CHAPTER - I

THE PROBLEM

1.0 Introduction:

Science has been man’s greatest ally since the dawn of civilization. It has created innumerable pathways to progress that has taken man from primitive life to the doorstep of advancement. The great achievements of science have made the present day world glorified to the extent that it has transformed the present civilization into scientific civilization. Life today is impossible without science.

The role of science is of utmost importance in raising the level of country from developing to advanced. All doors of economic growth and development pass through the gateway of scientific advancement. Pt. Jawaharlal Nehru was a firm believer of the crucial importance of science and technology for social transformation. He helped in laying a firm foundation of science education in our county. Science teaches children the necessary skills which they can use in other areas of their lives. Systematic exposure of science to children at early levels of education help in developing lifelong interest for the subject in them.

Young minds are creative, innovative and full of ideas. Science offers them with tremendous opportunities to face the challenges of
material and social world. If we want our students to take those opportunities and meet those challenges we must expose them to science subject since primary level of education and should be made compulsory till the secondary level.

The general observation reveals that not all students perform well in science subject during examination. It is still not clear as to what is the reason for this. Many believe that learning science is a matter of one’s attitude and aptitude in science. How far it is true is an open question? The present research work intend to probe this very question.

1.1 **Theoretical Frame Work of the Study:**

The present study is based on the following theoretical background.

(i) **Importance of Science in the School Education of Children:**

Science is important for school children, not only as a subject but also as a path finder for their future life. The teaching of science subject at all levels in school plays a vital role. Science has enormous influence on our lives. Science in curriculum, provides certain values which are not provided by any other subject. The discoveries of scientists help to shape our views and outlook about the entire universe. What everybody needs is a sense of knowledge leading to understanding of science subject. Thus, the duty of the school is not
only to help the pupils acquire the requisite scientific knowledge but also teaching should inculcate the higher virtues of science such as critical thinking and accurate observation. The schools and parents have a big role to play to make the pupils aware of the social aim of teaching science. They should be explained how the knowledge of science can be utilized for the benefit of the individual and the society.

The teaching and learning of science helps enabling the learners to acquire problem solving and decision making skills and to link science with day today life, like agriculture, industry and interdependence of living creatures. Learning of science subject not only enriches students for learning of scientific phenomena of present and past but also develops a query in them to think of new events to happen. The National Policy on Education 1986 seeks to enable them to appreciate the part science plays in their lives. As per National Policy of Education 1986 “Every effort will be made to extend science education to the vast numbers who have remained away from reach of formal education”. The Policy has also emphasized and considered the importance of science in general education and suggests that “Science should be visualized as the vehicle to train a child to think, reason, analyze and to articulate logically”.
The study of science brings behavioral change in the learner and enriches his character and personality. Teaching of science at school level gives opportunity for creative thinking and constructive imagination to children. Science is a subject where ideas can be experimented upon and verified. The learner develops the habit of searching for the truth. These qualities affect the pattern of behavior and outlook of the learner. The significant aspect of science at school level is that whatever the student learns has immediate application in the world around him. Learning of science subject opens innumerable avenues in front of a student. A science learner is a seeker of truth. Scientific facts give a true picture of nature to the learner. In scientific pursuits, it requires intellectual honesty at each and every step. This clubbed altogether make the student educationally very sound and socially a strong personality. The qualities imbibed by the learner through learning science are of great value to all the citizens living in society. According to Kothari Commission report (1964-66) “Science education must become an integral part of school education. Science strengthens the commitments of man to free inquiry and the search for truth as its highest duty and obligation. By its emphasis on reason and free inquiry, science also helps to lessen ideological tensions. Although it is largely occupied with the understanding of nature at present, its
development is lending more and more help to man to understand himself and his place in the world”\textsuperscript{1}. Hence, science is now made a compulsory subject in every system in school education right from elementary stage.

Jawaharlal Nehru has once said, “It is an inherent obligation of a great nation like India, with its traditions, original thinking and its great cultural heritage, to participate fully in the march of science, which is probably mankind’s greatest enterprise today”\textsuperscript{2}.

This all makes us understand in a chronological order that why the learning of science subject is important at school level. How teaching of science should take place so that during teaching process individual differences amongst the students are understood, analyzed and taken into consideration. This all raises few questions as to how the teaching learning phenomena can be smoothly channelized so that it can make teaching interesting and learning an assimilating process. This not only yields to better achievement in science subject but also helps in developing scientific thinking and scientific bent of mind amongst the students.

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\textsuperscript{2} Key paragraph to: the \textit{National Science Policy Resolution}, moved in the Parliament by Jawaharlal Nehru on 12\textsuperscript{th} March 1958. The Policy is known as Scientists’ Charter.
(ii) **Importance of Achievement in Science Subject:**

Achievement in any subject holds a great importance for students and the schools as well. The same holds true for the subject of science. The present education system revolves around the system of examinations to seek and analyze the progress level of students in their respective studies. The achievement in science not only judges the performance level of students but also interlinks the entire education system and new discoveries prevailing in all over the countries of the world. Science achievement is judged by means of theory and practical examinations separately; theory to see how much a student has learnt and practical to see how much he has assimilated. Assessment of students in science serves the dual purpose of judging the level the students attained in subject and also help to the teachers and the school administrations to peep into the need for any kind of improvement required.

“Achievement also serves as an incentive to students to climb the academic ladder or go out into job market in search of livelihood, depending on the performance of the said examination”\(^3\). The arena of science is quite vast in professional market. The avenues to the

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contenders are categorized to be achieved by the students as per their achievement level. The value of academic achievement in science subject holds more importance at secondary stage because it serves the purpose to attain good academic position to select a suitable profession based on science and make it a career. As a result to all these factors there always comes an intense pressure on schools for its students to achieve high academic scores in science subject. These scores become the land mark to justify the educational grading of the students and quality of the school. The achievement in the science subject can be summed up as accomplishment or acquired proficiency in performance of an individual with respect to given subject matter, scientific knowledge or skill.

As compare to last two decades there has been marked increase in the avenues and career prospects in science stream and that is the reason that students see science stream as a key to a bright and meaningful future. There are multiple options available in market based on science background which students can go for, after secondary school level. Better the opportunity is tougher is the competition. For admission in any science oriented good career course after school level, marks achieved in science subject make a lot of difference. Here comes the need of higher achievement for students in
science, as higher the achievement level of the students will be, wide choice of career options will be open for them. To achieve high in secondary and higher level in science, students have to have a strong base in science since beginning of their studies. They should have basic scientific concepts clear to them and an inbuilt interest to learn science. Seeing all the factors and importance of achievement of science, it gives rise to the requirement of knowing the reasons which basically affect the achievement in science subject.

(iii) Factors Influencing Achievement in Science Subject:

There are some of the significant factors that influence students’ achievement in science subject. In school, the students are exposed to same subject matter same teacher and same environment still there are differences in achievement level of students in the science subject. What can be the cause of it? The achievement marks of students at the end of examinations are much less as comparison to the efforts they put in. On other hand there are a few students who comparatively do not spend that much of time and effort in studies but achieve better than others. This variation in academic achievement level of students in science is the indicator of individual differences and abilities of students’ achievements. All this draw attentions of researchers to go into depth of reasons as to how the learning can yield to better
assimilation in science subject. What are the individual differences which are required to be looked into, to achieve better in science subject.

In nutshell we can say that achievement in examinations is a multifarious process which does not depend only on efforts the students devote in studies. It involves number of factors affecting the scores. The first and foremost comes the interest, inclination and bent of mind the individual has in science subject. Thus, at all levels in school science education, always there is a great emphasis laid on achievement right from the beginning of formal education. When we talk about achievement in science we mostly concentrate on subject matter, studying hours, teaching process and school environment. The important aspect at this point of time which generally gets ignored is the individual differences amongst students. These individual differences are the key gaps which help a few students to be high achievers and a few come in the category of low achievers. Here comes the importance of analyzing the factors like scientific attitude and scientific aptitude amongst the students. There arises a need to know what scientific attitude is and what scientific aptitude is? How these factors can be judged in students? There after comes the need to know that how these factors are influencing achievement in science subject?
Then at the end comes the need to explore the measures to enhance these academic pursuits of individual students to get a better yield in the form of academic achievement in science subject.

(iv) **Scientific Attitude and its Role in Achievement in Science:**

Scientific attitude is the generalized disposition of any individual towards science, which can be measured in terms of its favorableness estimated from the scores obtained on a scientific attitude scale. The testing of scientific attitude involves the testing of components like curiosity, open-mindedness, faith in scientific methods, cause and effect relationship, critical mindedness, seeking evidence, objectivity, suspended judgment & aversion to superstition. In other words we can say that scientific attitude is a collective result of the above mentioned factors. Analyzing curiosity which is mentioned as a first factor to be judged while judging scientific attitude we can say that curiosity of a student towards any subject helps him or her to develop an inclination towards that subject. Curiosity towards subject of science indicates the quality of a student which helps in developing a quest amongst the students to know more about the subject. When there is a quest to know more there will be desire to study sincerely. The sincere study will automatically help to remember and assimilate. When the subject
is learnt with interest and retained for a longer duration that will help the students to perform well in examinations.

Open Mindedness is considered as another parameter in judgment of scientific attitude in students. Open mindedness comes when your basic fundamentals are clear. To clear basic fundamentals there is a requirement of sincere devotion towards the subject. The subject of science is such that if one studies it with interest and understands it with logics the thought process becomes streamlined. With streamlined thought process and logical thinking comes the open mindedness which helps the students to get into the study of science devotionally to yield into best of the achievement results. With the open minded attitude one avoids getting inclined towards fake views and imaginary ideas and develops a faith in scientific methods. This faith automatically directs a student to know more and more in science subject and thus helps him/her to study more, analyze more and remember more. With a faith in scientific methods come the analytical power and the quality of critical thinking amongst the students. The students start analyzing the aspects they are studying and try and find cause and effect relationship with each and every topic they are studying. This interlinking of one topic to another while studying science, helps the students to involve in the subject. This involvement
makes the retention of any topic last longer and yield to better achievement. Slowly and slowly the students develop objectivity. This develops logical thinking and inclination towards the past and present events in science.

When a student develops interest and tilt towards science subject he/she starts knowing about the scientific activities and the scientists involved in it and develops a scientific thinking. This directly or indirectly adds to cultural heritage of man.

In scientific pursuits it requires intellectual honesty at each step. Scientific attitude is the most important outcome of science teaching. Scientific attitude is a real significant concern of the process of science education. In this connection the rethinking of science education (Das, 1989) mentioned the characteristics of scientific attitude as “Open mindedness, a desire for accurate knowledge, confidence in procedure for seeking knowledge and the expectation that the solution of a problem will come through the use of verified knowledge”.

(v) **Scientific Aptitude and its Role in Achievement in Science:**

Scientific aptitude is a potentiality of future accomplishment in science without regard to past training and experience. Scientific aptitude is a compound of abilities which are developed through learning. It is a special intellectual ability to comprehend the scientific
knowledge. The judgment of scientific aptitude involves a high degree of tilt towards reasoning and understanding of scientific concepts.

The students with higher scientific aptitude have to have special visualization towards the subject of science. There should be a high degree of interest amongst the students to read the scientific literature and grasp the concepts innately. When a student has higher scientific aptitude he/she will have higher scientific vocabulary which actually comes with getting more inclined to the ‘know – how’ of scientific literature. The development of scientific aptitude helps in raising the quality of numerical ability in students along with the information about scientific events.

Without right aptitude towards the subject one cannot master or show much interest in subject likewise without good scientific aptitude an individual does not perform to a considerable level in science. Along with the presence of study skills which have been mentioned in paragraph above, every individual needs certain persistence factors in learning science. Heredity, background and the environment you live in are the eminent factors to count upon. To break it further we can say that the factors such as physical development, social and emotional maturity, moral character, individualistic interests/abilities and
attitudes may also be considered necessary for development of scientific aptitude.

Scientific aptitude plays a vital role in understanding and comprehending the content in science subject. As a whole science needs in-depth reasoning power and special visualization of the content. Achievement in science strongly depends upon the fact that how much the students have learnt and how much they have retained during the time of examination. If the students have scientific aptitude then the learning becomes easier and student will be able to retain it for a longer time. Thus it implies that there is a sincere need to explore as to how scientific aptitude links with enhancement of science education and thus achievement in science.

(vi) Profile of Meghalaya:-

Meghalaya means “the abode of clouds”. Meghalaya is a hill state which was born with abundant love and goodwill through the historical North Eastern Areas (Re-Organization)\(^4\) Act, 1971. This was inaugurated as an autonomous state from part of Assam on 2\(^{nd}\) April 1970 with two erstwhile districts of Assam i.e. the United Khasi & Jaintia Hills District and Garo Hills District of Meghalaya, and was

\(^4\) Government of Meghalaya, Meghalaya. Published by The Directorate of information and Public Relations, Shillong, 1991, p. 3.
declared a full fledged state on 21<sup>st</sup> Jan’1972. It is predominantly inhabited by Khasis, Jaintias and the Garos. Meghalaya<sup>5</sup> is bounded on the North by Golpara, Kamrup, Nagoan and Karbi Anglong Districts of Assam on the East by the District of Cachar, North Cachar hills also of Assam. On the South and West it has international boundary with the neighbouring country of Bangladesh.

The state has geographical area of approximately 22,429 Sq. km, and is flanked by Bangladesh on the South side and Assam to the North East and West. The population of Meghalaya is 29, 64,007 according to 2011 census and has the density of 132 persons per Sq. km. The Sex ratio of Meghalaya is at 986 females to 1000 males and is higher than the national average of 933. The state comprises of 07 districts viz.: East Khasi Hills District, West Khasi Hills District, Jaintia Hills District, Ri-Bhoi District, West Garo Hills District, East Garo Hills District and South Garo Hills District. Meghalaya’s capital is Shillong and also is District HQrs East Khasi Hills District. It is situated at an altitude of 1,496 meters above sea level and has a bracing climate throughout the year. Administratively Meghalaya is divided in two divisions of Khasi- Jaintia and the Garo Hills. The state has ten civil sub-divisions, 39 blocks, 16 towns and 6026 villages. The

Panchayati Raj system is absent in the state but there is a system of village councils known as “Durbar” which carries out the developmental works. This is the basic administrative unit in the villages. These “Durbars” are headed by the village headmen. At the head of these traditional administrative units, are the Autonomous District Councils, one each for the Khasi, Jaintia and Garo Hills. These District Councils are controlled by public representatives who are elected members. The table below shows the district wise distribution of land area of Meghalaya as per the latest census.

Table No. 1.1
District wise breakup of Population and Land Area as per Census 2011.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Districts</th>
<th>Area in Sq Km</th>
<th>Population</th>
<th>Head quarters</th>
<th>Population Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>East Garo Hills</td>
<td>2,603</td>
<td>50.80</td>
<td>49.20</td>
<td>317,618</td>
</tr>
<tr>
<td>2.</td>
<td>East Khasi Hills</td>
<td>2,748</td>
<td>49.80</td>
<td>49.80</td>
<td>824,059</td>
</tr>
<tr>
<td>3.</td>
<td>Jaintia Hills</td>
<td>3,819</td>
<td>49.80</td>
<td>50.20</td>
<td>392,852</td>
</tr>
<tr>
<td>4.</td>
<td>West Garo Hills</td>
<td>3,174</td>
<td>50.53</td>
<td>49.47</td>
<td>642,923</td>
</tr>
<tr>
<td>5.</td>
<td>West Khasi Hills</td>
<td>5,247</td>
<td>50.47</td>
<td>49.53</td>
<td>385,601</td>
</tr>
<tr>
<td>6.</td>
<td>Ri-Bhoi</td>
<td>2,448</td>
<td>51.26</td>
<td>48.74</td>
<td>258,380</td>
</tr>
<tr>
<td>7.</td>
<td>South Garo Hills</td>
<td>1,850</td>
<td>51.43</td>
<td>48.57</td>
<td>142,574</td>
</tr>
<tr>
<td></td>
<td>Meghalaya</td>
<td>22,429</td>
<td>50.35</td>
<td>49.65</td>
<td>2,964,007</td>
</tr>
</tbody>
</table>

(a) **Demographic Indicators**

Broadly, Meghalaya\textsuperscript{6} can be divided into two zones:

1. The Khasi-Jaintia Hills region comprises of eastern portion and central high plateau areas are predominantly occupied by the Khasi-Jaintias, one of another tribe of the state.

2. The western zone of the state is well known for its richness in biodiversity. This side of the region is predominantly occupied by the Garos, another tribe of the state.

These tribes share a matrilineal system under which descent is reckoned in the female line and the child belongs to the clan of the mother.

“The inhabitants belong to Scheduled Tribes and constitute 85.9 percent of the total population but it has a mixed ethnic population consisting of non tribal who follow a variety of religious beliefs and speak several languages. It represents cheerful uncomplicated and warm people, traits that run common throughout the North Eastern region”\textsuperscript{7}. The principal languages in the state are Khasi, Jaintia and Garo in their respective areas with English as the official language. Meghalaya is basically an agricultural state with 80 percent of the


\textsuperscript{7} B. Lyndem; *The Tryst with Literacy: A Meghalaya Experience*, Published by the Director, State Resource Centre, NEHU, Shillong, 2000.
population dependent entirely on agriculture for their livelihood. Meghalaya has developed into a culturally rich state over the years. Presently with higher educational achievements, people are actively engaged in other economic activities also besides agriculture, like business, administrative sectors, industries, etc. Literature in Khasi and Garo language has been developed and these two languages have found their place in the list of modern Indian languages. These two languages are now being studied up to post graduation level and are the main languages in Meghalaya, though English is the official language.

The present study was conducted within one of the district of Meghalaya i.e., the East Khasi Hills Districts with headquarter in Shillong, which is also the capital city of the state which form the central part of Meghalaya. The earlier East Khasi Hills District was bifurcated in 1992 with the formation of Ri-Bhoi district being carved out of it. According to the 2011 census report, East Khasi Hills District has shown the highest rate of literate persons in the state with 75.48 percent in the ratio of, Male 77.17 percent and 73.78 percent Female.

(b) Educational Facilities

Meghalaya holds number one position to be the hub of education in entire North-East. The convents occupy number one position and attract students not only from North-East India but also from the other
parts of the country. Other than convent schools which are run by missionaries there are number of other Government and privately run educational institutes and schools. The cost of education at school level is not very high. East Khasi Hills District were the state capital of Meghalaya and the Headquarters of North Eastern Council, has the highest literacy rate of 84.70% while West Garo Hills District in the western most part of the state has the literacy rate of 68.38%.

The state of Meghalaya is achieving a quite high and respective position in country as far as advancement and development is concerned. The cause for this rise in advancement is the rise in education level of general masses. Meghalaya has introduced compulsory and free education for students up to 14 years of age in order to improve academic scenario of state.

Meghalaya has five types of schools mainly. They are (a) Government Schools (b) Deficit Schools (c) Unaided schools (d) Adhoc Schools (e) Newly Permitted schools. The schools of Meghalaya are either affiliated to Meghalaya Board of State Education (MBOSE), CBSE Board or ICSE Board. Like other states, education system in Meghalaya provides for general education from the pre primary level onwards upto the degree level. Meghalaya has also followed 10+2 pattern of education since 1994. The system follows
Pre-primary, primary schools, Middle schools, high schools and higher secondary schools. The Higher education (Colleges) are affiliated to NEHU (North Eastern Hill University). The schools in Meghalaya generally follow medium of education as English whereas few schools teach regional languages also.

The education system in Meghalaya takes good care by providing appropriate guidelines to the students so as to enhance their proper mental, social and academic development. The evaluation system is achievement based. Most of the schools follow the judgment of achievement in the form of marks whereas a few schools follow the grading system also. The teachers at all the level play a vital role and own a great responsibility to enrich the students with the subject knowledge following the different methods of teaching, so as to result into better achievement in concerned subjects. Extracurricular and co-curricular activities also hold an important place in the school syllabi.

The achievement in all the subjects is measured by means of regular conduct of examinations. This helps the school system to judge the students, their performance level and also helps them to improvise upon the methods which can lead to better achievement of the students in terms of marks. The schools also classify the subject wise
demarcation with effect from Higher Secondary Level into Science stream, Commerce stream and Arts stream. The students are given admission into particular stream depending upon their achievement marks in respective subjects in class- X board examination. Thus the X standard marks in any particular subject are important for the students to go in and select that particular stream in higher secondary school onwards. This stresses the concentric efforts of school education to facilitate the students to attain high level of excellence in academic achievement.

(vii) Science Teaching in the Schools of Meghalaya

To peep into science teaching in the schools of Meghalaya first there is a need to highlight the school education system in Meghalaya. Before British time there was no formal education system in Meghalaya. After British colonial dominance Christian missionaries nurtured the route of education system, but at a slow pace. Meghalaya as a state remained not much looked after as far as education is concerned till independence. The beginning of education development started after Indian rule with a phenomenal increase in number of schools, and this was concentrated upon in first five year plan. The state of Meghalaya has also introduced the schemes like Sarva Shiksha
Abhiyan (SSA) for improved, helpful free and compulsory education to students up to the age of 14.

Though there is no lacking in the part of system as it provides appropriate guidelines to students to develop adequate mental and academic development. Despite this, other than a few well established schools in districts in Khasi Hills and Jaintia Hills, generally schools are such where due to lack of basic infrastructure and appropriate inclination of students to the science subject, the achievement level of students is not of the desired level. The syllabi though match with any developed area school; still the mental scientific bent of mind and angle of inclination of students to the subject of science does not hold that much of degree of concentration and association. The reasons for this can be that the exposure of these children is much less to the real scientific world. This may be the reason which keeps them away from faster grasping, understanding and analyzing the subject of science taught to them in class. The school system, like at any other place covers the prescribed syllabi and conducts regular examination to keep the students up-to-date. The aim of education in state is to facilitate the students to attain excellence in academic achievement in all subjects equally; still it is felt that for science education in schools, there is a requirement to incorporate new scientific methods of teaching the
science subject. This is possible only with the wider perspective of the subject exposed to children. There is a requirement to incorporate scientific developmental phenomena like development of scientific bent of mind and scientific and logical thinking. This can be made possible by incorporating the subject of wider interest amongst the students like enriching them with knowledge of scientific advancement and discoveries of present scientific world. This shall not only help the students to develop interest in subject of science but also would lead them to better understanding, assimilation and thus to better achievement.

1.2 Need and Justification of the Study:

It is generally observed that there are only a few students who have positive inclination towards the science subject. This is apparent by seeing that lesser no of students are opting for science stream in higher secondary level as compared to those opting for other subjects. This raises the question as to why the students of this region do not have as much interest in study of science as they have in other subjects? What could be the possible reasons for all this? Where are we lacking in inculcating this interest amongst the students? or have we not been able to develop scientific culture amongst the students?
If a subject is understood well in a class, the students welcome it with interest and the learning phenomena becomes easier. If the aptitude of students is towards the study of science then their attitude is welcoming to know more. This aspect of trying to know more is the quest to learn the subject more and go into its depth. If the students have the power to grasp faster and learn more, then that power can further be advanced from innate scientific aptitude to the enhanced scientific aptitude. This can further help the students to develop a positive attitude for the subject of science. Knowing about these two factors i.e. scientific attitude and scientific aptitude, develop a query as to how much these factors really influence the learning and grasping phenomena in the field of science. At this level there is a need to understand as to what can help the students in better learning and assimilation in the subject of science? What are the factors which can help and affect the students’ decision to choose science as a subject for their further studies? What are the factors which can affect the students’ level of achievement in the subject of science? In nutshell this can be summed up as a sincere requirement of knowing the effect of scientific attitude and scientific aptitude upon the achievement level of students in the subject of science. These two play a decisive role in enhancing the grasping power in science and thus leading the students
to understand the subject thoroughly. Both these factors are required to be judged and nurtured in the right direction amongst the students for the better perspective of science education.

Positive scientific attitude and higher scientific aptitude will help the students in early grasping and better adaptability to study science. This is the time when there is a requirement to open the field of science to those students who have an inborn scientific attitude and scientific aptitude. Along with this there is also a need to develop the measures as to how these qualities can be enhanced amongst the students for better achievement in the subject of science. How these variables can affect the results in the form of achievement in the subject of science amongst students? By studying the effect of these variables we can also find out the measures to develop and nurture the qualities to learn science in those students who are weak in science. These disciplinary qualities of mind, if judged and intensified may be carried over to manifest general achievement level of a learner. Scientific attitude and scientific aptitude are reflected amongst students’ involvement in science related activities, their orientation towards science literature and their knowledge about scientists and their subsequent achievements. Seeing all these aspects there arises a need to study these variables and establish their elaborated linkage.
upon the achievement in science subject which are the basic ingredients to develop the required scientific culture.

Thus the problem under investigation is designed with a thought of finding out the effect of scientific attitude and scientific aptitude on the academic achievement of class X students in science subject, in which academic achievement in science will be taken as dependent variable where as scientific attitude and scientific aptitude as independent variables.

1.3 Statement of The problem:

In view of the background as described above, the problem under study is specifically titled as follows:-

“Effect of Scientific Attitude and Scientific Aptitude on the Academic Achievement in Science Subject of Class X Students in East Khasi Hills District of Meghalaya”.

1.4 Operational Definitions of the Key Terms Used:

The present study involves the following key terms which are operationally defined as follows.

(i)  **Effect:-**

It refers to the influence of naturally occurring independent variables (i.e. Scientific Attitude and Scientific Aptitude) on the dependent variable (i.e. Achievement)
(ii) **Scientific Attitude**

Scientific attitude can be defined as a generalized disposition towards science, which can be measured in terms of its favorableness estimated from the scores obtained on a scientific attitude scale by testing the components like curiosity, open-mindedness, faith in scientific methods, cause and effect relationship, critical mindedness, seeking evidence, objectivity, suspended judgment & aversion to superstition.

(iii) **Scientific Aptitude**

Scientific aptitude can be defined as a special intellectual ability to comprehend the scientific knowledge which can be measured in terms of its favorableness estimated from the scores obtained on a scientific aptitude scale by testing the components like reasoning, special visualization, scientific vocabulary and numerical ability along with the information about scientific events.

(iv) **Academic Achievement**

It refers to the students’ ability to achieve academically. It is reflected in terms of the percentage of marks obtained by class-X students in the subject of science in their SSLC examination conducted by MBOSE.
1.5 Objectives of the Study:

i) To find out the scientific attitude, scientific aptitude and the level of academic achievement in science of class X students in East Khasi Hills Districts of Meghalaya.

ii) To study the relationship between scientific attitude and academic achievement in science of class X students in East Khasi Hills District of Meghalaya.

iii) To study the relationship between scientific aptitude and academic achievement in science of class X students in East Khasi Hills District of Meghalaya.

iv) To study the multiple effect of scientific attitude and scientific aptitude on academic achievement in science of class X students in East Khasi Hills District of Meghalaya.

v) To study the effect of scientific attitude on the academic achievement in science of class X students in East Khasi Hills District of Meghalaya.

vi) To study the effect of scientific aptitude on the academic achievement in science of class X students in East Khasi Hills District of Meghalaya.

vii) To suggest measures to improve the quality of science education in schools in East Khasi Hills District of Meghalaya.
1.6 Hypotheses of the study:

(A) Research Hypotheses:

(i) There is significant relationship between the scientific attitude and academic achievement in science of class X students in East Khasi Hills District of Meghalaya.

(ii) There is significant relationship between the scientific aptitude and academic achievement in science of class X students in East Khasi Hills District of Meghalaya.

(iii) There is significant multiple relation between academic achievement and the variables of scientific attitude and scientific aptitude taken together of class X students in East Khasi Hills District of Meghalaya.

(iv) There is significant difference in scientific attitude of class X students between high and low achievers.

(v) There is significant difference in scientific aptitude of class X students between high and low achievers.

(B) Null Hypotheses:

(i) There is no significant relationship between the scientific attitude and academic achievement in science of class X students in East Khasi Hills District of Meghalaya.
(ii) There is no significant relationship between the scientific aptitude and academic achievement in science of class X students in East Khasi Hills District of Meghalaya.

(iii) There is no significant multiple relation between academic achievement and the variables of scientific attitude and scientific aptitude taken together of class X students in East Khasi Hills District of Meghalaya.

(iv) There is no significant difference in scientific attitude of class X students between high and low achievers.

(v) There is no significant difference in scientific aptitude of class X students between high and low achievers.

1.7 Delimitation of the study:

The study is delimited to the students of class X belonging to different secondary schools of East Khasi Hills district of Meghalaya under the Meghalaya Board of Secondary Education (MBOSE).