CHAPTER – I

CONCEPTUAL FRAMEWORK

1.1 EDUCATION IN INDIA

In the modern era, the progress and development of a nation depends upon the quality and quantity of education received by its people. Education performs the duty of transmitting the heritage and cultural values of the past to future generations with its accumulated wisdom and preparing the new generation for the present and future emergent needs of the society. Each country has its own educational system having unique features. Since independence, many efforts have been made in India to reorganise and reform the system of education.

The present system of education in India is controlled by both the Union Government and the State governments. According to the Indian constitution, education is considered as a fundamental right of all people. India’s improved educational system is considered as one of the main contributors to the economic rise of India. However, India continues to face stern challenges. Annual Status of Education Report (2009) indicates that despite the new educational policies implemented by the central government and growing investment in education, 35% of its population is still illiterate; only 15% of Indian students reach high school and just 7% students are graduates. World Bank statistics found that fewer than 40% of adolescents in India attend secondary schools. The Economist reports that half of ten-year-old rural children could not read at basic level, over 60% were unable to do divide numbers and half dropped out by the age 14.

Census of 2011 shows that literacy rate has increased to 75.06 from 12% at the end of British rule in 1947. The improvement is greater but the level is well below the world average literacy rate of 84%. India still has the largest illiterate population on this earth. The
rate of increase of literacy is more in rural areas than the urban areas. Literacy rates (age 7 and above) in 2011 has been 82.14% for men and 65.46% for women. Kerala is the most literate state in India with 93.91 literacy rate and Bihar has the lowest literacy rate in India i.e. 63.82%. Literacy rate in Punjab is 76.68% out of which male literacy rate is 80.23% and female literacy rate is 68.36%. There is a wide gender disparity in literacy rate in India. The gender disparities can be seen in Punjab also.

The present educational system of India mainly consists of elementary education, secondary education, senior secondary education and higher education. Elementary education consists of eight years of education. Each of secondary and senior secondary education consists of two years of education. Higher education in India starts after passing the higher/senior secondary education or the 12th standard. Doing graduation in India can take three to five years depending on the stream. Post graduation courses are generally of two or three years of duration.

Elementary education is aimed to provide the minimum essentials like reading, writing and arithmetic. On the other hand, secondary education is that stage of education which helps children to become full members of a complex modern society. It develops to the highest potential of abilities, aptitudes, interests and qualities of a character. It enables the individuals to enter life as a knowledgeable, active-minded and sociable individual.

Secondary education is really the nation-building education. It is considered as a gateway to the opportunities and benefits of economic and social development. So the maintenance of good quality is of remarkable importance. The standards of elementary education as well as the higher education depend considerably upon those of secondary education. Secondary education is considered as a central link in the chain of education i.e. the elementary education and higher education. It is an investment as well as a tool that can be used to
achieve a more rapid economic, technological, scientific, political, social and cultural development in the country.

India’s higher education system is the second largest in the world, after the United States. University Grants Commission was established for the development of higher education in India. The primary role of UGC has been to regulate the standard of higher education in India. There has been a remarkable progress in the expansion of higher education. As of 2011 India has 42 central universities, 275 state universities, 130 deemed universities, 90 private universities and 33 institutes of National importance. Other institutions include 16000 government and private degree colleges, including 1800 exclusive women’s colleges functioning under these universities and institutions.

Prior to the coming of the British in India, there was no formal system of secondary education in India. Maktabas and Pathshalas were the only institutions imparting education. By 1852, there were only 52 secondary schools throughout the country. After independence, on the recommendations of the Tara Chand Committee and the Central Advisory Board of Education (CABE), the government of India appointed a Commission on September 23, 1952 under the chairmanship of Dr. A. Lakshmanaswami Mudaliar, the Vice-Chancellor of Madras University. The Commission was directed to examine the prevailing system of secondary education in the country and to suggest suitable measures for reorganisation and improvement of secondary education.

Secondary education remains the responsibility of state governments and the Ministry of Human Resource Development. As secondary education prepares students for higher education as well as for the world of work, it becomes essential that school leavers should acquire a higher level of knowledge and skills to face the challenges of life confidently. To achieve this aim, qualitative education is made available, accessible and affordable to all young people in the age
group of 15-16 years. Rashtriya Madhamik Shiksha Abhiyan (RMSA) has been launched in 2009 to achieve the target of Universal Secondary Education.

At present the secondary stage consists of classes IX-X in 19 States/UTs. Viz., Arunachal Pradesh, Bihar, Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Manipur, Nagaland, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal, Andaman & Nicobar Islands, Chandigarh, Delhi and Karaikal region of Pondicherry. The High School stage comprises classes VIII to X in 13 States/UTs viz., Andhra Pradesh, Assam, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Meghalaya, Mizoram, Orissa, Dadra & Nagar Haveli, Daman & Diu, Lakshadweep and Mahe & Yanam regions of Pondicherry. However, the Higher Secondary / Senior Secondary stage of school comprising classes XI-XII (10+2 pattern) is available in all the States/UTs though in some States/UTs these classes are attached to Universities/Colleges.

A significant characteristic of India’s secondary school system is the emphasis of the inclusion of the disadvantaged sections of the society. Under the scheme, financial assistance is provided for education of disabled children which includes provision of books and stationery, uniforms, transport allowance, readers allowance for blind children, escort allowance for severely handicapped children, boarding and lodging charges for disabled children residing in hostels, salary of resource teachers and helpers, setting up and equipping resource rooms, survey and assessment of disabled children, purchase and production of instructional material, training and orientation of resource teachers, funds for making modifications in school buildings and salary of an administrative cell at the state level to implement and monitor the programme. Another feature of the India’s secondary school system is its emphasis on profession based vocational training to help students to acquire skills for finding a vocation of his/her choice.
1.2 EDUCATIONAL SCENARIO IN PUNJAB

Punjab is a famous north Indian state which is known for its agriculture, culture and tradition. The state has been ranked third amongst the all Indian states in terms of education. It leads in providing education whether it is primary compulsory education or higher technical education. There are four directorates working under the Punjab Education Department. These are named as Directorate of Public Instruction, (Colleges), Directorate of Secondary Education, Directorate of Primary Education and Directorate of State Council of Educational Research and Training (SCERT).

Punjab is a state where proper attention is given to education. Punjab has always made sincere efforts to improve literacy among its people to improve the educational status of the state. The state government of Punjab highlights the importance of education and provides various schemes to inculcate the passion of education among its people. The state government has framed and determined proper set of rules for providing education. The new education policy of Sarva Siksha Abhiyan (SSA) was started by Indian government in 2001 to provide education to children between 6-14 years by 2010. Special attention is paid to girls and children with challenged social or financial backgrounds under this programme. The SSA also intended to provide practical infrastructure and relevant source material in form of free text books to children in remote areas. Computer education in rural areas has also been widened. The international language, English is given emphasis. Earlier, English was taught from class 6 onwards, now it has been taught from class 3 onwards. Instructions for science subjects and computers are provided in English. Mid day meal scheme has been launched to enhance the attendance in government schools. Primary and middle schools are merged into one system, similarly high and secondary schools are merged together. It is decided by the government of Punjab to hand over the primary school administration to panchayts. A District
Education Officer would inspect the functioning of government schools on regular basis. The Education Department of Punjab has witnessed an increase in the number of students enrolling in government primary schools in different districts due to such effective policies. But still in this progressive state, about 50,000 children are out of school and more than one lakh disabled are in need of inclusive education.

Many institutions have been established for higher professional and higher technical education in Punjab. Due to industrial growth in Punjab, a huge manpower is required for both technical and non-technical fields. The main objective of technical colleges is to produce capable engineers, technicians and craftsmen for industrial and technical fields. The World Bank is supporting the educational development project in Punjab. Punjab Technical University has been set up in Jalandhar. There are five universities in the state; two deemed universities, 38 engineering colleges, 57 MBA and BBA colleges, 25 MCA colleges, 355 undergraduate colleges and 75 post graduate colleges.

According to census of 2011, total population of Punjab is 2,77,04,236 out of which the number of males is 1,46,34,819 and the number of females is 1,30,69,417. It means that the population of Punjab is 27.7 millions i.e. 14.6 million males and 13.1 million females. Total area of Punjab is 50,362 square kilometres, 1.5% of India’s area. The state can take pride in showing a significant improvement on sex ratio, child sex ratio and literacy fronts. Table 1.1 shows the literacy rate of Punjab according to census of 2011.

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons</td>
<td>18988611</td>
<td>76.7%</td>
</tr>
<tr>
<td>Males</td>
<td>10626788</td>
<td>81.5%</td>
</tr>
<tr>
<td>Females</td>
<td>8361823</td>
<td>71.3%</td>
</tr>
</tbody>
</table>

(Source: Census 2011)
Table 1.2
District Wise Literacy Rate of Punjab

<table>
<thead>
<tr>
<th>S.No.</th>
<th>District</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hoshiarpur</td>
<td>89.9</td>
<td>80.8</td>
<td>85.4</td>
</tr>
<tr>
<td>2</td>
<td>SAS Nagar</td>
<td>89.2</td>
<td>80.0</td>
<td>84.9</td>
</tr>
<tr>
<td>3</td>
<td>Roopnagar</td>
<td>88.9</td>
<td>77.2</td>
<td>83.3</td>
</tr>
<tr>
<td>4</td>
<td>Ludhiana</td>
<td>86.3</td>
<td>78.2</td>
<td>82.7</td>
</tr>
<tr>
<td>5</td>
<td>Jalandhar</td>
<td>86.1</td>
<td>78.3</td>
<td>82.4</td>
</tr>
<tr>
<td>6</td>
<td>Gurdaspur</td>
<td>85.9</td>
<td>75.7</td>
<td>81.1</td>
</tr>
<tr>
<td>7</td>
<td>SBS Nagar</td>
<td>86.2</td>
<td>74.3</td>
<td>80.3</td>
</tr>
<tr>
<td>8</td>
<td>Fatehgarh Sahib</td>
<td>84.5</td>
<td>75.5</td>
<td>80.3</td>
</tr>
<tr>
<td>9</td>
<td>Kapurthala</td>
<td>84.6</td>
<td>75.4</td>
<td>80.2</td>
</tr>
<tr>
<td>10</td>
<td>Amritsar</td>
<td>81.2</td>
<td>72.8</td>
<td>77.2</td>
</tr>
<tr>
<td>11</td>
<td>Patiala</td>
<td>81.4</td>
<td>70.5</td>
<td>76.3</td>
</tr>
<tr>
<td>12</td>
<td>Moga</td>
<td>75.3</td>
<td>67.4</td>
<td>71.6</td>
</tr>
<tr>
<td>13</td>
<td>Faridkot</td>
<td>75.9</td>
<td>64.8</td>
<td>70.6</td>
</tr>
<tr>
<td>14</td>
<td>Ferozepur</td>
<td>76.7</td>
<td>62.2</td>
<td>69.8</td>
</tr>
<tr>
<td>15</td>
<td>Bathinda</td>
<td>75.3</td>
<td>62.9</td>
<td>69.6</td>
</tr>
<tr>
<td>16</td>
<td>Tarn Taran</td>
<td>75.4</td>
<td>62.9</td>
<td>69.4</td>
</tr>
<tr>
<td>17</td>
<td>Barnala</td>
<td>73.1</td>
<td>64.1</td>
<td>68.9</td>
</tr>
<tr>
<td>18</td>
<td>Sangrur</td>
<td>74.2</td>
<td>62.9</td>
<td>68.9</td>
</tr>
<tr>
<td>19</td>
<td>Muktsar</td>
<td>72.9</td>
<td>60.0</td>
<td>66.6</td>
</tr>
<tr>
<td>20</td>
<td>Mansa</td>
<td>68.4</td>
<td>56.4</td>
<td>62.8</td>
</tr>
<tr>
<td>21</td>
<td>Punjab</td>
<td>81.5</td>
<td>71.3</td>
<td>76.4</td>
</tr>
</tbody>
</table>

(Source: Census 2011)

According to the census of 2011, the literacy rate in Punjab has almost doubled in the past forty years. The latest data with Census Department show that the literacy rate in the state has increased to 76.7% from 34.1% in 1971. Male and female literacy rates are 81.5 and 71.3% respectively. Gap in literacy between males and females has reduced. Table 1.2 indicates the literacy rate of all the districts of
Punjab. It is clear from the table that Hoshiarpur district with 85.4% has the highest literacy rate. The district having least literacy rate is Mansa with just 62.8% literate population. In Hoshiarpur, maximum urban women (85.4%) are literate while the most literate urban men are in Mohali district (92.2%).

1.3 SECONDARY EDUCATION IN PUNJAB

Punjab School Education Board is the authority which is responsible for providing affiliation to all government schools in Punjab. The private schools are free to have affiliation from Punjab School Education Board (PSEB) or Central Board of Secondary Education (CBSE) or Indian Certificate of Secondary Education (ICSE) after obtaining a ‘No Objection Certificate’ from the Department of Education, Government of Punjab for VI to XII class. It is proposed by the government to have at least one senior secondary school for boys and girls at each block Head Quarter, to provide education in all subject areas i.e. Humanities, Science, Commerce and Vocational groups.

Punjab School Education Board is managing adarsh schools for providing quality education to the students belonging to the rural areas of the State.

DPI (Secondary Education) is the largest organization working for the development of Human Resources in Punjab by providing an opportunity for all round development of the younger generation. The department is not only providing academic and job oriented education but is also promoting cultural and sports activities among younger ones. Education for all is the mission of this organization. To achieve this aim, well equipped and well staffed schools have been opened in geographically isolated regions of the state. Provisions are made for facilitating economically weaker sections of the society. Department works with the concept that all children have the right to be educated. Private organizations are also welcomed to join hands with the department for spreading education.
The prime aim of the department is to provide education to the youth of the state to make them eligible for higher education as well as for job market and for self employment. New courses and new streams of education have been introduced in Punjab. Welfare of employees including the teaching staff, non-teaching staff and ministerial staff is one of the major aims of the department. The employees have the privilege to communicate with the Directorate Head through their representatives. Various welfare schemes like house building loans, vehicle loans, retirement benefits and pensions have been started. The policy of the department has a humanitarian touch also. Employment to the next of kin on priority basis in case of death of an employee, reservation of jobs for physically handicapped, grant of maternity leave are some of the efforts to fulfil this objective. Vocational subjects prepare students for the work place in class 11th and 12th. There are about 345 schools involved in providing vocational courses/trades of agriculture, commerce, home science and, engineering, general which are going on at +2 stages for the state of Punjab. Science, Social sciences, Languages (Punjabi, Hindi and English) and Mathematics are the main subjects which are being taught by students of Punjab at secondary stage. Computer education is introduced on a large scale.

1.4 IMPORTANCE OF MATHEMATICS

Science and Mathematics have always been important areas of study for students both in elementary and secondary schools. As the 21st century draws closer, citizens of the whole world, have a greater need of high quality science and mathematics. According to Steen (1989) mathematics does not only empower people with the capacity to control their lives but also provides science a firm foundation for effective theories, and also guarantees society a vigorous economy. Therefore, special attention is being paid to Mathematics and Science because these two subjects play a vital role in the development of any country.
Plato a famous thinker in the seventh book of his masterpiece, *The Republic*, stressed on the study of mathematics. Abdul Kalam, who was the 11th president of India from 2002 to 2007, a renowned scientist and engineer, insisted that Mathematics and science are useful in the real world. Mathematics and Science create the basis of our modern world and as long as our present generation continues to focus on Mathematics and Science, we can benefit the world.

President of America, Obama also has launched a campaign “Educate to Innovate” to motivate American students to participate and perform well in science, technology, engineering, and mathematics. This campaign includes efforts not only from the Federal Government but also from the leading companies, foundations and science and engineering societies to work with young people across America to excel in science and mathematics.

In one of the dictionaries Mathematics is considered as the science of number and space while it is also defined as the science of measurement, quantity and magnitude. Bacon the famous essayist defined mathematics as a gate and key of the scientists. Napoleon the great warrior, once said that the progress and the improvement of Mathematics are linked with the prosperity of the state. It is agreed by Graeber and Weisman (1995) that Mathematics helps the individual to understand his/her environment and to give accurate account of the physical phenomena around him/her. Obe (1996) regards Mathematics as the master and servant of most disciplines and thus, a source of enlightenment and understanding of the universe. Setidisho (1996) agrees that no other subject forms a strong binding force among various branches of science as Mathematics, and without it, knowledge of the sciences often remains superficial.

Robert (1987) remarked that in the United States, Mathematics has contributed a lot and the engineering of highways, the search for energy, the designing of television sets, the profitable operation of most businesses, astronauts flying space-craft, the study of
epidemics, the navigation of ships at sea, etc. all depend on the study of Mathematics. Ogunbanjo (1998) stated that all over the world, science has been accepted and considered as a vehicle of technology, social and economic development. Igbokwe (2003) highlighted the intricate link of Mathematics to science and technology, and remarked that without Mathematics there will be no science and without science there will be no technology, and without technology there will be no modern society.

It is a well known fact that mathematics has influenced on our everyday lives and contributed to the economic development of the country. The prosperity, industrial future of mankind can be changed with the proper use of latest researches in mathematics. Mathematics has contributed a lot to the development of various subjects. It has intensive application in the subjects like physical sciences, life and health sciences, social sciences, technical sciences, business and commerce, actuarial science and medicine. Knowledge of statistics is essential in order to understand information in newspapers and school books. The knowledge of mathematics is needed to calculate taxes, compare payment methods, figure out loans and home budgets. Algebra helps to develop thinking and is necessary to study science, electronics, physics, commerce, medicine, accountancy, economics and other subjects. The contributions that mathematical knowledge and skills have made to economic, industrial and technological growth of modern world are quite obvious to almost everyone.

The importance of mathematics does not only lie in its contributions to scientific and technological development but also in its utility in day-to-day interactions at the market places, transportations, business of all sorts by both literate and illiterate members of the society. Mathematics is needed in the world today much more than before since a lot of equipment based on digital development is going on and calculations are becoming much more complex.
It is a fact that greater level of mathematical skill is required for the development of technology. NCERT has been the key player in all aspects of science and mathematics education in schools including policy formulation and implementation. Many proactive measures have been taken by INSA (Indian National Science Academy) to improve the standard of mathematics in the country. The students who complete advanced courses in Mathematics, Science and Technology have good scope for employment and can expect a successful and bright future. The new scientific, industrial and educational revolution in our country makes important to study mathematics as it plays a vital role in technical, professional and educational researches. The study of mathematics is considered as a universal tool which helps in building up civilizations in interpreting physical and social sciences and bringing out the advantage of science and technology within the reach of common people.

The study of mathematics can satisfy a wide range of interests and abilities. It has been rightly said that Mathematics sharpens the minds of the people in the same way as some stone sharpens the tools. Mathematics helps in the development of intellectual power like power of imagination, observation, originality, creativity and systematic thinking and reasoning. Children get a lot of experience in problem solving. Problem solving ability is becoming increasingly important in the modern world. Problems in mathematics are well defined, and require children to think, and often to think creatively, to find a solution. It develops the imagination. It trains clear and logical thought. It is interesting and enjoyable. It is for health and well being to have an active mental health. Mathematics is a vital part of many games and puzzles which can contribute a lot for pursuing rich and rewarding intellectual pastimes.

Mathematics and science are mandatory subjects in school syllabus. Without the knowledge of science and mathematics, the doors of almost every form of useful occupation are closed for a
student. Kothari Education Commission (1964-66) remarked that 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 provisions of special courses in these subjects at the secondary stage, for students of more than average ability. Hence, making student to learn mathematics is unquestionable because of its great impact on society.

Realising the importance of mathematics, the study of mathematics has been included in the school as a compulsory subject up to secondary level. It is expected that learning about concepts and processes of mathematics lead to inculcation of rational outlook, clear and logical thought and mathematical attitude. The importance of mathematics is twofold. It is important in the advancement of science and understanding of the working of universe. It is important for personal advancement both mentally and in the work place. It prepares the learners to study the interaction between physical, biological and social factors of the environment. Educationists view learning of mathematics is very essential as it is the base of science for the improvement in the quality of life i.e. it provides better health, improved agricultural production, efficient good preservation; faster means of communication and better quality of clothing etc.

1.5 LOW ACHIEVEMENT IN MATHEMATICS

Achievement is generally used in the sense of “ability to do, capacity to do or tendency to do”. Academic achievement means level of success of proficiency attained in some special area concerning scholastic or academic work. On the other hand, low achievement means when a student passes the examination by attaining low marks. The students getting marks between 33-40 are considered as low achievers.

Centuries ago, India was a global leader in mathematics, with mathematicians like the Aryabhatta, who gave the concept of zero, his disciple Bhaskara followed by Ramanujan. But now, it seems that the
The magic of mathematics is fast losing its charm. Suresh Dharur reported in ‘The Tribune’ on 21st August, 2010 that there is a lack of interest in mathematics among younger generation. This was highlighted in the International Congress of Mathematicians. Seven awards were given for outstanding contribution in mathematics but there was not any Indian who got the medal there. Ramanujam of the Chennai based institute of Mathematical Sciences declared that in Indian context the main problem lies with school education. The teachers of mathematics do not have effective study material to make the subject interesting for students.

It is experienced that students with poor achievement in mathematics face a difficulty to progress in the disciplines they have chosen to. Students who choose to ignore mathematics or not take it seriously in high school, forfeit many further career opportunities that they could have. It is strongly recommended that students should take mathematics seriously during their high school years and they should have positive attitude towards mathematics.

Mathematics enjoys a unique position in the school curriculum and it is also necessary for the study of other subjects in our daily life but the teaching of mathematics in our schools is in chaotic state and not satisfactory. Most of the students fail to understand the importance of mathematics and are often unable to apply their knowledge to advanced work or to practical problems. The fault is found in present syllabus, teachers, methodology, text books, examination systems, students, etc.

Obioma (2005) states that despite the importance placed on mathematics, researchers had observed that students lack interest in the subject and perform poorly in it. It is unfortunate to note that mathematics in general is disliked by students and is not taught effectively by all teachers of mathematics in a classroom. Majority of pupils feel that mathematics is a difficult subject and it can be understood and followed only by exceptionally intelligent students.
Many efforts are being made to improve the standard of mathematics at school level. In spite of all the best efforts made in schools to raise the standard of mathematics, it is not possible for us to attain the expected goal of making students knowledgeable in mathematics. Some students are intelligent and acquire good marks in mathematics and some students fail in the examination. There are some students who pass the examination but have low achievement in mathematics. The results of matriculation since 2003 will make clear the performance of students in mathematics.

Table 1.3
Subject Wise Pass Percentage of Matriculation Examination (2003-2008)

<table>
<thead>
<tr>
<th>Subject</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjabi</td>
<td>95.46%</td>
<td>96.90%</td>
<td>98.09%</td>
<td>97.37%</td>
<td>97.33%</td>
<td>98.53%</td>
</tr>
<tr>
<td>English</td>
<td>67.87%</td>
<td>71.22%</td>
<td>69.02%</td>
<td>71.67%</td>
<td>77.33%</td>
<td>80.22%</td>
</tr>
<tr>
<td>Hindi</td>
<td>89.34%</td>
<td>93.44%</td>
<td>94.25%</td>
<td>93.19%</td>
<td>95.20%</td>
<td>97.27%</td>
</tr>
<tr>
<td>Mathematics</td>
<td>57.50%</td>
<td>58.72%</td>
<td>42.70%</td>
<td>43.30%</td>
<td>55.21%</td>
<td>57.76%</td>
</tr>
<tr>
<td>Science</td>
<td>82.93%</td>
<td>89.14%</td>
<td>77.88%</td>
<td>73.52%</td>
<td>68.84%</td>
<td>83.50%</td>
</tr>
<tr>
<td>Social Studies</td>
<td>69.37%</td>
<td>81.85%</td>
<td>77.36%</td>
<td>79.42%</td>
<td>81.58%</td>
<td>89.55%</td>
</tr>
<tr>
<td>Overall</td>
<td>63.43%</td>
<td>70.57%</td>
<td>60.42%</td>
<td>60.30%</td>
<td>65.08%</td>
<td>75.26%</td>
</tr>
</tbody>
</table>

(Source: Punjab School Education Board, Mohali)

Table 1.3 indicates subject wise pass percentage of matriculation examination of Punjab School Education Board from 2003-2008. It is clear that students’ pass percentage in each subject has been improved but the science and mathematics are the subjects in which the pass percentage of students is almost same in 2003 and 2008. Pass percentage in science is 83.50% which is satisfactory but the pass percentage in mathematics is 57.50% in 2003 and 57.76% in 2008. So there is not seen any type of improvement. Pass percentage in each subject is above 80% except in mathematics. Mathematics is
the only one subject in which the pass percentage is found below 60%.

**Table 1.4**

**Subject Wise Analysis of Matriculation Examination (2007-2008)**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Marks 0-20</th>
<th>Marks 21-40</th>
<th>Marks 41-60</th>
<th>Marks 61-80</th>
<th>Marks 81-100</th>
<th>Marks Above100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjabi</td>
<td>8726</td>
<td>2148</td>
<td>14766</td>
<td>63391</td>
<td>129632</td>
<td>135999</td>
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<td>38894</td>
<td>121585</td>
<td>142697</td>
<td>37180</td>
<td>NIL</td>
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<tr>
<td>English</td>
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<td>137546</td>
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<td>54928</td>
<td>11160</td>
<td>NIL</td>
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<tr>
<td>Maths</td>
<td>140340</td>
<td>108031</td>
<td>65443</td>
<td>30258</td>
<td>15150</td>
<td>NIL</td>
</tr>
<tr>
<td>Social Studies</td>
<td>34909</td>
<td>111092</td>
<td>146497</td>
<td>61449</td>
<td>5275</td>
<td>NIL</td>
</tr>
<tr>
<td>Science</td>
<td>45776</td>
<td>52036</td>
<td>202210</td>
<td>52295</td>
<td>6905</td>
<td>NIL</td>
</tr>
</tbody>
</table>

(Source: Punjab School Education Board, Mohali)

Table 1.4 shows subject wise analysis of matriculation examination of 2007-2008. From the table it becomes clear that about 69% students have achieved below than 40% marks in mathematics. Only 4.2% students have achieved marks more than 80%.
Table 1.5
Subject Wise Analysis of Matriculation Examination (2008-2009)

<table>
<thead>
<tr>
<th>Subject</th>
<th>0-20</th>
<th>21-40</th>
<th>41-60</th>
<th>61-80</th>
<th>81-100</th>
<th>100 onwards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjabi</td>
<td>643</td>
<td>1612</td>
<td>10683</td>
<td>49004</td>
<td>111655</td>
<td>68730</td>
</tr>
<tr>
<td>Hindi</td>
<td>1352</td>
<td>26736</td>
<td>101607</td>
<td>132994</td>
<td>39514</td>
<td>Nil</td>
</tr>
<tr>
<td>English</td>
<td>16984</td>
<td>103206</td>
<td>99147</td>
<td>54719</td>
<td>11317</td>
<td>Nil</td>
</tr>
<tr>
<td>Maths</td>
<td>36901</td>
<td>87620</td>
<td>84551</td>
<td>43159</td>
<td>20787</td>
<td>Nil</td>
</tr>
<tr>
<td>Social Studies</td>
<td>9203</td>
<td>77182</td>
<td>129542</td>
<td>72054</td>
<td>8565</td>
<td>Nil</td>
</tr>
<tr>
<td>Science</td>
<td>895</td>
<td>22832</td>
<td>186646</td>
<td>76968</td>
<td>10147</td>
<td>Nil</td>
</tr>
</tbody>
</table>

(Source: Punjab School Education Board, Mohali)

Subject wise analysis of matriculation examination of 2008-09 has been given in table 1.5. The achievement of matriculation students in mathematics has improved in 2009. About 46% students have achieved below than 40% marks and 7.6% students have achieved marks more than 80% in mathematics.

Table 1.6
Subject Wise Pass Percentage of Matriculation Examination (March 2010)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Regular</th>
<th>Private</th>
<th>Open (Regular)</th>
<th>Open (Private)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjabi</td>
<td>98.19%</td>
<td>95.72%</td>
<td>77.33%</td>
<td>46.45%</td>
</tr>
<tr>
<td>English</td>
<td>78.72%</td>
<td>68.11%</td>
<td>32.15%</td>
<td>19.07%</td>
</tr>
<tr>
<td>Hindi</td>
<td>96.11%</td>
<td>94.03%</td>
<td>68.42%</td>
<td>45.56%</td>
</tr>
<tr>
<td>Mathematics</td>
<td>74.21%</td>
<td>56.12%</td>
<td>53.57%</td>
<td>22.41%</td>
</tr>
<tr>
<td>Science</td>
<td>92.90%</td>
<td>84.69%</td>
<td>57.66%</td>
<td>32.07%</td>
</tr>
<tr>
<td>S. Studies</td>
<td>87.05%</td>
<td>80.25%</td>
<td>42.90%</td>
<td>28.64%</td>
</tr>
</tbody>
</table>

(Source: Punjab School Education Board, Mohali)
Table 1.6 indicates subject wise pass percentage of matriculation examination of session 2010 and it is found whether it is achievement of regular, private or open (regular/private) the achievement of matriculation students in mathematics is the lowest.

**Table 1.7**

Subject Wise Pass Percentage of Matriculation Examination (March 2011)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Appeared students</th>
<th>Passed</th>
<th>Pass Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjabi</td>
<td>361535</td>
<td>343338</td>
<td>94.97%</td>
</tr>
<tr>
<td>English</td>
<td>360905</td>
<td>318354</td>
<td>88.21%</td>
</tr>
<tr>
<td>Hindi</td>
<td>361210</td>
<td>337358</td>
<td>93.40%</td>
</tr>
<tr>
<td>Mathematics</td>
<td>355191</td>
<td>266164</td>
<td>74.94%</td>
</tr>
<tr>
<td>Science</td>
<td>360434</td>
<td>317569</td>
<td>88.11%</td>
</tr>
<tr>
<td>Social Studies</td>
<td>360652</td>
<td>318327</td>
<td>88.26%</td>
</tr>
</tbody>
</table>

(Source: Punjab School Education Board, Mohali)

It is clear from table 1.7 that if we see the subject wise pass percentage of matriculation examination of 2011, Mathematics is the subject with low achievement whereas in other subjects the achievement has been improved. Therefore, above tables show that a very large number of students fail in mathematics or achieve low performance in mathematics at secondary stage.

Many new methods and advance techniques have been used to develop the mathematical and scientific attitude among students. Since our government spends a lot of money on education of mathematics, it is disappointing to see a high percentage of students continuously failing in mathematics for more than 20 years. The performance of school children in mathematics is a cause for worry for teachers, parents and educationists. Of course; it causes a lot of worry to student too.
The achievement of students in mathematics is low, though mathematics occupies a place of importance all over the country. It is clear that our efforts to improve the status of mathematics at school levels over the past decades have been largely ineffective.

1.6 FACTORS RELATED TO LOW ACHIEVEMENT IN MATHEMATICS

Many countries have participated in national surveys of students’ achievement in mathematics and science. Most countries have their own monitoring of educational progress and measure the achievement of students at regular intervals. The difficulties and problems experienced by different countries in the administration of education of mathematics in schools are very similar. Main problems faced by all countries are overcrowded classes, inadequate number of trained teachers, lack of teacher training facilities, low expectation, poor teaching, lax examinations, absence of continuing education programmes for in-service teachers, non-availability of teaching materials like good text books or laboratory and inadequate contact hours. In India there may be a number of reasons for low achievement in mathematics concentrating on personal, social, economic, political, psychological and pedagogical.

(A) Personal Factors

Personal factors are related to the personality of the individual. These factors can enhance or minimize the achievement of students. Poor concentration, low intelligence, poor health, gender, race, interest, passivity, withdrawal, limited initiative, low attentive span, school maladjustment, lack of motivation, negative attitude, lack of proper study habits and lack of practice may cause low achievement in general as well as in specific subjects. If a student is highly motivated to secure good marks, he or she will work hard to achieve good marks. If he or she has sound health, sharp sense organs, supporting environment at home and school, his or her achievement
will be definitely superior. Nirmala et al. (2006) stated that many factors influence the academic achievement of the students in mathematics at higher secondary school level. It is observed that Mathematical information processing skills, decision making and attitude towards mathematics have made a significant contribution towards the academic achievement in mathematics.

(B) Social Factors

The family, the peer group, the community and the society in general also play a vital role in one’s achievement. If the child is in the company of good students, he or she gets the benefit of better competition and achieves better marks. Lower educational status of parents, poverty of the home, lower status, unhappy family and environmental factors are the main predicted variables for low achievement in India. Educated parents, of course will play an important part in achievement of their wards. Some parents show little interest in the work done at school. Parents know a little about the career opportunities in mathematics which sometimes leads to low achievement in mathematics. According to Hui-Ling (2001) the variables home environment, peer influences, school environment, educational aspirations of parents are consistent predictors of mathematics achievement.

(C) Economic Factors

Economically backward children are not able to meet the financial needs and necessities of a costly educational system. Our schools are lacking in infrastructure and conducive environment. The people living below the poverty line are unable to get one square meal daily. So they cannot send their children to good schools. Students in less affluent schools lag seriously behind. In such schools there may be many factors which can cause low achievement like lack of experimental setups, absence of proper evaluations of laboratory tests, absence of qualified staff, lack of experimental infrastructure, lack of
reading materials and good text books and faulty methods of teaching students. Lack of sound base in primary school is also considered a factor. Maria (2006) conducted her study on low performance of Chilean students in mathematics and science. The main causes were found as low educational status of parents and fewer educational resources at home. Poverty of the home, lower status, unhappy family is the main predictor in India for low achievement. Nutritive food and proper medication is also required for healthy body which again is not possible without sufficient money. Only the economically well settled people can provide the needed facilities to their children like balanced diet, good school, good reading material, proper coaching and modern facilities. Muijs, Harris, Chapman, Stoll, & Russ, (2009) stated that schools in low-income communities suffer from high levels of unemployment, migration of the best qualified teachers, and low educational achievement

(D) Psychological Factors

Psychology of the child is another factor which influences the achievement negatively. In a single class the students are of varying abilities and have individual differences. So students are not classified on the basis of individual differences. All the students are taught with same technique and method. Child centered approach is not being applied. Individual psychological problems are not attended to. Even their physical problems are also ignored. Worries and disorders in the domestic regions make the children psychologically disturbed. The teachers have no time to understand the psychological problems of the students. According to Wachira (2005) the best predictor of mathematics achievement is prior achievement in mathematics. When the basics of mathematics are not clear to students they become psychologically disturbed. Counselling facilities are not provided in schools. This has also bad effect on achievement of students.
(E) Pedagogical Factors

The last, not the least however, is the pedagogical cause. Many teachers do not know the correct method of teaching or dealing with the students. There are less contact hours between teachers and students. The teachers are not creative by nature. They do not know the tact to deal students with individual differences. They blame learners for their poor performance. The teachers do not seem to see themselves as part of the problem. Pedagogically teachers are unprepared and inadequate. His professional growth has come to a stop. The teachers use to sit in schools but the classes are not attended sincerely. The teachers are irregular and they are not concerned to education of children.

A large number of factors are responsible for the low achievement of students in mathematics at secondary stage in India. It is neither possible nor desirable to study all the factors responsible for low achievement in mathematics and, thus, it is decided to study the main factors like intelligence, achievement motivation, and attitude towards mathematics, socio-economic status and perceptions of the parents and teachers of low achievers in mathematics and low achievers in mathematics about factors of low achievement in mathematics.

1.7 INTELLIGENCE

Despite a long history of research and debate about the exact definition and nature of intelligence, there is not any single standard definition of intelligence. Numerous definitions of intelligence have been proposed by psychologists. Some strong similarities are obvious between many of the definitions.

Intelligence is an umbrella term which describes a property of the mind including related abilities, such as the capacities for abstract thought, understanding, communication, reasoning, learning, learning from past experiences, planning and problem solving.
Intelligence comes from the Latin word ‘intelligere’ which means to ‘understand’ and in other words cognitive ‘processes’. Intelligence can be defined in various ways because of individual differences. It may be defined as the capacity to solve new problems, to accept challenge and to learn.

Francis Galton was the first scientist to propose a theory of general intelligence; that intelligence is a true, biologically-based mental faculty that can be studied by measuring a person’s reaction times to cognitive tasks. On the other hand, Alfred Binet and the French school of intelligence, believed intelligence was an aggregate of dissimilar abilities, not a unitary entity with specific, identifiable properties.

Binet (1905) described that in intelligence there is a fundamental faculty, the alteration or the lack of which, is of the utmost importance for practical life. This faculty is judgement, practical sense, initiative, the faculty of adapting one’s self to circumstances. Piaget (1952) defined intelligence as the ability to adapt to one’s surroundings.

Wechsler (1958) stated that “A global concept that involves an individual’s ability to act purposefully, think rationally, and deal effectively with the environment.”

Intelligence is not confined to thinking only. Purposeful actions demonstrating appropriate responses to the situation and reasoned application of one’s knowledge are the evidences of intelligence. However intelligence is the ability to learn, to understand, to interact with one’s environment. A person is considered as intelligent-

- who adapts the new environment or tries to change the current environment.
- who has capacity for knowledge and ability to acquire it.
- who has capacity for original and productive thoughts.
- who has ability for reasoning and abstract thinking.
- who has ability to comprehend relationships.
who has ability to evaluate and judge.

Anastasi (1992) defined that intelligence is not a single, unitary ability, but rather a composite of several functions. The term denotes that combination of abilities required for survival and advancement within a particular culture.

Gardner (1993) defined that intelligence is the ability to solve problems, or to create products, that are valued within one or more cultural settings.

An editorial statement by fifty-two researches from Mainstream Science on Intelligence (1994), defined intelligence as a very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience.

Simonton (2003) in his interview described intelligence as a certain set of cognitive capacities that enable an individual to adapt and thrive in any given environment they find themselves in, and those cognitive capacities include things like memory and retrieval, and problem solving and so forth. There’s a cluster of cognitive abilities that lead to successful adaptation to a wide range of environments.

Mangal (2007) has attempted to define intelligence as a sort of mental energy, in the form of mental or cognitive abilities, available with an individual which enables him to handle his environment in terms of adaptation to face novel situations as effectively as possible.

In matters of definition, it is difficult to argue that there is an objective sense in which one definition could be considered to be the correct one. Nevertheless, some definitions are clearly more concise, precise and general than others. If we scan through the definitions pulling out commonly occurring features we find that intelligence is:

- A property that an individual agent has as it interacts with its environment or environments.
➢ Is related to the agent’s ability to succeed or profit with respect to some goal or objective.

➢ Depends on how able to agent is to adapt to different objectives and environments.

Many theories have been propounded by psychologists from time to time to uncover the elements of intelligence. These theories can be grouped under two categories, factor theories and cognitive theories. Factor theories employ factor analysis techniques for identifying factors or common abilities which constitute one’s intelligence. The unitary theory which was put forward by Johnson and Stern holds that intelligence consists of only one factor i.e. a fund of intellectual competence. Group factor theory was given by Prof. Thomson. According to this theory, intellectual abilities belong to certain groups which are not related to each other but there is close relationship between the abilities belonging to the same group i.e. they have got positive correlation. But on the other hand, the multi –factor theory propagated by Thorndike (1914) considers that intelligence is the combination of several separate factors or elements. He has given three types of intelligence i.e. abstract intelligence (ability to solve problems presented in the form of symbols, words, numbers, formulae and diagrams), concrete intelligence (ability to deal with things as in skilled trades) and social intelligence (ability to deal with persons, capacity to behave effectively in social situations). Spearman’s (1923) two factor theory advocates the presence of two factors- general intelligence ‘g’ and specific intelligence ‘s’. Thurstone (1938) demonstrated that Spearman’s one common factor method (Spearman’s method yielded only a single factor) was a special case of his multiple factor analysis. Thurstone proposed a model of intelligence that included nine primary mental abilities (i) Numerical ability (ii) word fluency (iii) reasoning ability (iv) visual ability (v) spatial ability (vi) memorising ability (vii) inductive ability (viii) deductive ability and (ix) perceptual ability.
Guilford suggests that mind is composed of at least three dimensions of intellectual abilities namely operations, contents and products. Catell (1963) and Horn’s (1978) theory of intelligence states that intelligence is made up of two types of intelligence i.e. fluid intelligence (derived more from biological and genetic factors and free from influences of education and culture) and crystallized intelligence (acquired fund of general information). Jensen’s theory of mental functioning (1969), describes that one’s intelligence is composed of two types of abilities, i.e. associative abilities (related to biological maturation differing little among social classes and races) and conceptual abilities (dependent on education and culture and responsible for observed differences in conceptual reasoning among social classes and races).

Gardner’s theory of multiple intelligence (1983) is based on studies not only of normal children and adults but also by studies of gifted individuals, of persons who have suffered brain damage, of experts and virtuosos, and of individuals from diverse cultures. This led Gardner to break intelligence down into at least eight different components: logical, linguistic, spatial, musical, kinaesthetic, interpersonal, intrapersonal in 1983 and naturalist intelligences added in 1999.

Piaget was the founder of the developmental approach to the study of intelligence. According to his theory of cognitive development, intelligence is the basic mechanism of ensuring equilibrium in the relations between the person and the environment.

Many attempts have been made to measure intelligence by various methods. At the end of 18th century Gall discovered that intelligence is directly proportional to the size of head i.e. the larger the head, the greater is the intelligence. Features of the face were also taken to be an index of intelligence. It was held that an intelligent individual would have sharp and bright facial features. Wilhelm Stern, a German psychologist used the term Intelligence Quotient (I.Q.) in
1912. Intelligent Quotient is an index of intelligence. It is the ratio between mental age and chronological age. Education and training, socio-economic factors, environment of home, occupation of parents, rural or urban background influence intelligent scores.

Many standardised intelligence tests are designed to measure a variety of mental functions, such as reasoning, comprehension and judgement. Intelligence tests are used in the form of individual tests or group tests. Individual tests again may be verbal or non-verbal. Intelligence tests are best predictors of academic achievement.

A review of available literature reveals that intelligence can be inferred as the basic concept of one’s ability to adjust adequately to new and different situations. Hence an intelligent person is he who meets the situation in its novelty, complexity and abstractness.

1.8 ACADEMIC ACHIEVEMENT MOTIVATION

Motivation can be defined as the driving force. Generally, motivation is derived from the word ‘movere’ which means ‘to move’. It is the process of raising action, maintaining activity in progress, regulating and directing pattern of activity transformations in the tissues of the organism. It is an art of inculcating and stimulating interest in studies and in other such activities in the pupils. It is generally agreed that motivation has positive impact upon learning-it stimulates, sustains, and give direction to an activity.

Motivation plays a vital role at various phases of life. Our basic behaviours and feelings are affected by our inner drive to succeed over life’s challenges while we set goals for ourselves. Our motivation provides us with means to compete with others in order to prove ourselves better and to seek out new information to learn and absorb. Some people strive to achieve their goals for personal satisfaction and self-improvement while others compete with their surroundings in achievement settings to simply be classified as the best. All of our behaviours, actions, thoughts, and beliefs are influenced by our inner drive to succeeding force behind all the actions of an individual. The
influence of an individual’s needs and desires both have a strong impact on the direction of their behaviour.

There are different forms of motivation including extrinsic and intrinsic motivation. Intrinsic motivation is often associated with curiosity, which culminates in satisfaction through learning. This type of motivation prompted by want, desire, urge, or drive and this internal drive is referred to as intrinsic motivation. It is indicated by some of researchers that children with high curiosity either learn more in a given period of time or else retain more of what they experience. Highly motivated students often require little guidance from the teacher and are capable of doing many higher degree of complicated work independently. Intrinsic motivation occurs when people are internally motivated to do something because it either brings them pleasure, they think it is important, or they feel that what they are learning is significant. Extrinsic motivation is initiated by outside stimulus. Because students are not always internally motivated, they sometimes need situated motivation, which is found in environmental conditions that the teacher creates. Group competition, reward from teacher, the opportunity for participation in planning and decision making seems to have very beneficial effect upon learning. Kumar (2006) states that students readily become interested in things, which are new, or exciting, in things for which they can perceive practical value.

Academic achievement motivation is considered as one of the crucial factors which determine the achievement of a student. Achievement motivation is based on reaching success and achieving all of aspirations in life. John W. McDavid and Herbert Harari (1968) in their book ‘Social Psychology’ state that a system of goal-direction in human activity that is closely related to competence, aggressiveness and dominance is described by psychologists as achievement motivation. McClelland and Atkinson defined that achievement motivation may be associated with a variety of goals, but in general
the behaviour adopted will involve activity which is directed towards
the attainment of some standard of excellence. Over the past decades,
the concept of motivation has been studied extensively, leading to
various terminologies and diverse perspectives that emphasize
different aspects of motivation, such as, the expectancy-value theory
(Atkinson, 1964), self-efficacy theory (Bandura, 1997), self-
determination theory (Deci & Ryan, 1985), attribution theory (Weiner,
1985) and goal theory (Maehr & Anderman, 1993). According to
Atkinson’s theory (1964), achievement behaviour is defined as the
resultant of the emotional conflict between two tendencies, namely,
achievement motivation or the tendency to approach success and fear
of failure or the tendency to avoid failure. Atkinson’s theory nowadays
remains very important not in the least because of its applicability
within the educational setting and particularly within student
coaching, such as, prevention and remediation of fear of failure.

Generally achievement motivation has two characteristics,
positive and negative. The person who has got more of approach
aspect is called high need oriented person and a person having more
avoidance is called a low motivated person.

Achievement motivation has a practical importance not only for
the education but also for the generation of enterprises. It is
associated to traditional sociological interest of its relationship to
entrepreneurial activity it has taken a matter of considerable interest
to economists and others concerned with economic advancement.

Achievement motivation has been conceptualized in many
different ways. Our understanding of achievement-relevant effects,
cognition, and behaviour has improved. Despite being similar in
nature, many achievement motivation approaches have been
developed separately, suggesting that most achievement motivation
theories are in concordance with one another instead of competing.

Elliot & McGregor (1999) have sought to promote a hierarchal
model of approach and avoidance achievement motivation by
incorporating the two prominent theories: the achievement motive approach and the achievement goal approach. Achievement motives include the need for achievement and the fear of failure. These are the more predominant motives that direct our behaviour toward positive and negative outcomes. Achievement goals are viewed as more solid cognitive representations pointing individuals toward a specific end. There are three types of these achievement goals: a performance-approach goal, a performance-avoidance goal, and a mastery goal. A performance-approach goal is focused on attaining competence relative to others, a performance-avoidance goal is focused on avoiding incompetence relative to others, and a mastery goal is focused on the development of competence itself and of task mastery.

Achievement goal theorists Elliot & Church, (1997) commonly identify two distinct ideas toward competence: a performance goal focused on demonstrating ability when compared to others, and a mastery goal focused on the development of competence and task mastery. Performance goals are hypothesized to produce vulnerability to certain response patterns in achievement settings such as preferences for easy tasks, withdrawal of effort in the face of failure, and decreased task enjoyment. Mastery goals can lead to a motivational pattern that creates a preference for moderately challenging tasks, persistence in the face of failure, and increased enjoyment of tasks.

The desire for success and the desire to avoid failure were identified as critical determinants of aspiration and behaviour by a theorist named Lewin. In his achievement motivation theory, McClelland proposed that there are two kinds of achievement motivation, one oriented around avoiding failure and the other around the more positive goal of attaining success. Atkinson, another motivational theorist, drew from the work of Lewin and McClelland in forming his need-achievement theory, a mathematical framework that
assigned the desire to succeed and the desire to avoid failure as important determinants in achievement behaviour.

1.9 ATTITUDE TOWARDS MATHEMATICS

According to Fishbein & Ajzen (1975) attitudes are generally regarded as having been learnt. They predispose an individual for action that has some degree of consistency and can be evaluated as either negative or positive. Attitude is the sum total of man’s inclinations and feelings, prejudices, pre-conceived notions, ideas, fears or threats about any specific topic.

Attitude towards mathematics denotes interest or feeling towards studying mathematics. It is the students’ disposition ‘like’ or ‘dislike’ towards mathematics. The mathematical attitude is a complex process involving the interaction of many factors. It cannot be explained simply or completely.

Research on attitude has a long history in mathematics education. Attitude toward mathematics plays an important role in education of mathematics. In the field of mathematics education, research on attitude has been motivated by the belief that something called "attitude" plays a crucial role in learning mathematics according to Neale (1969) but according to Ma and Kishore (1997) the goal of highlighting a connection between a ‘positive’ attitude and achievement has not been reached.

According to McLeod (1992) factors such as attitudes and beliefs play an important role in achievement of mathematics. The general relationship between achievement and attitude is based on the concept that better the attitude a learner has towards the subject or task, the higher the achievement or performance level in mathematics.

Stuart (2000) argues that teacher, peer and family attitudes towards mathematics may either positively or negatively influence learner’s confidence in mathematics. The learners having positive attitude towards their teachers have high achievement levels.
The research literature on beliefs reveals an area of considerable complexity with a lack of a common definition (McLeod & McLeod, 2002), that results in disagreement over whether beliefs are expressions of knowledge or opinion and whether beliefs belong to the cognitive or to the affective domain.

During the 1960's and early 1970's, mathematics educators' interest in the affective domain was usually limited to what was called 'attitude toward mathematics.' Recent research has also transcended this simplistic view. The Fennema-Sherman Mathematics Attitude Scales are multidimensional and designed to measure specific attitude components. Specifically the eight twelve-item scales are designed to measure: usefulness of mathematics; attitudes of mother, father, teacher; mathematics anxiety; confidence in learning mathematics; attitude toward success in mathematics; and motivation in mathematics.

Many definitions define attitude towards mathematics partially and do not provide a clear definition. When a definition is explicitly given, or can be inferred, it mainly refers to one of the three following types:

McLeod (1992), Haladyna, Shaughnessy & Shaughnessy (1983) gave a simple definition of attitude describing that the attitude toward mathematics is just a positive or negative emotional disposition toward mathematics.

Hart (1989) gave a multidimensional definition. Mainly three components are included in the attitude: emotional response, beliefs regarding the subject, behaviour related to the subject. From this point of view, attitude of an individual toward mathematics is defined in a more complex way by the emotions that he/she associates with mathematics (which, however, have a positive or negative value); by the beliefs of an individual towards mathematics, and by how he/she behaves.
Daskalogianni & Simpson (2000) gave a bi-dimensional definition, in which behaviours do not appear explicitly. Attitude toward mathematics is therefore seen as the pattern of beliefs and emotions associated with mathematics.

Kulm (1980) suggests that 'It is probably not possible to offer a definition of attitude toward mathematics that would be suitable for all situations'. In actual fact the term attitude is used in both practice and research together with the adjectives positive/ negative. For example, classic studies regarding the relationship between attitude and achievement in fact investigate the correlation between positive attitude and success. The definition of ‘positive’ or ‘negative’ attitude toward mathematics clearly depends on the definition of attitude itself.

If we choose the bi dimensional (or multidimensional) definition, it is not clear what a ‘positive’ attitude should mean, but referring only to the emotional dimension is reductive, since we have to take into account the two (three) dimensions, i.e. emotions, beliefs, (behaviours) and their interaction.

Bruner's (1990) work emphasizing process and Gardner's (1983) theory of multiple intelligences support (either directly or tangentially) the idea that students' attitudes develop when they interact with other persons and their environment. Since an attitude is defined as a way of thinking, feeling, and acting. This attitude is affected by all three components— a person's actions, thoughts and feelings. A person's attitude (including feelings, thoughts, and actions) is affected by his/her environment. This includes experiences within the environment as well as the culture of the environment itself. Other persons are also a part of the environment. For an individual, this means that his/her attitude toward mathematics, including feelings, thoughts, and actions, has changed an attitude, and factors influencing attitude development. The mathematical attitude is a complex process involving the interaction of many factors. It cannot be
explained simply or completely. Among the factors influencing attitude development are the family, socialization, schooling experiences, and relationships with role models and mentors.

At some times attitudes toward mathematics focus primarily on feelings, while at other times they focused more on thoughts or actions. While the focus is more toward one of the areas, the other components still influence attitude development. For example, sometimes attitudes are most influenced by mathematical thoughts; however, even though feelings and actions (both past and present) were minimized, they still affect attitudes.

One of the most important factors in developing learners’ mathematics ability is the attitude of the teacher towards learners. Fennema and Romberg (1999) state that it is not only the teachers’ belief about mathematics and its usefulness that are important, but also the teachers’ beliefs about their learners’ ability to do mathematics.

Mandler’s discrepancy theory (1989) argues that a negative attitude is a result of frequent failures, which were intended to face mathematical tasks. Repeated emotional reactions result in the formation of negative attitude towards Mathematics which becomes permanent.

1.10 SOCIO-ECONOMIC STATUS

In modern society, the status is acquired on the basis of occupation, membership of certain associations and organisations, the area in which his house is located, type of house in which a person lives, the ownership of various household materials, e.g., T.V., car, telephone, cell phone, etc as well as the education, the type of schools in which he had studied, type of newspaper, caste and prestige acquired by the individuals. The economic factor plays an important role in determining social status, which includes the total income of the family, savings and capacity to collect money in emergency.
Socio-economic status (SES) is evaluated as a combination of factors including income, level of education, and occupation. It is a way of looking at how individuals or families fit into society using economic and social measures that have been shown to impact individuals' health and well being.

The main factor of the social environment is the parent’s Socio-economic status which affects the learning of an individual. The Socio-economic status of the parents is determined by their education, job, income, political power and prestige in society. Parson and Sardo-Brown (2001) described that “Socio-economic Status (SES) is the term used to distinguish between people’s relative position in the society in terms of family income, political power, educational background and occupational prestige”. The group having higher degree, better job, higher income and some status in the society is categorized as upper class, the other which have relatively low income less education and less status are categories as middle class and the group which is low on these indicators is known as lower class. Generally social classes are distributed into five categories such as “upper class”, “upper middle class”, “middle class”, “lower middle class” and “lower class”. A general perception is that the students belonging to upper class have greater opportunities to interact with learning environment and show greater achievement; on the other hand students belonging to lower socio-economic status class have fewer opportunities and fewer resources they remain behind in every walk of life. They may not be more productive as compared to other groups.

Every organization has some hierarchical structure. The members have different responsibilities and enjoy different status. For example a school is an organization in which principal, teacher, students, administration staff and guards all have different responsibilities. Together it constitutes a social system in which different people have different status. The status was defined by Stockwell, Peter (2002) as “a status is a rank or position in a group or
organization”. In the above example the status of principal is different from teachers because of qualification and experience and status of teachers is different from administrative staff.

Socio-economic factors are the social and economic experiences and realities that help shaping one’s personality, attitudes, and lifestyle. There are some socio-economic factors.

(a) Education: Among socio-economic factors is education. One’s level of education can shape how he or she views the world and can contribute to social growth. Education also can contribute to decision-making processes that alter the paths people take in life. The lower the education one has, the lower the prestige.

(b) Income and Occupation: One’s income and corresponding occupation are factors that can contribute to socioeconomic status. In society, we often are judged by what we do and what we earn. When getting to know someone, the question of what we do for a living often is among the first addressed. The doctors, engineers, bank managers, businessmen, professors, advocates, etc. have high socio-economic status; on the other hand the coolie, rickshaw pullers, the peon, the watchman, even the skilled workers have low socio-economic status.

(c) Place of Residence: The place of residence is another leading socioeconomic factor. We are judged from the type of house we live in or our neighbourhood in which we reside. People prefer to live among people with similar incomes and often similar backgrounds.

(d) Culture/Ethnicity: Culture or ethnicity also is socioeconomic factors that can contribute to our thoughts and attitudes. Both can have an impact on how people are raised, their core values, and their sense of family and tradition. The history of one's ethnicity, special holidays, and cultural beliefs are all things that can be passed down between generations and shape individual identities.

(e) Religion: Often closely tied to culture is the socioeconomic factor of religion. Whole social networks are built around Gurudwaras,
churches, temples and mosques. So religion plays an important social role in the lives of many.

The status of the person determines the class to which he belongs. Theories of classes are very old. From the very first “Three class Theory” of social stratification was very popular. According to this theory society is divided into three classes, the “upper class”, “middle class” and the “lower class”. The upper class composed of a relatively few individuals who hold the top most positions in society; a middle class composed of persons of lesser status but of relatively comfortable means; and a lower class is of persons who have a bare existence when measured by the given society standards. The chief criticism of this theory is that it does not draw a sharp dividing line between individuals of different classes in society. The middle class for instance, may run the whole range from semiskilled workers to owners of relatively large business enterprises as well as highly paid professionals. Such criticisms have led to the five and six class theories of social stratification. The six class theory holds that the upper class is divided in to an upper-middle and a lower upper class, and the middle class is divided in to an upper middle and a lower middle class and that the lower class is divided in to an upper lower class and a lower class. The five class theory generally used to categories people in social classes. These classes are named as upper class, upper middle class, middle class, lower middle class and lower class.

Good (1975) defines socio-economic status as “the level indicative of both the social and economic position of an individual or group”.

Kuppuswamy (1981) stated that socio-economic status of the individual are based on three assumptions: (a) there is a class structure in society, (b) status positions are determined mainly by a few commonly accepted characteristics, and (c) these characteristics can be scaled and combined using statistical procedures.
Crnic and Lamberty (1994) discuss the impact of socioeconomic status on children's readiness for school: "The segregating nature of social class, ethnicity, and race may well reduce the variety of enriching experiences thought to be prerequisite for creating readiness to learn among children. Social class, ethnicity, and race entail a set of 'contextual givens' that dictate neighbourhood, housing, and access to resources that affect enrichment or deprivation as well as the acquisition of specific value systems."

Ramey and Ramey (1994) described that "Across all socioeconomic groups, parents face major challenges when it comes to providing optimal care and education for their children. For families in poverty, these challenges can be formidable. Sometimes, when basic necessities are lacking, parents must place top priority on housing, food, clothing, and health care. Educational toys, games, and books may appear to be luxuries, and parents may not have the time, energy, or knowledge to find innovative and less-expensive ways to foster young children's development.

Even in families with above-average incomes, parents often lack the time and energy to invest fully in their children's preparation for school, and they sometimes face a limited array of options for high-quality child care--both before their children start school and during the early school years. Kindergarten teachers throughout the country report that children are increasingly arriving at school inadequately prepared.

Zill, Collins, West, and Hausken (1995) state that low maternal education and minority-language status are most consistently associated with fewer signs of emerging literacy and a greater number of difficulties in preschoolers.

According to Boskey (2009) Socioeconomic status and health are closely related, and socio-economic status can often have profound effects on a person's health due to differences in ability to
access health care as well as dietary and other lifestyle choices that are associated with both finances and education.

Families with high socioeconomic status are often found more successful in preparing their young children for school because they can afford a wide range of resources to promote and support young children’s development. They are able to provide their young children with high-quality child care, books, computers, tuitions and toys to encourage children in various learning activities at home. Also, they have more awareness about their children’s health, as well as social, emotional, and cognitive development. Families with high socioeconomic status often seek out information to help them better prepare their young children for school.

On the other hand, families with low socioeconomic status often have inadequate sources. Poor families also may have inadequate or limited access to community resources that promote and support children’s development and school readiness. Parents may lack information about childhood immunizations and nutrition. They cannot afford necessary material to their wards. Having inadequate resources and limited access to available resources can negatively affect families’ decisions regarding their young children’s development and learning.