CHAPTER: I

THE PROBLEM

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1.0 Introduction

Mathematics is a relevant subject in education. It serves as the basis of modern inventions, scientific discoveries and research studies. The contributions of mathematical knowledge and skills have enhanced the economic, industrial and technological growth of modern world. It helps in drawing necessary conclusion and interpreting various ideas with useful meaning. Furthermore, mathematics is used in life’s day to day interactions like at market places, transportations, businesses of all sorts by both literate and illiterate members of the society. It has a real value in real-life applications. Without mathematics students are likely to perform poor in their academics because mathematics has its associations and roots in the Science and as firmly as it has with the Arts subjects. It nourishes and in turn gets nourished form Science as well as Art. That is why it is termed as ‘Science of all Sciences and Art of all Arts’.¹ Thus there is no valid reason to ignore the importance of mathematics.

The main goal of mathematics education in schools is the mathematisation of the child’s thinking. Clarity of thought and pursuing assumptions to logical conclusions is central to the mathematical enterprise. There are many ways of thinking, and the kind of thinking one learns in mathematics is an ability to handle abstractions, and an approach to problem solving.² Hence, mathematics at secondary level is undeniable and it lays a strong foundation on which the structure of higher mathematics is built. Mathematics helps in training and disciplining the mind. It develops the power of thinking and reasoning and gives mental exercises best fitted for strengthening the mental faculties. According to Young, “Mathematics is the only subject that encourages and develops logical thinking. It enables the student to discriminate between essentials and non-essential.”

Students’ attitude towards mathematics and their study habits affects their academic achievement in the subject. Low attitude towards the subject could considerably reduce a student’s willingness to persist with a problem and this may hinder in the development of good study habits. The student may also lose interest in the subject and think not to continue it at the higher level. This indifference towards the subject is a serious problem for any school administration. School teachers can help the students by encouraging them to develop favourable attitude towards the subject and to cultivate better study habits. A favourable attitude is considered as one of the most valuable tool in learning mathematics because any task attempted is vastly influenced by one’s attitude towards it.

It is generally believed that mathematics is difficult subject, but any student of an average intelligence can learn this subject. It is also assumed that its learning requires special ability and intelligence, and therefore, most of the students try to avoid the trouble of studying this subject thinking that they are not competent enough to learn mathematics. There is nothing like mathematical ability or intelligence,¹ any student can acquire this ability by developing positive attitude towards mathematics. Some students who are not showing any potential in the subject at this stage may prove their worth in the coming years of his/her school stage by developing proper study habits.

If the mathematics subject is not difficult and does not require any special intelligence than what other factors may be responsible for creating fear in mathematics. This is an area which must be explored.

¹ Ibid. p. 12.
1.1 Theoretical Background of the Study

1.1.1 Value and Importance of Mathematics

Value of Mathematics:

Mathematics is an exact science and provides high cognitive abilities and powers. To quote Courant and Robbins (1941), “Mathematics as an expression of the human mind reflects the active will, the contemplative reason, and the desire for aesthetic perfection. Its basic elements are logic and intuition, analysis and construction, generality and individuality.”¹

Mathematics has its own language, signs, symbols, terms and operations. It is the tool which deals with abstract concept of any kind. It gives satisfaction of work and makes a person confident and organised. It trains a mind to be disciplined and gives a clear understanding of right and wrong. Mathematics develops skills in students to analyse a problem and make judgement without falling into the hands of biases or prejudices.

A child is sent to school to acquire three main values, these are: (i) knowledge and skill, (ii) intellectual habits and power, and (iii) desirable attitudes and ideals. These three values are facilitates by practical or utilitarian value, disciplinary and cultural values of education respectively.² The knowledge of mathematics helps in realization of these values.

(i) Practical or Utilitarian Value

Mathematics imparts system in life because is deals with number. Our life rotates around numbers, as we can feel the need of mathematics right from the early morning and throughout the day. It cannot be eliminated from daily life process. It is needed by all everyone whether rich or poor, younger or older, man or woman in every sphere of one’s life, even big industries, business firms, engineers and bankers. Besides, mathematics is utilized by petty shopkeepers,

humble coolies, small carpenters and labourers, not only for earning livelihood but also to spend wisely and save for their future. Utilitarian or practical value thus, establishes relation between the subject and practical life.

(ii) Disciplinary Value

Mathematics trains and disciplines the mind. It equips a person with proper intellect, reasoning and seriousness. Knowledge of mathematics helps a student to take decision without unnecessary biases and prejudices and ably distinguish between good and bad. He does not take decision under the influence of any emotion but tries to apply intellect and logic. Disciplinary value has some major following characteristics:

a) Simplicity
   It teaches that definite facts are always expressed in simple language and are always easily understandable. So students should learn from this to express themselves in simplest way.

b) Accuracy
   Development of mathematics depends on accuracy, exactness and preciseness. Students learn the value and appreciation of accuracy and adopt it as a principle of life.

c) Certainty of result
   There is no place for subjectivity in mathematics. The answer is either right or wrong. This teaches the student to work without worrying about the result. This develops faith in self-effort which is the secret of success in life.

d) Originality
   Mathematics works are original. There is no reproduction and cramming of ideas in this subject. This enables the students to face new challenges and develop confidence in them.

e) Reasoning
   Before finding out solution for any problem the students first grasp the whole meaning and understand the problem. This develops clarity and
exactness in thinking. This habit of thinking will be helpful in solving many problems in later life.

f) Verification of result
Mathematics allows students to verify their result. This inculcates a sense of achievement, confidence and pleasure. This develops a habit of self-criticism and self-evaluation in students’ later life.

g) Power not knowledge
The acquisition of knowledge can be outdated, but not the acquisition of power of acquiring knowledge. Mathematics is a discipline of mind and it doesn’t aspire only to learn the facts but also to how to learn the facts.

h) Application of knowledge
Mathematics allows applying knowledge to new situations. Thus, students acquire the power of effective thinking, reasoning, discovery and judgment of the individual.

(iii) Cultural Value

The secret of development of civilization and culture lies in the advancement of science and technology. Therefore, mathematics can be said as the backbone of civilization and culture. All the scientific discoveries would not have been possible without mathematics. In various cultural arts like poetry, drawing, painting, music, sculpture, architecture and design making mathematics plays a vital role. This value helps in understanding and appreciating the contribution of mathematics to the present world. The modern world of science and technology and various other occupations viz. agriculture, engineering, surveying, medicine, industry, navigation, railroad building, etc. owes its debt to mathematics for its advancement.

Importance of Mathematics

Of all the subjects Mathematics occupies a vital place in the school curriculum as it plays a key role in shaping individuals to deal with the various
spheres of private, social, and civil life (Anthony & Walshaw, 2009). Kothari Commission (1964) has remarked, “Science and Mathematics should be taught on a compulsory basis to all pupils as a part of general education during the first ten years of schooling. In addition, there should be provision of special courses in these subjects at the secondary stage, for students of more than average ability.”

In the present competitive world, life has become more complex and more mathematical knowledge is needed to understand and adjust to the demand of life. With the increase in scientific inventions and approaches the value and importance of mathematics has also gained its significance in secondary level, as at this stage, this subject prepares students for higher education in sciences, engineering, technology etc. Thus, mathematics is a highly valued subject in school curriculum. By learning mathematics students are able to acquire essential mathematical knowledge, skills, interests and attitudes. Mathematics teaches disciplinary and intellectual values by providing training to mind of the learner and developing intellectual habits. It also helps in understanding the contribution of mathematics in the development of civilization and culture. It imbibes essential social virtues and attributes of morality. The knowledge of mathematics help students to satisfy their varying interests which allow them to utilize their leisure time. It also develops international outlook and understanding in students along with the power of thinking, reasoning, concentration, expression etc. Mathematics also contributes in all-round and harmonious development of the personality.¹

Mathematics is a powerful learning tool. As students identify relationships between mathematical concepts and everyday situations and make connections between mathematics and other subjects, they develop the ability to use mathematics to extend and apply their knowledge in other curriculum areas, including science, music, and language.² Knowledge of Mathematics assists

¹ Ibid. 17-18.
them to think clearly and helps in taking a rational decision. It also helps in disciplining the mind and teaches to discriminate between right and wrong. The decision taken by mathematically trained mind is logical without any ambiguity, biasness and prejudices. According to Young, “Mathematics is the only subject that encourages and develops logical thinking. It enables the student to discriminate between essentials and non-essentials.”

1.1.2 Attitude towards Mathematics

Attitude towards mathematics has been defined by researchers and thinkers in numerous ways and there is no exact definition of it (Akinsola & Olowojaie, 2008). Neale (1969) says it is a liking or disliking of mathematics, a tendency to engage in or avoid mathematical activities, a belief that one is good or bad at mathematics, and a belief that mathematics is useful or useless. According to some point of view the attitude toward mathematics is just a positive or negative emotional disposition towards mathematics (McLeod, 1992; Haladyna, Shaughnessy J. & Shaughnessy M., 1983). Ertem & Alkan (2003) defines attitude towards mathematics as the behaviours of students, like giving priority for mathematics homework and studying, like continuing with the lessons at home that was taught in school.

According to Mandler’s discrepancy theory (1989) a negative attitude is a result of frequent failures or interruptions of planned actions, which were intended to face mathematical tasks. This theory was supported in a study done by Nicolaïdou and Philippou, 2003; they further added that these negative attitudes may become relatively permanent. An important aim of mathematics education is to develop in students positive attitudes towards mathematics.... The notion of having a positive attitude towards mathematics encompasses both liking mathematics and feeling good about one's own capacity to deal with situations in which mathematics is involved (Australian Education Council, 1991, p. 31). Thus, by learning mathematics student can also develop positive

\[\text{Ibid. 5.}\]
attitude towards this subject. Hence, learning of mathematics and students’ performance in mathematics has an undeniable significance in academics. Positive attitude can be considered as the main cause in learning and perceiving mathematics and acquiring good grades in exam. Similarly, unfavourable attitude towards the subject may cause failure in the subject. Attitude of students towards mathematics may differ in boys and girls and so their achievement. Secondary level students might not have similar attitude towards mathematics to that of students of junior level and higher secondary level. Attitude of student toward any subject is supported or hampered by other factors too viz. school and home environment, teacher’s attitude and beliefs, teaching strategies, parental attitudes, parents’ education, students’ belief in mathematics etc.

1.1.3 Academic Achievement in Mathematics

Some of the scholars agree that individuals with positive attitudes towards mathematics would be more successful than the individuals with negative attitude (Reyes, 1984; Ma, 1997). So, achievement in mathematics and attitude toward mathematics are the most important factors that affect participation in advanced mathematics (Ma, 2001). Students’ achievements in mathematics in high school have a significant effect on their performance in college (Ismail and Awang, 2008). Studies have also found that students who are preferred to be engaged in mathematical related career have relatively high attitude towards mathematics compared to students who preferred to be engaged in non-mathematical related career (Usman and Abubakar, 2003).

There are several factors which affects academic achievement in mathematics, some of these factors are cognitive ability, teaching strategy, involvement of parents, pupil’s self-concept, motivation, sex difference, pupil’s attitude towards mathematics, study habits etc. It is also influenced by the factors such as evaluation, sufficiency of textbooks, adequacy of mathematics teachers and time adequacy. Studies have inferred that a well qualified mathematics teacher will employ efficient strategy in teaching that enhances the
achievement of his/her students in mathematics and develop positive attitude and interest towards mathematics which again enhances the achievement in mathematics.

Students have many responsibilities with regard to their studies and these responsibilities increases as they advance through elementary, middle and secondary school. Students who are willing to make effort to develop positive attitude towards mathematics and develop good study habits has to accept that their efforts are directly related to achievement in mathematics. It has been revealed in numerous studies that there is a positive correlation between attitude towards the subject and achievement in the subject. Students’ mathematics achievement is often associated with future economic power of a country (Baker & LeTendre, 2005; Wobmann, 2003). Thus it can be said that for development of any country strategies of use of mathematics is important.

1.1.4 Role of Study Habits in Academic Achievement

Study Habit is defined as an application of the mind to the acquirement of knowledge. It is the tendency of a student to learn in a systematic and efficient way. It is the devotion of time and attention to acquire information or knowledge especially from books or in other words it’s the pursuit of academic knowledge by a detailed investigation of a subject or situation. According to Crede and Kuncel (2008), study habits typically denotes the degree to which the student engages in regular acts of studying that are characterized by appropriate studying routines occurring in an environment that is conducive to studying.

Like attitude study habits too play a vital role in academic achievement. Good study habits are considered to be a means for the achievement of good grades in academics. It is evident in many studies that efficient study habits lead to good grades and inefficient study habits lead to poor grades. Effective study habits are regular, consistent study habits that good students use every time they prepare for a test or do homework.
It may not be always right that those students who perform poorly do not possess well mental ability to study; there might be another reason, that they do not know or do not use most effective method of studying. To improve study habits there is a need to identify factors which has adverse affect. Only when these factors are identified remedial measures can be suggested and strategies for the development of good study habits can be employed with the combined efforts of parents, teachers and the students themselves.

Study habits does not confine within the boundaries of schools and libraries alone. According to Patel (1976) effective study habits include home environment & planning of work, reading & note taking habits, planning of subjects, habits of concentration, preparation for examination, general habits & attitudes, school environment.

1.1.5 Profile of Sikkim

Little is known of Sikkim’s history prior to the 17th century. The state’s name is derived from the Limbu words *su khim*, meaning “new house.” The Lepcha were early inhabitants of the region, apparently assimilating the Naong, Chang, Mon, and other tribes. The Bhutia began entering the area from Tibet in the 14th century. When the kingdom of Sikkim was established in 1642, Phuntsog Namgyal, the first *chogyal* (temporal and spiritual king) rule Sikkim who came from the Bhutia community. The Namgyal dynasty ruled Sikkim until 1975.¹

A very small hilly state in the Eastern Himalayas, Sikkim, extends approximately 114 Kms from north to south and 64Kms from east to west. The State is located at the foothills of Eastern Himalayas between latitude of 27degree 49” and 28 degree 10” North and the longitudes of 88 degree 28” and 88 degree 55” East.²

This state is surrounded by the Darjeeling district of West Bengal on the South, Nepal on the West, Bhutan and China (Tibet) on the East and China (Tibet) on the North. In 1963, through a notification, Government of Sikkim divided the whole Sikkim into four districts for administrative purposes viz. North (with headquarter at Mangan), South (with headquarter at Namchi), East (with headquarter at Gangtok), and West (with headquarter at Gyalshing).
These districts are further been bifurcated into two sub-divisions for administrative purpose except the East district which has four sub-divisions.

**Map of Sikkim**

**The Area of Research**

Sikkim is a multi-ethnic state. Broadly, the population can be divided into tribal and non-tribal groups. Lepchas, Bhutias, Sherpas, Limbus are categorized as Scheduled Tribes. The Lepchas are the original inhabitants of the state. Compared to other ethnic groups, the Lepchas still maintain many of their traditional ways. The Bhutias comprise the Sikkimese Bhutia and Bhutia from Bhutan and Tibet. The Sherpas are a marginal ethnic group in the state. Over 70% population consist of Nepalese. They are dominant ethnic group in the state. The people from the plain mostly involved in trade and services
represent a marginal group.\textsuperscript{1} The local language is Nepali and the official language is English and Nepali. Other languages spoken in the Sikkim state includes Limbu, Newari, Kulung, Gurung, Manggar, Sherpa, Tamang and Sunwar.

On 16\textsuperscript{th} May, 1975 Sikkim formally merged into Indian Union as the 22\textsuperscript{nd} state with Gangtok as its capital, which is also the largest city in the state\textsuperscript{2} and was included as the 8\textsuperscript{th} member in North Eastern Council on 23\textsuperscript{rd} December 2002.\textsuperscript{3} Sikkim’s special constitutional status under Article 371F makes it a unique state in terms of a various traditional laws and institutional practices.

**Demographic Indicators**

The state of Sikkim is also the second smallest state in India. In the census of 2011 it was found that the population of Sikkim is the least in all of the country. This thinly populated state has a population of mere 6 lacs, and has grown by approximately one lac since the last census. In Sikkim, the growth rate of population has considerably reduced to just above 10%. Percentage of literates however, has increased by about 20%, which is a huge leap toward progress. Increase in female literacy also tells an optimistic sign. As with most north eastern states in India, the land has not been developed largely. Hence, only over 20% of the population of Sikkim lives in cities. The capital city Gangtok is also the largest one in Sikkim. Population growth in urban and rural areas shows too contrasts a picture. While, city population is growing at an alarming rate of above 150%, the rural population is not growing at all, but is decreasing. Total area of Sikkim is 7,096 sq. km. Density of Sikkim is 86 per sq km which is lower than national average 382 per sq km. In 2001, density of Sikkim was 76 per sq km, while nation average in 2001 was 324 per sq km. The gender ratio in Sikkim is quite alarming, and has not shown significant increase in last 10 years. It shows only 890 female for each 1000 male, which is

\footnotesize{\textsuperscript{1} “Government of Sikkim, Home Department.” Introduction to Sikkim. Web 29\textsuperscript{th} September 2013. <http://sikkim.nic.in/>.
\textsuperscript{2} Bikash Deokota, Know your Sikkim. 3\textsuperscript{rd} edition. 30.
\textsuperscript{3} Ibid. 38.}
below national average of 940 as per census 2011. In 2001, the sex ratio of female was 875 per 1000 males in Sikkim.¹

The table 1.1.4(a) shows the district wise distribution of population of Sikkim, sex ratio and population density in 2011 census:

Table: 1.1.4(a)

**Showing District wise Area, Population, Literacy rate, Sex ratio and Population Density**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>State/ Districts</th>
<th>Head Quarters</th>
<th>Area (sq. km.)</th>
<th>Population in percentage</th>
<th>Literacy Rate</th>
<th>Sex Ratio</th>
<th>Population Density</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>Males</td>
<td>Females</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>North</td>
<td>Mangan</td>
<td>4226</td>
<td>43,354</td>
<td>24,513</td>
<td>18,841</td>
<td>69.39</td>
</tr>
<tr>
<td>2.</td>
<td>East</td>
<td>Gangtok</td>
<td>954</td>
<td>281,293</td>
<td>150,259</td>
<td>131,033</td>
<td>76.67</td>
</tr>
<tr>
<td>3.</td>
<td>South</td>
<td>Namchi</td>
<td>750</td>
<td>146,742</td>
<td>76,663</td>
<td>70,079</td>
<td>73.64</td>
</tr>
<tr>
<td>4.</td>
<td>West</td>
<td>Gyalshing</td>
<td>1166</td>
<td>135,299</td>
<td>70,224</td>
<td>66,074</td>
<td>70.05</td>
</tr>
<tr>
<td>SIKKIM</td>
<td></td>
<td></td>
<td>7096</td>
<td>607,688</td>
<td>321,027</td>
<td>286,027</td>
<td>73.94</td>
</tr>
</tbody>
</table>

*Source: Census of India 2011*

The table 1.1.4(b) gives a glance of literacy rates by sex for the state of Sikkim and its districts viz. 2001 and 2011.

Table: 1.1.4(b)

**Literacy Rates (%) by Sex for State and District: 2001 and 2011**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>State/ Districts</th>
<th>Persons</th>
<th>Males</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2001</td>
<td>2011</td>
<td>2001</td>
</tr>
<tr>
<td>1.</td>
<td>North District</td>
<td>67.21</td>
<td>77.39</td>
<td>75.69</td>
</tr>
<tr>
<td>2.</td>
<td>East District</td>
<td>74.68</td>
<td>84.67</td>
<td>81.20</td>
</tr>
<tr>
<td>3.</td>
<td>South District</td>
<td>67.31</td>
<td>82.07</td>
<td>74.29</td>
</tr>
<tr>
<td>4.</td>
<td>West District</td>
<td>58.81</td>
<td>82.70</td>
<td>66.82</td>
</tr>
<tr>
<td>SIKKIM</td>
<td></td>
<td>68.81</td>
<td>82.20</td>
<td>76.04</td>
</tr>
</tbody>
</table>

*Source: Census of India 2011*

*Literacy rate is the percentage of literates to population aged 7 years and above*

The above table shows that females are improving in literacy indicators. Although the total number of literate women at 76.43% is still lower than the literacy rate of 87.30% of the males, the ladies have shown a stronger improvement, having grown from 60.41% in 2001 against the 76.04% males who were literate at that time. Sikkim’s overall literacy rate stands at 82.20%.1

1.1.6 Educational Scenario of Sikkim

Sikkim’s early history up to 1942 is unrecorded and so has happened regarding its history of education. But it is believed that the education in early Sikkim was practical in nature. Family was the laboratory where the young ones observed, involved and practice social values. The family, society and religious ceremony were the place to learn and instruct people.

With the advent of Buddhism from Tibet in early 1640s monasteries and temples have made a significant contribution to education in Sikkim. Even today the Ecclesiastical Department in the Government of Sikkim has recorded 163 monasteries and temples all over Sikkim excluding the small shrines.

The monastic education was supplemented by Modern education system which was brought in Sikkim in later half of 19th century by Finnish Christian Missionaries and they started the first school at Khamdong Rhenok, Song, and Lachen in 1880. The Finnish missionaries later handed over to the Scottish Missionaries and by the end of 19th century; thirteen primary schools had been opened at Vok, Rhenock Pakyong Pache Khani, Namthang, Sadam, Turuk, Chakung, Soreng, Dentam Sang and Phambong.2 Till the first decade of 20th century participation of state in modern education continued. The real participation came along with planning extended by the Central Government when Sikkim formally joined the mainstream of national life in 1975.

After the amalgamation of Sikkim into the Indian Union, there has been a steady increase in the number of schools and in the number of teachers. In

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1998-99 out of the total number of 1,474 schools in the State, 50% were pre-
primary schools, followed by primary schools (34%), middle school (9%),
secondary schools (5%) and higher secondary schools (2%)\(^1\). Education has
been made free for boys upto Class VIII and for girls upto class XI. Text books
upto class VIII have been subsidized and are now sold to students at 50 per cent
off their market price. A general impression is that the standard of education
has gone down as education has become a free public good.\(^2\)

Today, with the institutions of a Democratic Government in the state
there has been a spurt in educational activities all over the state. Education
being the backbone of economic and social progress, the state government has
also taken a number of measures to make schooling a must for both boys and
girls at least up to secondary level (class X). There is a provision of financial
support to the needy and meritorious children at different level.

The 86\(^{th}\) Amendment to the Constitution of India guarantees Education as
a fundamental right of every child in the country. Sikkim has also defined its
role in development of educational system in the recent times with emphasis on
delivery of quality education on its children.\(^3\)

There are a total of 1,545 government-run educational institutions and 18
private schools mostly located in the towns. There are about 12 colleges and
other institutions in Sikkim that offer higher education. The largest institution is
the Sikkim Manipal University (in East district) which has 2 wings Sikkim
Manipal Institute of Technology which offers higher education in engineering
and SMIMS medicine. There are two state-run polytechnics, Advanced
Technical Training Centre (ATTC) and Centre for Computers and
Communication Technology (CCCT) in Sikkim which offer diploma courses in
various branches of engineering. ATTC is situated at Bardang, Singtam (East

\(^2\) Ibid. 31.
district) and CCCT at Chisopani, Namchi (South district). Many students however, migrate to Siliguri and Calcutta for their higher education.¹

**Curriculum**

The curriculum in monasteries was the preparation of monk and thus stressed Buddhist teaching and recitation of important verses. These monasteries also taught subjects like diversified subjects like painting, sculpture, astrology, mathematics, medicine, philosophy, literature, tantra and so on. The Shedas (Monastic Colleges for Higher Studies in Buddhist Literature) at Deorali and Rumtek are primarily aimed at reviving the formal educational role of the monasteries (Lama, 2001)².

The curriculum in the missionary schools besides teaching 3 R’s also taught subjects like English, Geography, Hindi Science and Tibetan. Thus formal curriculum in Sikkim came into existence. From 1906 onward, the state initiated schools with modern education. The curriculum of the West Bengal School Board was followed in the schools in Sikkim till 1970. From 1971 onward, Central Board syllabus was introduced in schools in the state.

At the higher secondary stage, new pattern of education was introduced in 1975 and the same year new ten year school curriculum was also introduced, in which work experience and community service constitute an integral part of the school curriculum. From the year 1977 vocational subject was introduced in the curriculum of +2 level (senior secondary/ classes XI & XII).

**Education System and Structure**

The state of Sikkim has received tremendous growth in the field of education since the last decades. There has been abundance number of fresh schools and colleges that are being erected in order to procure an impetus to Sikkim education.

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² Ibid. 29.
As is the rule in most other Indian states, the education system in Sikkim is also divided into different levels viz. Primary School, Secondary School, Pre University / College, University, Diploma / Degree / Certificate Professional Courses. The medium of instruction in the schools and colleges of Sikkim is English, though Nepali and Tibetan are also spoken among the locals.¹

In Sikkim a child has to attain the age of five to be admitted in school. A student progresses from primary to secondary school and has to complete twelve years of schooling before attending college. Two board examinations are held in Sikkim; one at the end of class X and the other at the end of class XII. The central and state government authorities have also introduced the ‘Sarva Siksha Abhiyan’ to encourage the education of every child in Sikkim, especially the children living in the interiors of the Himalayan Mountains. Every school in Sikkim is either affiliated to the ICSE or the CBSE board.²

Several centres for higher studies have been introduced in Sikkim over the last couple of years. Colleges providing bachelor degrees, BE / BTech, MTech, MCA, LLB, MBBS, BSc, Diploma, MBA have established in the state and other diploma courses too are providing their best education to the students. The computer learning academies constitute another integral wing of the education within Sikkim.

Secondary Education is expected to prepare young people both for the world of work and entry into higher education. East and South districts are the two highly populated districts of the state and these two districts have higher numbers of secondary and senior secondary schools as compared to other two districts. The total number of enrolled students in class X in these two districts is 2,784 (as on 2009)³.

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³ HRDD (Human Resource Development Department), Gangtok, Sikkim.
1.2 Need and Justification of the Study

An important aim of mathematics education is to develop positive towards mathematics in students. It has been found in many studies that pupils’ positive attitude towards the subject is related to their academic achievement. Without interest and personal effort in learning mathematics, students are likely to perform poor in the subject. Attitude plays a vital role in studying and completing any tasks. Attitude can obstruct or enhance students’ academic achievement. Low achievement and school failure has become a general problem of almost all countries in the world. Though there may be many factors which effects academic achievement, study habits and attitude may gain importance over all other variables.

Academic achievement determines future career of students. It is believed that if a child is high achiever he/she is able to avail a fruitful career. Likewise it is also well known belief that low achievers are not as successful as compared to that of high achievers. Most of the time students fail or achieve low in class X because of mathematics. Since this subject is known to be very difficult it creates fear in students and they fail to maintain high scores in academics. This fear may also hamper their study habits because they will not be interested in this subject anymore. There is a must to motivate students by making them understand the value and beauty of mathematics so that they overcome the fear and develop favourable attitude towards this subject and attain good study habits.

Like in other countries and other Indian states, Sikkim also has low achievers and failures in mathematics. This study is done with the aim to find out attitude towards mathematics and study habits of students studying in government schools in Sikkim. Referring to the two districts of Sikkim, i.e. East and South districts, it has come into notice that students studying in class X scores low pass percentage in mathematics. Though a large number of students pass this subject but the percentage they score is low (40%) which indicates that
They are not competent enough in scoring high in this subject and there is a need to find out the reason behind this incompetency.

Students’ Performance in Mathematics in Secondary School Examination in East & South Districts of Sikkim (2007 to 2012)

The above Fig. 1.0 shows performance of students in mathematics in Secondary School Examination conducted by CBSE. In 2007, 67.83% of students passed in mathematics whereas in 2008 only 65.36% of students passed in the subject. In 2009, 68.43% of students passed in mathematics.

In the year 2010, Central Board of Secondary Education (CBSE) introduced grading system to evaluate students’ performances. Implementation of this system helped students in scoring better percentage in the board exam. As the result, in the year 2010, 74.48% of students scored passing percentage in their exam. In 2011 and 2012, 89.55% and 95.12% of students passed in mathematics respectively. It is observed here that a huge number of students have passed in mathematics in their board exam, but most of them have scored only marginal marks. Maximum of 84.76% of students have scored between 40% and 60% in their board exam conducted by CBSE in 2012.¹

¹ Dona Rai. “An Analysis of Students’ Performance from the Year 2007 to 2012 in Mathematics at class X in East and South Districts of Sikkim.” Education: North East (Referred Journal of the North East India Education Society 17(1) (2013): 71-75.
There are various factors which may prevent a student from scoring good marks and lag behind as being average achievers or failures. The two prime factors which obstruct them in achieving better percentage are unfavourable attitude towards the subject and poor study habits.

1.3 Statement of the Problem

The problem under investigation is titled as:

“Attitude towards Mathematics and Study Habits in Relation to the Achievement in Mathematics of Class X Students in East and South Sikkim”.

The main purpose of selecting this problem is to investigate the influence of Attitude towards Mathematics and Study Habits of students of Class X on their performance in mathematics.

1.4 Operational Definition of the Key Terms Used

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

1) **Academic Achievement**

   It refers to the student’s achievement in the subject of Mathematics. In the present study it is reflected in terms of the percentage of marks obtained in Mathematics by students of Class X in Central Board of Secondary Education.

   i) **High Achievers**

   These are those students who acquire first division with 60 percent or above marks in the subject of Mathematics in their secondary school examination conducted by Central Board of Secondary Education (CBSE).
ii) **Average Achievers**

These are those students whose percentage is in between 48 and 60 in the subject of Mathematics in their secondary school examination conducted by Central Board of Secondary Education (CBSE).

iii) **Low Achievers**

These are those students whose percentage is between 36 and 48 in the subject of Mathematics in their secondary school examination conducted by Central Board of Secondary Education (CBSE).

2) **Attitude towards Mathematics**

It is a predisposition to perceive, feel or behave towards specific objects or certain people in a particular manner. In the present study in refers to the perception and feeling of a student towards the subject of mathematics.

3) **Study Habits**

It is a natural tendency of engaging oneself in the task of learning so as to acquire knowledge about a given subject. It refers to the skills and strategies used by the students while studying. In the present study it refers to the school and home environment for study, general habits of planning and preparing for the study of a subject.

1.5 **Objectives of the Study**

The objectives of the study are:

i. To find out the Attitude of Class X students towards Mathematics in East and South districts of Sikkim.

ii. To find out the Study Habits of Class X students in East and South districts of Sikkim.
iii. To find out the extent of relationship between Attitude towards Mathematics and Achievement in Mathematics of Class X students in East and South districts of Sikkim.

iv. To find out the extent of relationship between Study Habits and Achievement in Mathematics of Class X students in East and South districts of Sikkim.

v. To study the difference in Attitude towards Mathematics between high and low achievers in mathematics of Class X students in East and South districts of Sikkim in respect of the following components:

   a) Wider Applicability.
   b) Development of Skills.
   c) Reasoning.
   d) Objectivity.
   e) Intellectual Development.
   f) Non-Intellectual Development.
   g) Individual Outlook.
   h) Universal Outlook.

vi. To study the difference in Study Habits between high and low achievers in mathematics of Class X students in East and South districts of Sikkim in respect of the following components:

   a) Home Environment & Planning.
   b) Reading & Note-taking.
   c) Planning of Subjects.
   d) Habits of Concentration.
   e) Preparation for Examination.
   f) General Habits & Attitudes.
   g) School Environment.
vii. To find out sex differences (male/female) in Attitude towards Mathematics within high and low achievers of Class X students in East and South districts of Sikkim.

viii. To find out sex differences (male/female) in the Study Habits within high and low achievers of Class X students in East and South districts of Sikkim.

ix. To draw out the implications and suggest recommendations for the study.

1.6 Null Hypotheses

The null hypotheses of the study are:

i. There is no significant relationship between Attitude towards Mathematics and academic achievement of Class X students in East and South districts of Sikkim.

ii. There is no significant relationship between Study Habits and academic achievement of Class X students in East and South districts of Sikkim.

iii. There is no significant difference in the Attitude towards Mathematics between high and low achievers of Class X students in East and South districts of Sikkim in respect of the following components:

   a) Wider Applicability.
   b) Development of Skills.
   c) Reasoning.
   d) Objectivity.
   e) Intellectual Development.
   f) Non-Intellectual Development.
   g) Individual Outlook.
   h) Universal Outlook.
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iv. There is no significant difference in the Study Habits between high and low achievers of Class X students in East and South districts of Sikkim in respect of the following components:

a) Home Environment & Planning.
b) Reading & Note-taking.
c) Planning of Subjects.
d) Habits of Concentration.
e) Preparation for Examination.
f) General Habits & Attitudes.
g) School Environment.

v. There is no sex difference (male/female) in the Attitude towards Mathematics within high and low achievers of Class X students in East and South districts of Sikkim.

vi. There is no sex difference (male/female) in the Study Habits within high and low achievers of Class X students in East and South districts of Sikkim.

1.7 Delimitations of the Study

The study is delimited to the students studying in government schools affiliated to the Central Board of Secondary Education (CBSE) in East and South districts of Sikkim.