CHAPTER - III

THE PROBLEM AND THE STRATEGY OF ENQUIRY

3.1 SIGNIFICANCE OF THE STUDY

Mathematics is a fundamental pillar and mirror of civilization. Mathematics is important for science and science is important for technology which is very important in the modern world. During the last two decades development in the field of science and technology has brought drastic changes in the lives of people. It is difficult to predict the future world of 2020 as the developments in information technology and computer science are occurring so fast. Development of science and technology is necessary for the progress of any country. In fact the distinction between the developed and under developed and developing countries is largely based on their achievements in the field of science. In the modern world, it has become more important that the children of our country should have a strong science base. Without the knowledge of science and mathematics, the doors of almost every form of useful occupation are closed for a student. Making student to learn mathematics is a need of modern world. However, in this new world of technology, citizens of this whole world have a great need of high quality science and mathematics.

Realising the importance of mathematics, it has been given a unique position in any school curriculum. Many methods and techniques have been used to develop positive attitude of students towards mathematics and science. Since mathematics is a requirement for science, computer technology and engineering courses as well as for advanced courses of mathematics a low level of mathematics has become a barrier preventing many learners from pursuing careers related to these areas. Our government spends a lot of money to improve the performance of students in mathematics but it is disappointing to see a high percentage of students continuously
failing in mathematics for more than 20 years. Low achievement in Mathematics at secondary stage is a long standing problem in India. In spite of sincere and continuous efforts made by government, the problem of low achievement in mathematics still persists. 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.

Why is there a little visible progress in achievement of students in mathematics? The answer to this question will bring in light the factors causing low achievement in mathematics at secondary stage. The purpose of the study is to evaluate the causes of low achievement in mathematics at secondary stage in Punjab.

As it is known mathematics had added a new dimension to education that standard and quality of mathematics and science education should be improved at all levels in the country. Why do students achieve low marks in mathematics will be discovered through this study. Reasons may be economic, psychological, personal administrative, social or some others.

3.2 STATEMENT OF THE PROBLEM

Mouton (1996) believes that research begins with reflection, which includes unstructured thoughts, assumptions and questioning. This reflection can be seen as a run-up to the development of a research problem.

Mathematics has been an important subject at the secondary stage and the low achievement in mathematics has been a great concern by one and all concerned with the students. Present investigation intends to identify the causes related to the low achievement in mathematics at secondary stage. These causes may be psychological, social or personal. The problem in a measured language
can be stated as under:

CAUSES OF LOW ACHIEVEMENT IN MATHEMATICS AT SECONDARY STAGE.

3.3 OBJECTIVES OF THE STUDY

1. To identify the low achievers in Mathematics in secondary schools.
2. To study intelligence, academic achievement motivation, attitude towards mathematics and socio-economic status of the subjects having low achievement in mathematics.
3. To compare intelligence, academic achievement motivation, attitude towards mathematics and socio-economic status of low achievers in mathematics in relation to their gender, locale and type of school.
4. To enlist causes of low achievement in mathematics of the students as perceived by the low achievers in mathematics, their teachers and their parents.

3.4 HYPOTHESES

1. Students having low achievement in mathematics, both boys-girls, rural-urban, government-private separately and as a combined group have various levels of intelligence.
2. There is no significant difference in intelligence level of low achievers in mathematics in relation to their gender, locality and type of school.
3. Students having low achievement in mathematics both boys-girls, rural-urban, government-private separately and as a combined group have various levels of academic achievement motivation.
4. There is no significant difference in academic achievement motivation of low achievers in mathematics in relation to their gender, locality and type of school.
5. Students having low achievement in mathematics both boys-girls, rural-urban, government-private separately and as a combined group have various levels of attitude towards mathematics.
6. There is no significant difference in attitude towards mathematics of low achievers in mathematics in relation to their gender, locality and type of school.
7. Students having low achievement in mathematics both boys-girls, rural–urban, government-private separately and as a combined group belong to various levels of socio-economic status.
8. There is no significant difference in socio-economic status of low achievers in mathematics in relation to their gender, locality and type of school.
9. Perceptions of low achievers in mathematics, their teachers and their parents are different regarding the causes of low achievement in Mathematics.

3.5 DELIMITATION
1. The study was confined to the students who were low achievers in mathematics in the matriculation examination of Punjab School Education Board in the March 2008-2009.
2. While studying the causes of low achievement in mathematics, the study was delimited to variables namely intelligence, academic achievement motivation, attitude towards mathematics and socio-economic status and perceptions of parents, teachers and students about the causes of low achievement in mathematics.
3. The study was restricted to Malwa area.
4. It was delimited to teachers who taught Mathematics to the Matriculation classes and parents of students having low achievement in mathematics and students who were low achievers in Mathematics.
3.6 OPERATIONAL TERMS

In the present study a few operational terms have been used with a view to avoid any confusion and ambiguity in understanding of these terms. The investigator has explained such terms here under

3.6.1 Intelligence

It is the ability to learn or understand or to deal with new or trying situations. Here in this study intelligence means highly logical mathematical intelligence understanding the underlying principles of some kind of causal system, the manipulation of numbers, quantities and operations.

3.6.2 Academic Achievement Motivation

It is considered as one of the crucial determinants of student achievement and academic success. Achievement motivation is a concept that links personality traits and social background of an individual with his or her level of need for achievement. Achievement motivation is an acquired tendency of an individual which implies action to aspire, strive and achieve in competition with other with a standard set by the individual.

3.6.3 Attitude towards Mathematics

It is a mental set to respond to mathematical problems with readiness without any hesitation or fear.

3.6.4 Socio-Economic Status

Socio-economic status is an individual’s or group’s position within a hierarchical social structure. Socio-economic status depends on a combination of variables including occupation, education, income, wealth and place of residence of students achieving low marks in mathematics.

3.6.5 Low Achievement in Mathematics

Here in this study low achievement means to achieve marks
between 33-40 in mathematics. The students passed the examination but having very low marks in mathematics.

3.6.6 Perceptions of Parents, Teachers and Students about Causes of Low Achievement in Mathematics

Perceptions vary from person to person. Different people perceive different things about the same situations. In this study the perceptions of the low achievers in mathematics, parents and teachers of low achievers in mathematics were observed. Three areas of related factors (Personal factors, factors related to family background and factors related to school) were investigated through a checklist.

3.7 SAMPLE

If we intend to evaluate the population by the inferences drawn from a sample, it is essential that the sample be representative of the population. In the present study the population comprised the students who passed the matriculation examination with low achievement in mathematics. A sample of 354 students from three districts (Sangrur, Mansa and Faridkot) of Malwa region who have passed matriculation examination from Punjab School Education Board during 2008-09 have been taken. The students who have scored 33-40 marks in Mathematics subject and more than 40% in other subjects (at least four subjects) have been selected as sample. Equal number of male and female low achievers in mathematics has been selected from rural and urban areas and from government and private schools for this study. The parents of students having low achievement in mathematics and teachers who had taught them made the sample for securing teachers and parents’ perceptions. The investigator herself visited secondary and senior secondary schools of these three districts and was able to collect information regarding their personal, social, psychological and economic causes of low achievement in mathematics from these students, parents and
The district wise distribution of 354 low achievers in mathematics is given below:

<table>
<thead>
<tr>
<th>Name of District</th>
<th>Male</th>
<th>Female</th>
<th>Rural</th>
<th>Urban</th>
<th>Government</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sangrur</td>
<td>67</td>
<td>58</td>
<td>71</td>
<td>54</td>
<td>60</td>
<td>65</td>
<td>125</td>
</tr>
<tr>
<td>Mansa</td>
<td>52</td>
<td>61</td>
<td>59</td>
<td>54</td>
<td>60</td>
<td>53</td>
<td>113</td>
</tr>
<tr>
<td>Faridkot</td>
<td>58</td>
<td>58</td>
<td>51</td>
<td>65</td>
<td>51</td>
<td>65</td>
<td>116</td>
</tr>
</tbody>
</table>

3.8 TOOLS

Data have been collected from the sample of 354 students, 177 boys and 177 girls who got marks between 33-40 in mathematics in 10th class from 3 districts of Punjab. Perceptions of the low achievers in mathematics as well as their parents and teachers have also been collected to study the causes of low achievement in mathematics. The following tools were used to collect data related each variable of the study.

1. Intelligence Test of Ojha and Chowdhury (2006).
5. A self-constructed checklist was used to find out the perceptions of students; teachers and parents regarding the causes of low achievement.

The investigator first of all approached the principals and heads of the various schools to seek their permission to conduct the present study in their respective schools. The aim of the study was explained to them and the help of the teachers were also sought to administer the test in their class periods. First of all the students who got 33-40 marks in mathematics but in other any four main subjects got more
than 40% marks were selected and were made to sit comfortably. Every precaution was taken so that there was no disturbance outside or inside the room.

1. **Verbal Intelligence Test of Ojha And Chowdhury (2006)**

To measure the general intelligence of low achievers in mathematics, Test of Verbal Intelligence prepared by Ojha and Chowdhury (2006) was used. This test consists of eight sub tests. The test is comprised of 112 questions. In each sub test, the problems are arranged in difficulty order. The eight sub tests included in classification, analogies, synonyms, number test, completion test, paragraph test, best reasons and simple reasons.

1. **Classification:** It is related with classification ability of the student. Fifteen questions are given in this sub test. There is a word which is different from other four words and subject has to underline that odd word.

2. **Analogies:** This sub test also includes 15 questions which are related to analytical thinking. The student has to find the relation between two things, creatures, actions, materials, etc. First two words have a similar relation and student has to find and underline the relation of third word with fourth word.

3. **Synonyms:** There are 20 questions in this sub test. For each question there are given four choices. The subject has to underline the word which has the similar meaning of given word.

4. **Number test:** It is related with numerical ability. An incomplete series of number is given against each question number. The subject has to understand the relation between the number of every series and think over/find out the appropriate number which can be written in place of sign (....). There are 12 questions in this test. The subject has to write the appropriate answer against the related question number on the answer sheet.
5. **Completion Test:** It is related with general knowledge of the subjects related to their school subjects. In this sub test four paragraphs are given. The subject has to underline appropriate word to fill in the given blanks.

6. **Paragraph Test:** In this sub test a chart is given describing the relations of two families. The subject has to find out the relationship between two family members and write down in the given space in the answer sheet.

7. **Best Reasons:** There are ten questions in this sub test. Reasoning power of the subjects is judged. The subject has to identify the appropriate answer out of given choices.

8. **Simple Reasons:** This sub test is further divided into two parts. In first part there are allotted numbers to alphabets of Hindi language. In each sentence there are given some numbers and the subject has to write the alphabet according to the allotted number. A sentence with complete meaning is formed. In part second seven questions are given of simple reasoning. The subject has to underline the correct answer out of given choices.

**Reliability of the Test:**

Split half as well as Kuder Richardson Formula, reliabilities of the test scores for various sub tests, i.e. classification, analogies, synonyms, number test, completion test, paragraph test, best reasons and simple reasons are .87 and .91; .81 and .89; .86 and .88; .71 and .73; 74 and .88; .64 and .68; .58 and .79; .79 and .81; 75 and .83 respectively.

**Validity of the Test:**

Criterion related validity calculated by finding product moment coefficient of correlation. The validity coefficients for various sub test scores are high enough to place confidence in the use of the test.
2. Sharma Academic Achievement Motivation Test (1989)

The investigator used the Sharma Academic Achievement Motivation Test to measure the academic achievement motivation of low achievers in mathematics.

The 49 items with two alternatives each was tried on 100 students (average age 14+) selected at random from schools of Patiala between 11 to 15 years of age. r was found to be insignificant in case of 11 items, so the same were dropped. Only 38 items were retained and the same constituted the test.

Reliability:

Three methods were tried to determine the reliability of test. Reliability of test was found 0.697 by split half method. Reliability of the test for boys was found 0.795 and for girls 0.807 by test retest method.

Validity:

Three types of validities – Content, Criterion and Construct were established. The items of the test were selected on the basis of the pooled judgement of nearly 40 judges (experts) in the field of testing. This sufficed for content validity. For criterion validity on the basis of considered judgement of class teacher, twenty students, ten low on achievement motivation and ten high on Academic Achievement Motivation were administered, the test under standardization. Significant differences were found in the mean – test score of two groups. As mentioned previously each item was correlated with total test and items showing not significant were deleted from the test. This establishes the construct validity of the test.

The values of SK and KU are given below:

SK a) Boys =0.4315  
   b) Girls =0.41889
KU a) Boys =0.2280  
   b) Girls =0.3612
This shows that scores are nearly normally distributed. It has been found through analysis of variance method of multiple comparisons that the groups of boys as well as girls differ significantly from one another at .01 level confidence.

**Administration:**

The test is administered to the group of at least 40 children at a time. The subjects have to be seated separately that they are not tempted to consult one another or copy responses. The directions given on the booklet are read out to them. The sheets are distributed to them. Two samples provided in the test booklets are explained to the child.

**Scoring:**

One mark is awarded if box A has been ticked in case of items no.1,3,4,6,8,10,12,13,15,16,17,18,21,25,27,31,35, 36 and 37 and if box B has been ticked in cases 2, 5, 7, 9, 11, 14, 19, 20, 22, 23, 24, 26, 28, 29, 30, 32, 33, 34 and 38.

**3. Attitude towards Mathematics Scale (Gakhar and Rajni)**

For preparing Attitude towards Mathematics Scale, first step was to identify the different situations in the classroom environment wherein variations in the students ‘mathematical attitude was possible. Secondly, it was also essential to define the term attitude.

For the purpose of standardization of this scale, Thurstone’s (1946) definition of attitude was taken, Thurstone defines an attitude as the degree of positive or negative affect associated with some psychological objects (i.e. any instruction, ideal, symbol, phrase, idea towards people can differ with respect to positive or negative effect). The concept attitude according to him denotes the sum total of a man’s inclinations and feelings, prejudices, bias, pre-conceived notions, ideas, tears, threats and convictions about any specific topic. In other words attitude is a personal disposition which impels an
individual to react an object, situation or proposition in favourable or unfavourable ways.

Eight components were identified on the basis of researchers own experience, discussion with subject experts and other researchers. In the beginning 106 statements were prepared under eight components and were shown to five subject experts to avoid vagueness in the language and to get their opinion and criticism regarding the nature and difficulty of the statements. On the basis of their opinion 21 statements were deleted and in this way 85 statements were left.

For the purpose of standardization of this scale,” Method of Equal Appearing Intervals” devised by Thurstone and Chave (1929) was employed. For each statement the attitude coninum extended from Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) to Strongly Disagree (SD)

The preliminary draft comprising of 85 statements was given to a small group of students (N=10) for further modification and to see the difficulty level of the statement. On the basis of opinion of this small group further statements were deleted and now only 73 statements were left for final tryout of the scale. Component- wise distribution of these 73 statements has been shown in the following table.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Components</th>
<th>Number of Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wider Applicability</td>
<td>19</td>
</tr>
<tr>
<td>2</td>
<td>Development of Skills</td>
<td>08</td>
</tr>
<tr>
<td>3</td>
<td>Reasoning</td>
<td>06</td>
</tr>
<tr>
<td>4</td>
<td>Objectivity</td>
<td>08</td>
</tr>
<tr>
<td>5</td>
<td>Intellectual Development</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>Non-intellectual development</td>
<td>09</td>
</tr>
<tr>
<td>7</td>
<td>Individual Outlook</td>
<td>09</td>
</tr>
<tr>
<td>8</td>
<td>Universal Outlook</td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>73</td>
</tr>
</tbody>
</table>
**Final Tryout:**

73 statements were arranged and photo stated. These were given to 240 students of 10+1 class and they were told to give their response on a five point scale on a continuum according to degree of favourable or unfavourableness of each statement.

**Item Analysis:**

For selection of statements for final scale-value $\{Q3-Q1/2\}$ and median (or scale value) for each statement were computed and compared. The statements for the final scale were selected on the basis of Q and median (or scale values) so that the statements should be fairly and evenly spread on the scale continuum and Q-values of the selected items were ranging between 0.5 to 2.00 as per Vernon(1962). In this way median or scale values were indicative of the spread of the statements on the scale continuum and Q or inter-quartile range was the measure of the spread of the middle 50% of the judgements. As Thurstone and Chave (1929) regarded large Q-value as an indication that a statement is ambiguous, therefore, statement having Q-value more than 2.00 were rejected. In this way 27 statements were dropped. Thus Attitude towards Mathematics Scale in its final form comprised of 46 statements.

**Reliability of the Scale:**

The reliability of the scale was obtained by split-half method. In order to make the two forms truly parallel, all the statements of the scale were arranged in rank order according to the scale values. Successive pairs were then marked off. Reliability of the scale was found to be .78.

**Validity of the Scale:**

For finding the validity of the scale the scores of the attitude scale were compared to the actual behaviour of the students which were nearly comparable.
Scoring Procedure:

The five points were quantified by giving score ranging from 1 for strongly disagree to 5 for strongly agree for positive statements. The other categories of response such as disagree, undecided, agree were given 2, 3 and 4 scores. The procedure of scoring for negative statements were given scores of 1, 2, 3, 4 and 5 for strongly agree, agree, undecided, disagree and strongly disagree respectively. For each statement response of the statement was multiplicable by the scale value of the statement. Total of the scores of all statements will be the total scores on Attitude towards Mathematics Scale.

4. Socio-Economic Status Scale

Socio-economic status of the low achievers in mathematics was studied by using Meenakshi’s socio-economic status scale. This scale is comprehensive in nature and does not discriminate between rural/urban students of classes VIII through XII. It has been standardized on the sample of 1127 students of classes VIII to XII. On 153 boys of class XI in a Senior Secondary School, the test-retest reliability has been found to be r=.82 with a time interval of ten days.

Validity:

Two samples of N1=37 and N2=42 of the students respectively of a reputed public school and ordinary government school were taken to have an idea of the validity of the scale. The average scores were found to be 116.8 and 54.8 with SD’s 35.9 and 20.1 and differentiating t standing at 9.29 was significant at 0.01.

Administration of the Tool and Scoring:

The printed scale was given to the students in groups of 15 to 20 and the purpose of the instrument was explained. They were asked to put a tick mark against the statements which fit them a (x) marks which did not fit them. For scoring weight age on each item is shown below, part wise.
Part-I (Education)

From this part student is asked to tick the highest class up to which he/she or members of his/her family have studied i.e. educational qualification of his/her and each member of the family.

Part-II (Profession)

From this part the student is asked to tick the category of profession of his/her family members.

Part-III (Monthly Income)

The student is asked to tick the total monthly income of his/her family from salaries, business, agricultural land or other sources of income.

Part-IV

There are three columns in this section. In this part the student has to tick the total wealth in cash or debts.

Part-V

Here the student has to give the record of his/her property like number of houses, type of house, agricultural land or plot and number of rooms, etc.

Part-VI

In this part the student has to describe about his surroundings or locality, number of scooters or cars, usable items in house.

Part VII

In this part the student has to opt his/her social status

<table>
<thead>
<tr>
<th>Category of Socio-Economic Status</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>105 or above</td>
</tr>
<tr>
<td>Above average</td>
<td>Between 90-104</td>
</tr>
<tr>
<td>Average</td>
<td>Between 65-89</td>
</tr>
<tr>
<td>Below Average</td>
<td>Between 50-64</td>
</tr>
<tr>
<td>Poor</td>
<td>49 or below</td>
</tr>
</tbody>
</table>
5. Checklist of Causes

The investigator herself prepared a checklist of perceptions about causes of low achievement in mathematics at secondary stage. The perceptions of low achievers in mathematics as well as their teachers of mathematics and parents of low achievers have been taken. Three areas of related causes have been taken.

1. Personal Factors
2. Factors related to School
3. Factors related to Family

(a) Personal Factors:

Personal factors perceived by students, teachers and parents behind the low achievement in mathematics are intelligence, academic achievement motivation, lack of confidence, lack of practice in mathematics, inferiority complex and hesitation in asking questions from teacher, maintenance of a distance from mathematics assuming mathematics a difficult subject, lack of readiness to understand concepts of mathematics, carelessness on the part of student, lack of interest in mathematics, poor performance in prior classes, lack of concentration and bad handwriting.

(b) Factors Related to Home Environment:

The family is the primary socializing agent of which a child is a member since it is in the family the child is born. One may rightly say that the family is the informal socializing agent since all its members are blood relations. It is clear that families differ vastly in terms of their significance in social order as some have more prestige, dignity, money and power than others. Research studies of Ajala & Iyiola (1988) have indicated that children from nuclear families perform better in school than children from the compound or polygamous families. The children have more time for their studies in most cases because there are less people to send them on errands. The larger the
family the less the attention and devotion of each child by the parents and the more the difficulties encountered by the parents in meeting the needs of the children both physically and emotionally particularly in this austerity period when the prices of food and commodities are skyrocketed. The position a child occupies in a family equally plays a significant role in his development and academic achievement. Family Educational Background and Socio-Economic Status are lumped together because they are related and one may rightly say that they are married and hence should not be ‘divorced’. Wealth is strongly correlated with education and occupation and when socio-economic status is measured these other factors are usually included.

The second cause perceived by low achievers, teachers and parents is causes related to family like lack of proper guidance at home, lack of proper time to study mathematics properly due to assistance given to family i.e. helping parents in looking after business, home or agriculture, lack of proper atmosphere at home due to the poverty of home, shortage of facilities at home, non-availability of extra tuitions, poor base of mathematics because of insisting parents to promote the child in next class in spite of poor performance in mathematics, inferiority complex due to the poverty of home, ignorance of parents and lack of awareness of the importance of mathematics by parents and lack of necessary articles in learning mathematics.

(c) Factors Related to School Environment:

The importance of these to a successful academic achievement cannot be overemphasized. Healthy interpersonal relationship among the personnel in the school setting will help to promote conducive environment for teaching-learning situation. The healthy relationships will attract and sustain the academic interest of the learners.

Osokoye (1996) sees teaching method as the strategy or plan that outlines the approach that teachers intend to take in order to achieve the desirable objectives. It involves the way teachers organize
and use techniques of subject matter, teaching tools and teaching materials to meet teaching objectives. Sometimes when a teacher teaches and at the end of the lesson, evaluation is carried out and it is discovered that students are unable to carry out the behavioural or instructional objectives what the teacher needs to do is to examine his teaching methods rather than looking at students as the causes. Most untrained teachers point accusing fingers on students rather than on themselves when the students are unable to carry out the expected behaviour at the end of the lesson or in examinations. Adequate well prepared instructional materials determine the amount of learning that can be placed in a learning setting. Good quality materials can motivate interest, maintain concentration and make learning more meaningful. The need for the use of instructional materials by the subject teacher in the modern age cannot be overemphasized; the traditional method of talk and chalk approach can no longer improve the performance of students in secondary schools academically. The unconducive atmosphere of our secondary schools’ learning environment also contributes to the poor academic performance of students. The problems of too large population of students in classroom do not create a good condition for learning which can lead to poor academic performance of students.

The third area is connected to causes related to school of the student such as lack of interesting methods to teach mathematics at school and lack of laboratory, lack of interest of teacher in mathematics, lack of inductive approach, difficult and whole syllabus to be done by all students even by the weak students, lack of proper time due to the official duties dine by the teachers, lack of proper checking of notebooks and tests, trend of copying in the school and lack of individual attention given to the weak students in mathematics.
Procedure of Construction of Check List

To frame check list of the causes of low achievement in mathematics, the investigator personally visited twenty five teachers of mathematics, twenty five parents and five school principals to find out the possible causes behind the low achievement in mathematics. Even the low achievers in mathematics were interviewed for their perceptions for low achievement in mathematics. The causes were listed in three areas related to the causes of low achievement in mathematics as suggested by teachers of mathematics, parents, principals as well as the students who were low achievers in mathematics. In each area there were about 15 to 20 causes. But only those causes to which all the judges agreed were retained and others were deleted from the list. The final check list has ten items in each area. The test has not been standardised.

Administration and Scoring:

The students who were low achievers in mathematics, the parents of low achievers in mathematics and the teachers of mathematics who have taught the low achievers in mathematics were asked to give their opinions on all the 30 causes of low achievement in mathematics on 5 point scale, i.e. Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree.

There was not any time limit given to fill the checklist but usually they filled nearly in 10 minutes. The opinions were given weight age as given below: Scoring: 5 to Strongly Agree, 4 to Agree, 3 to Undecided, 2 to Disagree and 1 to Strongly Disagree.

Validity:

The questionnaire has only face validity. All the items were shown to nearly 30 judges in the field of education and all pertained to the causes behind the low achievement in mathematics. Only those items were kept on which all the judges were completely agreed.
3.9 PROCEDURE

For the present study, descriptive survey method was employed. Data was collected for variables like intelligence, achievement motivation, attitude towards mathematics and socio-economic status. Standardized tests were administered to 354 low achievers in mathematics. From the gazette and internet the result of final examination of matriculation was scrutinized and the low achievers were found in different government and private schools of three districts (Sangrur, Mansa and Faridkot) of Malwa. The low achievers (male and female) were chosen from rural and urban areas of three districts.

The instructions and directions given in each manual were strictly followed. The scoring procedure was carried out as directed by the author of the tests.

For finding the causes behind the low achievement in mathematics as perceived by the low achievers in mathematics, their parents as well as their teachers of mathematics, a checklist was prepared. The checklist was administered to each low achiever of the sample and the parents and teachers of mathematics of the low achievers of the sample.

The data were recorded in tabular form for statistical analysis according to the objectives of the investigation. The analysed data was given a statistical treatment for discussion, results interpretation and conclusions.

Means, medians, standard deviations, skewness, kurtosis of all variables i.e. intelligence, achievement motivation, attitude towards mathematics and socio-economic status were calculated.

$t$-test was used to find significance of the difference between the male and female, rural and urban and government and private students who are low achievers in mathematics. The obtained results were tabulated for discussion, interpretation and conclusion in the chapter that follows.