematic work of God. Each and every mountains, hills, valley, plants and animals are created in some size, shape, height, weight, quantity, quality and thickness.

Human beings are the Crown of all Creations. Mathematics is the Queen of all Sciences. Life without mathematics is like ‘the well’ without water. Mathematics plays a very important role in educated as well as the uneducated people. Human beings who are all created in a symmetrical manner easily grasp the wonder of mathematics by their own. Each and every part of the body reveals all the shapes in mathematics. The acids, chemicals and the flesh proclaim the greatness of God’s proportionate to each body. More precisely the functions of human parts speak about the distance and speed. In a single sight human beings are able to observe uncountable messages from uncountable dimensions and form all the trigonometric ratios in mind itself. By seeing the height, weight and comparing with others, human beings are good at finding out the mean, median and mode of their own.

The uneducated fisherman who mends his net without any calculations finishes it in a perfect shape and size. The farmer without schooling knows the measurement, amount, selling price, cost price, and profit and loss. Missing of civil engineering nothing bothers the builders who knows very clearly about the inch, centimeter, meter, feet, square feet and acre. Not only with the measures but also accurate in all the shapes like square, rectangle, circle, cube, cuboids, cylinder, cone and spheres etc. The ordinary shop keepers also shine well in using the basic operations of mathematics like addition, subtraction, multiplication and division. Either rich or poor mathematics remains same for all. Even the house wife who knows nothing of the technological world knows how to solve cooking problems with proper
proportionate to make delicious food, make proper budget to maintain the family and save money for the future, buying house hold things, counting the days, months and years.

In day to day life the absence of mathematics is something which can be unimaginable. Each and every moment of our life is filled with mathematics. In fact mathematics is involved directly or indirectly where ever we go and whatever we do.

1.1 THE PROMINENT ROLE OF MATHEMATICS IN HUMAN WORLD

Without mathematics one cannot survive in the real world. Mathematics is very essential factor in human life since it helps to quantify all the visible as well as the invisible things with which everyday life is filled. It plays an increasingly vital part in all areas of modern science, technology and innumerous segments of socio economic and cultural life, including industries, telecommunications, education, medicine, transportation, banking, insurance, agriculture and development. Due to these wide ranging applications, it is inescapably tied to human kind’s advancement. Mathematics is deeply involved with the political issues like government, rapport among nations, social classes, people’s welfare and the preservation of natural and cultural resources. It is important to have a look into the role of mathematicians and mathematics educators in the evolution of mankind, especially because mathematics is recognized as the most universal mode of thought. Many great mathematicians have been philosophers as well, (eg.) Descartes, Pascal and Russell. If space could be made, mathematics can make spiritual development and probably mean they are better prepared for life. Anjali Sharma (2007) says, Some of the Mathematicians proclaims, Mathematics should be the subject which “teaches you to think” (Howson, 1986) and allows you to “display the sharpness of the mind”. Mathematics main potential here seems to be regarding developing the skills of reflection and possibly, for the more receptive, a sense of the “beauty” of a solution. The aesthetic quality of an elegant solution is something that may
be lost on a dedicated “mathematics hater”. “Mathematics rightly viewed possesses not only truth but supreme beauty” (Bertand Russell). Hence the Prominent role of Mathematics in human world is excellent.

1.2 HISTORY OF MATHEMATICS

Elementary mathematics was part of the education system in most ancient civilizations, including Ancient Greece, the Roman Empire, Vedic society and Ancient Egypt. In most cases, a formal education was only available to male children with a sufficiently high status, wealth or caste. In Plato’s division of the liberal arts into the trivium and the quadrivium, the quadrivium included the mathematical fields of arithmetic and geometry. This structure was continued in medieval Europe. Teaching of geometry was almost universally based on Euclid’s elements. Apprentices to trades such as masons, merchants and money lenders could expect to learn such practical mathematics as was relevant to their profession. The first mathematics text books to be written in English and French were published by Robert Recorde, beginning with The Grounde of Artes in 1540AD. However, there are many different writings on mathematics and math methodology that date back to 1800BCE.

1.3 REVOLUTION IN MATHEMATICS

In the 18th and 19th centuries, the industrial revolution led to an enormous increase in urban populations. Basic numeracy skills, such as the ability to tell the time, count money and carryout simple arithmetic, became essential in this new urban life style. Within the new public education systems, mathematics became a central part of the curriculum from an early age. By the twentieth century, mathematics was part of the core curriculum in all developed countries. During that period, mathematics was established as an independent field of research.
1.4 OBJECTIVES OF TEACHING MATHEMATICS AT SCHOOL LEVEL

At different times and in different cultures and countries, mathematics education has attempted to achieve a variety of different objectives. These objectives have included:

- The teaching of basic numeracy to all pupils.
- The teaching of practical mathematics (arithmetic, elementary algebra, plane and solid geometry, trigonometry) to most pupils, to equip them to follow a trade or craft.
- The teaching of abstract mathematical concepts (such as set and function) at an early age.
- The teaching of selected areas of mathematics (such as Euclidean geometry) as an example of an axiomatic system and a model of deductive reasoning.
- The teaching of selected areas of mathematics (such as calculus) as an example of the intellectual achievements of the modern world.
- The teaching of advanced mathematics to those pupils who wish to follow a career in Science, Technology, Engineering, and Mathematics (STEM) fields.
- The teaching of heuristics and other problem-solving strategies to solve non-routine problems.

1.5 ACHIEVEMENT IN MATHEMATICS

It is both the best and cheapest way to boost student achievement, student engagement and teacher professional satisfaction. Results surpass those of reducing class size or increasing teachers' content knowledge. Effective assessment is based on clarifying what students should know, creating appropriate activities to obtain the evidence needed, giving good feedback, encouraging students to take control of their learning and letting students be resources for one another. Homework which leads students to practice past lessons or prepare
future lessons are more effective than those going over today's lesson. Students benefit from feedback.

There are useful theories on how children learn mathematics and much research has been conducted in recent decades to explore how these theories can be applied to teaching. One of the strongest results in recent research is that the most important feature in effective teaching is, giving students "opportunity to learn". Teachers can set expectations, time, and kinds of tasks, questions, acceptable answers, and type of discussions that will influence students' opportunity to learn. Mathematics education research depends on both quantitative and qualitative studies.

1.6 MODERN MIND MAPPING

Pictorial methods for recording knowledge and modeling systems have been used for centuries in learning, brainstorming, memory, visual thinking, and problem solving by educators, engineers, psychologists, and others. Some of the earliest examples of such graphical records were developed by Porphyry of Tyros, a noted thinker of the 3rd century, as he graphically visualized the concept categories of Aristotle. Philosopher Ramon Llull (1235–1315) also used such techniques. The semantic network was developed in the late 1950s as a theory to understand human learning and developed further by Allan M. Collins and M. Ross Quillian during the early 1960s. British popular psychology author Tony Buzan claims to have invented modern mind mapping. He claimed the idea was inspired by Alfred Korzybski’s general semantics as popularized in science fiction novels, such as those of Robert A. Heinlein and A.E. van Vogt. Buzan argues that while "traditional" outlines force readers to scan left to right and top to bottom, readers actually tend to scan the entire page in a non-linear fashion. Buzan also uses popular assumptions about the cerebral hemispheres in order to promote the exclusive use of mind mapping over other forms of note making.
1.7 MIND MAP IN EDUCATION

The mind map continues to be used in various forms, and for various applications including learning and education (where it is often taught as "webs", "mind webs", or "webbing"), planning, and in engineering diagramming. When compared with the concept map (which was developed by learning experts in the 1970s) the structure of a mind map is a similar radial, but is simplified by having one central key word. Buzan states that Mind Maps have four essential characteristics as:

- a central image that represents the subject being mapped
- main themes that radiate like branches from that central image
- those branches have a key image or key word printed on an associated line
- the branches have a connected structure

Author Tony Buzan suggests the following guidelines for creating mind maps:

- Start in the center with an image of the topic, using at least 3 colors.
- Use images, symbols, codes, and dimensions throughout your mind map.
- Select key words and print using upper or lower case letters.
- Each word/image is best alone and sitting on its own line.
- The lines should be connected, starting from the central image. The central lines are thicker, organic and thinner as they radiate out from the centre.
- Make the lines the same length as the word/image they support.
- Use multiple colors throughout the mind map, for visual stimulation and also to encode or group.
- Develop your own personal style of mind mapping.
- Use emphasis and show associations in your mind map.
Keep the mind map clear by using radial hierarchy, numerical order or outlines to embrace your branches.

1.8 THREE DIFFERENT TYPES OF MIND MAPS

Type: 1 - Radial Mind Map: It arranges topics from a central topic out radially in both the left and right directions. It is shown in fig.1.1.

![Radial Mind Map](image)

Fig.1.1 showing the Radial Mind Map

Type: 2 - Right-Columnar Mind Map: It arranges topics from top to bottom on the right side of the central topic. It is shown in fig 1.2.

![Right-Columnar Mind Map](image)

Fig. 1.2 showing Right-Columnar Mind Map

Type: 3 - Left-Columnar Mind Maps: It arranges topics from top to bottom on the left side of the central topic. It is shown in fig 1.3.
1.9 USES OF MIND MAPS

Mind maps have many applications in personal, family, educational, and business situations, including note taking, brainstorming (wherein ideas are inserted into the map radially around the center node, without the implicit prioritization that comes from hierarchy or sequential arrangements, and wherein grouping and organizing is reserved for later stages), summarizing, as a mnemonic technique, or to sort out a complicated idea. Mind maps are also promoted as a way to collaborate in color pen creativity sessions.

Mind maps can be used for:

- problem solving
- outline/framework design
- structure/relationship representations
- anonymous collaboration
- marriage of words and visuals
- individual expression of creativity
- condensing material into a concise and memorable format
- team building or synergy creating activity
- enhancing work morale
1.10 ROLE OF MIND MAP STRATEGY IN EDUCATION

Creating an environment that engages students in the learning journey is not always easy. Mind Map is an excellent tool for collaborating with one another to develop plans or implement key projects. It allows the students to harness the input of all members of the classroom in a dynamic and creative way. Mind Mapping enhances critical thinking and cooperation as well as providing a solid basis for collaborative problem-solving. Mind Mapping raises the performance of students at all levels of ability as they became more efficient in generating and organizing ideas. Since the brain loves pictures and colors, Mind Mapping helps to take notes quickly and efficiently. Students learn to combine pictures and colors to help tie the learning into their personal connections which makes retention much easier.

The school and institutions of higher learning are searching for Active Learning Methodologies. Research and anecdotal evidence overwhelmingly support the claim that students learn best when they engage with course material and actively participative in their learning. Yet the traditional teaching method has positioned students as passive receptors into which teachers deposit concepts and information. Students must be engaged in higher order thinking tasks as analysis, synthesis, problem solving and evaluation along with reading, writing and discussing. The strategies promoting activities that involve students in doing things and thinking about what they are doing can be implemented in the class rooms. Mind mapping is a very powerful tool for brainstorming, creative thinking, problem solving, organizing of ideas and of course, note taking. It is an innovative strategy enabling the practitioner to organize information and perceptions in ways that allow them to achieve results that were once inconceivable. The impact of Mind map in students is shown in fig 1.4.
1.11 MIND MAP IN MATHEMATICS

Researchers in mathematics education are primarily concerned with the tools, methods and approaches that facilitate practice or the study of practice. New situations lead to new problems and new challenges, requiring an enhanced capacity to understand, visualize, interpret and share. Mind Maps are an ideal tool for understanding inter-relationships between different aspects of a situation. By focusing on meaning rather than worrying about grammar and semantics, the Mind Map helps students to rapidly build up an enhanced understanding of any problem, challenge or situation. By Mind maps, using more of the range of our right and left skills, the brain is kept in balance and busy which is very much needed for Mathematics education.

1.12 STATEMENT OF THE PROBLEM

Researcher reviewed the related researches. Orhan Akinoglu, and Zeynep Yasar. (2007). studied the effects of note taking in science education through the mind mapping
technique on students’ attitudes, academic achievement and concept learning. Thangarajathi, S. (2008). found out the effectiveness of Mind mapping technique in teaching Mathematics at High school level in terms of sex, parental educational qualification and parental income. Toi, H. (2009). revealed that the mind map improves memory. Anthony, V., D'Antoni, Genevieve, P., Zipp, Valerie, G., Olson, and Terrence, F., Cahill. (2010). investigated the mind map learning strategy facilitate information retrieval and critical thinking in medical students. Ertug Evrekli, Didem Inel, and Ali Günay Balim. (2010). found out the development of a scoring system to assess mind maps. From the review, it was recognized that very few researches are done on Mind map in India.

The present study is entitled as, “THE IMPACT OF MIND MAP TEACHING STRATEGY ON ACHIEVEMENT IN MATHEMATICS AND CERTAIN SELECT VARIABLES OF HIGH SCHOOL STUDENTS”.

1.13 NEED AND SIGNIFICANCE OF THE STUDY

Since the recommendations of the secondary Education Commission report of 1952-53 we are teaching mathematics on compulsory basis throughout the school stages (from primary to secondary level) because of the multifarious and many sided values to human being. National Policy of Education (1986) remarkably suggests that “mathematics should be visualized as the vehicle to train the child to think, reason, analyze and articulate logically.” Attainment or achievement in mathematics is based on mastery of fundamental skills. The new curriculum in mathematics at secondary school level demands for rapid learning and clear understanding of new curriculum. (ie. Trimester system of education newly introduced in the field of education). In this curriculum more concepts, theories, theorems, principles, axioms, postulates, formulae have to be taught and students have to be trained in solving numerical problems. Many researchers are in thirst to find out through which methodology,
understanding mathematics can made easy and reach highest performance. A team from World Bank, Venita Kaul, Deepa Sankar and Savita Dhingra and European commission, Shanti Jagannathan visited the SSA programme in Tamil Nadu, from August 19-21, 2008 with the objectives of learning and understanding the education reform and the active learning methodology (ALM) programme in upper primary schools. A key feature of an ALM class is to encourage each student to prepare a ‘mind map’ of a particular concept or theme. This cause the investigator to study on the impact of mind map teaching strategy on achievement in mathematics and certain select variables of High school students.

1.14 OPERATIONAL DEFINITIONS OF KEY TERMS

Mind Map

Mind mapping is a diagram used to visually outline information. A mind map is often created around a single word or text, placed in the center, to which associated ideas, words and concepts are added. Major categories radiate from central node, and lesser categories are sub-branches of larger branches. Categories can represent words, ideas, tasks, or other items related to a central key word or idea.

Teaching strategy

The teaching strategy refers to the teaching method and technique adopted in planning the subject matter, classroom management and interaction with students. It is the method adopted according to one’s style and basic approach. The strategies are expected to be instrumental for effective learning in students.
Achievement

Achievement means a measure of knowledge gained in formal education generally indicated by test scores. It is the end product of all educational endeavors, the main concern all educational efforts is to see that the learner achieves. The term is to describe the performance of the students in various subjects of school curriculum.

Variable

A variable is something that can be changed, such as a characteristic or value. Variables are generally used in psychology experiments to determine if changes to one thing results in changes to another. There are two types of variables in the present study. They are dependent variable and independent variable.

1.15 OBJECTIVES OF THE STUDY

The study has the following objectives

1. To develop and validate Mind map teaching strategy for teaching Mathematics to the High school students.
2. To construct and validate a tool to assess the Achievement in Mathematics and scale of Attitude towards Mind map teaching strategy of High school students.
3. To study the Achievement in Mathematics of High school students learning Mathematics through Mind map teaching strategy and through Conventional Lecture method.
4. To study the impact of Mind map teaching strategy on Achievement in Mathematics of High school students over the Conventional lecture method.
5. To study the Attitude towards Mind map teaching strategy and Problem solving ability in Mathematics of High school students.
6. To find out the correlation between Achievement in Mathematics and Attitude towards Mind map teaching strategy; Attitude towards Mind map teaching strategy and Problem solving ability in Mathematics; and Problem solving ability in Mathematics and Achievement in Mathematics of High school students.

7. To recommend the results of Mind map teaching strategy for Policy making at High School Programme.

1.16 RESEARCH QUESTIONS

Based on the personal observation and experiences of the investigator observation and the opinion of the teachers, parents, experts and educationist the following research questions were formulated:

1. What differences currently exist between the traditional conventional lecture method and Mind map teaching strategy among IX std. students?

2. How effective the special treatment given for students?

3. Is there a relationship between attitude towards mind map teaching strategy and achievement in Mathematics?

4. Does Mind map teaching strategy give way to problem solving ability in Mathematics?

5. Does Problem solving ability relate to student achievement?

1.17 DELIMITATIONS OF THE STUDY

The following are some of the delimitations of the study

1. The few High school students were selected as a sample.

2. Only selected dimensions in Attitude towards Mind map was included for the investigation.

3. Only the limited variables were selected.
**1.18 CHAPTER SCHEME**

Chapter – I deals with conceptual framework and introduction.

Chapter – II gives the survey of related literature related to the variables of the study.

Chapter – III gives the method and procedure followed by the investigator.

Chapter – IV deals with the analysis and interpretation of the data.

Chapter – V gives the summary, findings and recommendations of the study.

**1.19 CONCLUSION**

Education is considered as an important index to measure societal development. This is the reason that education is taken as priority sector for development by all nations. Every nation develops the system of education to express and promote its unique socio-cultural identity and also to meet the challenges of the times. The role of educational development in several problems of the human society has been realized at all levels. School education is an important segment of the whole educational structure and it is considered as a powerful instrument to develop students’ behavior and hence the society. Students’ performance in the subject mathematics has been investigated through this research. Hope it will be useful for the secondary school teachers and students to reach their goal easily.