CHAPTER III

* PLAN AND PROCEDURE
A. STATEMENT OF THE PROBLEM

A STUDY OF UNDER-ACHIEVEMENT IN MATHEMATICS AT THE SECONDARY SCHOOL LEVEL.

B. EXPLANATION OF THE TERMS USED IN THE STUDY.

Under-and Over-Achievers, defined by the investigator.

The Under-and Over-Achievers were differentiated on the basis of the difference in their respective abilities & scores i.e. Intelligence and achievement scores.

1. The marks obtained in the subject of mathematics at the class-VIII Board Examination is taken as index of mathematics Achievement (IMA) and test of Achievement in mathematics (TAM)- An objective test constructed especially study was administrated.

2. Intelligence quotient (IQ) were obtained by the Group test of General mental Ability test. (JGTMA).

a. UNDER-ACHIEVERS - The Under-Achievers were taken to be those who were +1 S.D above the class-mean on the intelligence test score and -1SD below the class mean in their achievement score.

b. OVER-ACHIEVERS - The Over Achievers are taken to be those who were just in the reverse category -1SD.
below the class mean in intelligence and +1SD above the class mean on achievement score.

2. MATHEMATICS: The course study presented in the syllabus for the class-VIII recognised by Madhya Pradesh Education Board for the year 1992-93 was considered for the study. Syllabus contains mainly Arithmetics, Geometry, Algebra, and Statistics.

3. THE SECONDARY SCHOOL LEVEL: In the state of Madhya Pradesh Government has demarcated IXth and Xth Classes as the secondary school level. For the present study investigator has taken IX th class students as the representative of the population for the present study.

IXth standard being the 1st class of the secondary stage is important for the course of study presented upto 10th standard is of general education i.e. it includes all subject including science, mathematics and Humanities as compulsory for all. At this stage only we are confined with the problem of failures and dropout if efforts are made to tackle the causes of Under-Achievers, the loss of otherwise average and above average students who by reasons of their intelligence and Attitude, fail back to the class Under-achievers. Since they score below average marks in mathematics. Such population of students in
our secondary schools is growing large and need is to check it. It remedial and corrective educational practices are introduced the number can be reduced and Under-achievement in mathematics in particular can be eliminated.

C. OBJECTIVES OF THE STUDY

The following objectives were formulated for the present study.

1. To compare the mean score obtained over-and under-achievers in mathematics in there -
   - Attitude &
   - Socio-Economic-status (SES)
   In respect to subgroups.

2. To compare the mean score obtained in over-and Under-achievers in a. Social and b. Economic factors among -
   - Sex
   - Caste &
   - Place of residence. (locale)

3. To determine whether significant group differences exists in Achievement in mathematics among-
   - Sex
   - Caste &
   - Place of residence
4. To determine whether significant group differences exists in Achievement, Attitude and SES of Rural and Urban students among -
   - Sc & Nsc - Boys
   - Sc & Nsc - Girls

5. To determine whether significant group difference exists in a. Social and b. Economic factors of Rural and Urban students among -
   a. Sc & Nsc - Boys
   b. Sc & Nsc - Girls

6. To find out the extent of relationship between over-and Under-achievers in their variables -
   - Attitude &
   - SES.

7. To find out the extent of relationship between the seven areas of SES with Achievement in mathematics of the over-and Under-achievers among -
   - Sex
   - Caste &
   - Place of residence

D. VARIABLES: The investigator takes into consideration of the following variables.

a. Dependent variable
   - Achievement
b. Independent variables
   - Attitude towards mathematics &
   - Socio-Economic status (SES)

c. Dichomatic
   Intelligence (To Classified the groups like over-average-and Under-achievers).

E. DIFFERENT-SUBGROUPS
   a. Sex - Boys and Girls
   b. Place of residence - Rural & Urban.
      Rural - School located in Janpad Area.
      Urban - School located in Tahsil & Distric place.
   c. Caste - Sc & Nsc.
      Sc  - Scheduled caste
      Nsc - Non scheduled caste.
      Verified by their certificates.

G. HYPOTHESES:

   The following null hypotheses were set up for verification.

1. Over-and Under-achievers in Mathematics do not differ significantly in their
   - Attitude &
   - SES.

   In respect of subgroups.

- Sex
- Caste &
- Place of residence.

3. There is no significant group difference exists in achievement in mathematics among -

- Sex
- Caste &
- Place of residence.

4. There is no significant group difference exists in Achievement, Attitude and SES of Rural and Urban students among -

a. Sc & Nsc - Boys
b. Sc & Nsc - Girls.

5. There is no whether significant group difference exists in a. Social and b. Economic factors of Rural and Urban students among -

a. Sc & Nsc - Boys
b. Sc & Nsc - Girls.

6. There is no relationship exist between over-and Under-achievers in their variables -
- Attitude &
- SES.

7. There is no significant relationship between each of the seven areas of SES with Achievement in mathematics of the over-and Under-achievers among -
- Sex
- Caste &
- Place of residence.

**SCOPE OF THE PROBLEM:**

The study has vast scope as it envisages to identify the extent and nature of certain factors, which interact in the under achievement in mathematics. The study takes the population of students (Boys and Girls) of rural and urban areas of different socio-economic status. The students taken for investigation is of IX class. This is the vital class for the students, the beginning of secondary stage. At this stage only children are trying to develop their future lines and the courses of the study they know of their self preparation and self esteem the vital psychological ingredients for future personality development. Sprout at age the study has concerned nearly all the schools of Sagar district.
For the study two tools, have been developed named: Test of Achievement in Mathematics (TAM), (An objective test) and A-Scale of Measuring Attitude towards Mathematics (AM). Both these scales have been standardised. There have been lack of good scales covering the present curricular requirements and conceptual objectives. The scales have been prepared in Hindi and are made easy to use. There are of Universal type which can be administered to IX class students, irrespective of sex, locality and socio-economic status.

The study takes into consideration Achievement in mathematics according to the syllabus of the Madhya Pradesh secondary Board of education. It confined itself to the standard and norms. Norms and objectives as envisaged in the syllabi.

DELIMITATIONS OF THE STUDY

1. The study is confined to Sagar district only.

2. The study confines itself to the student population of IXth class.

3. The study has taken the secondary schools where the (M.P.E.B.) syllabus is followed.
4. The study is confined to the students population who are under and over-achievers in mathematics (the normal achievers had been excluded.)

5. Students not well conversant with Hindi will not included in the sample.

6. As per the limitations of the tests used not more than 30 students were selected for the study, whose age was 11 to 16 years.

7. Sample of the study was randomly selected.

METHOD OF THE STUDY

- The study is based on Normalitve survey method.

The term normative survey is known as descriptive, normative survey and status or trend study. Gulford (1956), reiterates this concern:

All the terms suggest the gathering of evidence relating to current conditions on the basis of observations under normal field conditions.

This method has potential of combining qualitative and quantitative data coherently and affords studies at various degree of complexity and amenable to statistical interpretation of that (Best, 1959).
CHOICE OF THE SUITABLE TOOLS

The selection of proper tools is the very important and an onerous task in the research field. Investigator has studied the present topic. **A STUDY OF UNDER-ACHIEVEMENT IN MATHEMATICS AT THE SECONDARY SCHOOL LEVEL.** With the deep interest of finding the factors and extend of causing of the under-achievers in mathematics. Investigator has gone through the literature and tools used in various studies. For the present study investigator selected the tools used very carefully with the discussion of some experts.

Tools were discussed and finalised. Investigator has prepared two tools details discussed in chapter - III. Which were more reliable to the present study at the particular area and period following tools were constructed and standarized:

1. Test of Achievement in Mathematics. (TAM)
2. A scale of Measuring Attitude towards Mathematics. (MAM)

As Both the tools were administered at the same population where study was carried and recently prepared tools which was one of the great contribution of the present study.

To clarified the objectives and testing null-hypotheses investigator has selected another two tools as follows.
SELECTION OF THE GROUP TEST OF GENERAL MENTAL ABILITY -
S. Jalota.

To select the appropriate tool, the investigator has studied following tools -
- General mental ability Test
  - R.P. Srivastava and Kiran Suksena.
- Group Test of Intelligence (PGTI)
  - G.C. Ahuja
- Group Test of Intelligence.
  - R.K. Jadon
- Mixed type Group Test of Intelligence.
  - P.N. Mehrotra
- Group test of General Mental ability 1972 (GAMT) -
  Hindi.
  - S. Jalota

The investigator scanned and scrutinized above tests. Some tests having the problems of ranging period. Medium of administration. Some tests were verbal and nonverbal.

Group test of General mental ability 1972 (GAMT) Hindi version was selected for the study. As the test was administered at Sagar district's population. Original test in Hindi Medium. Ranging of the children age 11 to 16 years.
Secondly the test having seven elements i.e. Similars, opposites, Number-series, Classification, Best-Answer, Inference and Analogies out of these two are numerical and reasoning and other having verbal structure. Reliability of the test is .88 which was seen by the investigator with the help of 200 students of the Sagar district. It was found .87 which was very near to the standardized scale's reliability (.88).

**SELECTION OF SOCIO-ECONOMIC STATUS SCALE:**

Investigator has studied different scales available mainly. Kupasawmii's, Kulshrestha's, Pareek and Trivedi's, Jalota's et.al. Srivastava's etc. Investigator has choice the scale Socio-Economic Status Scale by Rajeev Bhardwaj. A test has been administered in both urban and rural areas at Hindi medium population. The most important choice of the test was. It has two separate score of Economic and Status defined as the complete Socio-Economic Status and the seven factors mentioned in Table : 3.1. was main attraction for the selection of test. As various investigator were pointed out the affecting factors of the achievement of pupils were mostly out of these seven factors.
TOOL USED.

1. Index of Mathematics Achievement (IMA). Based on
   the previous achievement in the mathematics
   subject. The marks obtained in the subject of
   mathematics at the annual examination of class
   VIII th. is considered as the index of
   mathematics achievement.

2. Test of Achievement in Mathematics (TAM)-An
   objective test constructed for the study. After
   standardization the test was administered. The
   chapter IV has been assigned to the planning and
   preparation of the test.

3. The group test of general mental ability (1972)
   (TGTMA) 11 to 16 year by S. Jalota.

4. A scale of measuring attitude towards Mathematics
   (MAT). Test constructed and standardized by
   investigator. The chapter IV has been assigned
   to the planning, and preparation of the test.

5. Socio-Economic status scale (SESS) by- Rajeev
   Bhardwaj.

Following table 3.1 showing the reliability
of the test of different areas of SES.
TABLE 3.1

The reliability of the test

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Factors</th>
<th>Coefficient correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Family</td>
<td>.72</td>
</tr>
<tr>
<td>2</td>
<td>Social</td>
<td>.68</td>
</tr>
<tr>
<td>3</td>
<td>Education</td>
<td>.82</td>
</tr>
<tr>
<td>4</td>
<td>Profession</td>
<td>.76</td>
</tr>
<tr>
<td>5</td>
<td>Caste</td>
<td>.93</td>
</tr>
<tr>
<td>6</td>
<td>Total assets</td>
<td>.67</td>
</tr>
<tr>
<td>7</td>
<td>Monthly income</td>
<td>.73</td>
</tr>
<tr>
<td>8</td>
<td>Scale (as a whole)</td>
<td>.75</td>
</tr>
</tbody>
</table>

Statistical measurement:

1. *-test
2. Correlation (r)
POPULATION AND SAMPLE

The selection of an adequate sample from the universe is an essential and important step in the conduct of a research. Since it is difficult to make a study on the whole population, it seemed convenient to select a sample from the population with the application and use of appropriate statistical technique.

A sample selected from the population should be the representative of the whole population and should possess almost all the characteristics. If not so the results obtained from the sample cannot be validly generalised. This selection of an adequate and representative sample is essential for obtaining valid and variable results. The proper sampling technique enhances the quality of dependability of the obtaining results.

The selection of an appropriate sample totally depends upon the needs and aims of the study. Besides, there were other factors also which affect the sample. Selection and which should be kept in mind before its selection, there factors in a nut-shell are (i) economical in result of time, energy & availability (ii) time limitation of the research (iii) size and knowledge of the population (iv) Tools availability required for the study (v) The
generalizability. To be praise to selection of an appropriate sample depends mainly on the objectives of the research from the stand point of generalizability for the whole universe or far a particular population. Random sampling is considered to be the best, due to the fact that in this type of sampling each element of the population has an equal change of being selected and there remains no bias in the selection of the element of population result based on such type of sampling can therefore be said to be valid for the whole population or universe.

In according with the objectives and hypotheses of the study the selection of sample through stratified random sampling procedure was considered to be appropriate for the present-investigation

Population of the present study

Investigator has registered his topic at Sagar university and familiar the locality and results particularly of mathematics. So for the study investigator choose as the population in schools' of Sagar district at the IX class students for the study of radomly selection were done. 19 school-rural and 17 school-urban areas with different socio-economic group were selected for the required sample.
Homogenous selection were kept for locale, sex and caste: following table gives the picture of schools with particular of students.

**TABLE : 3.2**

**DISTRIBUTION OF THE POPULATION.**

<table>
<thead>
<tr>
<th>Locality of School</th>
<th>Boys Sc</th>
<th>Boys Nsc</th>
<th>Girls Sc</th>
<th>Girls Nsc</th>
<th>Total No. of School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>126</td>
<td>126</td>
<td>126</td>
<td>126</td>
<td>19</td>
</tr>
<tr>
<td>Urban</td>
<td>126</td>
<td>126</td>
<td>126</td>
<td>126</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>252</td>
<td>252</td>
<td>252</td>
<td>252</td>
<td>36</td>
</tr>
</tbody>
</table>

List of the schools conducted for the study enclosed in Appendix - I.

Location of the selected school in Sagar district is mentioned in the Map of Sagar district. The enclosed map of Sagar district Figure 3.a showing location of the selected schools.

Keeping in the view of limitation for the administration of the test was minimum 30 students of each class. Investigator was selected total number of schools 36 for the population 1008 student homogenous
MAP SHOWING LOCATION OF THE SCHOOLS IN SAGAR DISTRICTS

( ) - SAGAR, ( ) - URBAN, ( ) - RURAL

FIGURE 3.a.
selection were considered. As some schools were not fulfilled 30 students. Therefore in some schools 20 to 30 students were selected for the required population but investigator was highly concentrated at the equal proportion of locale, sex and caste. Following chart showing the required population.

FLOW CHART: 3.3

DISTRIBUTION OF POPULATION

<table>
<thead>
<tr>
<th>POPULATION (1008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
</tr>
<tr>
<td>504</td>
</tr>
<tr>
<td>Urban</td>
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<td>504</td>
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<table>
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<th></th>
<th>Boys</th>
<th>Girls</th>
<th>Boys</th>
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<td>126</td>
<td>126</td>
</tr>
</tbody>
</table>

**Sample**: The selected students of the IX class of Hindi medium school. Between the age group 11 to 16 years of Rural-Urban, Boys-Grils and Sc-Nsc. Were obtained by the measurements of the tools TAM and IQ test. The group was treated as under-and over-achievers details discussed under the head of
Phase - I - Selection of Under-and-over-Achievers of this chapter.

Total number of sample required for the study were 992 details mentioned in Table 5.7 Under the head number of Under-Average and Over-Achievers.