CHAPTER III

METHODOLOGY
CHAPTER III  
METHODOLOGY

This chapter gives a detailed account of the research design followed in the study. It gives an idea of the structure and strategy that control the investigation. It provides an overview of the operational characteristic like population, sample, instrumentation, procedure of data collection and decisions taken regarding the analysis of data.

3.1 Population

In the city of Aurangabad, there are many colleges, which had the provision for the teaching of Arts and Science (both the courses), at undergraduate level. Students studying in the arts and science sections of the first year class in these colleges constituted the population for this study. This distribution of the population gender-wise and curriculum-wise in these colleges of Aurangabad City has been shown in Table 3.1.

Table 3.1  Gender-wise and Curriculum-wise Distribution of the population.

<table>
<thead>
<tr>
<th>TABLE 3.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURRICULUM</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>Boys</td>
</tr>
<tr>
<td>Girls</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
3.2 Sample

To make the study scientific, effective and reliable, as also to minimize sampling errors, the requirement was for an adequate and representative sample. Girls in the arts and science stream were in the ratio of 1:1, maintaining this proportionality in the two streams, it was decided to draw 20% students from each of the four groups to constitute the sample for this study.

**TABLE 3.2 Gender-wise and Curriculum-wise Distribution of the sample.**

<table>
<thead>
<tr>
<th>CURRICULUM</th>
<th>Gender</th>
<th>Arts</th>
<th>Science</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>120</td>
<td>120</td>
<td></td>
<td>240</td>
</tr>
<tr>
<td>Girls</td>
<td>120</td>
<td>120</td>
<td></td>
<td>240</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>240</td>
<td></td>
<td>480</td>
</tr>
</tbody>
</table>

The size of the sample, thus, arrived at was 480 Boys and Girls of first year class in the arts and science streams.

3.3 Final Sample

Since intelligence is an important correlate of achievement and research evidence confirms its role, an effort has been made to obtain a homogenous sample by conducting study on students of average intelligence only. The students in the two curriculum constituting the
sample were administered the Raven's Standard Progressive Matrices. Subjects whose scores on this test lie in between 25th and 75th Percentile (Grade III), were considered to be of average intelligence. The effective sample thus consisted of these 'Average' students only. Rest of the students were screened out from the study. Thus 68 Boys and Girls had to be left out of the study.

The effective sample thus comprised of 412 students belonging to average intelligence (Table 3.4) drawn from a population of 2400 students using the random proportionate sampling techniques.

Table 3.3 Gender-wise and Curriculum-wise distribution of Effective Sample.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Arts</th>
<th>Science</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>103</td>
<td>103</td>
<td>206</td>
</tr>
<tr>
<td>Girls</td>
<td>103</td>
<td>103</td>
<td>206</td>
</tr>
<tr>
<td>Total</td>
<td>206</td>
<td>206</td>
<td>412</td>
</tr>
</tbody>
</table>

3.4 Tools used for data collection:

In order to attain the objectives of this study and test the hypotheses proposed, following measuring instruments were used:

1) Standard Progressive Matrices (J.C.Raven).


4) W – A Self- Analysis Form (D.Sinha)

5) Aggregate marks of SSC and HSC Examinations as a measure of Academic Achievement.

The guidelines and criteria for the selection of these tools were:

1) The relevance of tools to the objectives of this study;
2) The availability of the tools;
3) The reliability and validity of the tools;
4) The time needed to administer them;
5) Standardization of the tools;
6) Their usability on the sample taken up for the present study.

3.5 Description of the Tools used.

1) Standard Progressive Matrices (SPM)

SPM, developed in Great Britain by J.C.Raven, was designed as a measure of Spearman’s ‘g’ factor. It consists of 60 matrices or designs, from each of which a part has been removed. The examinee chooses the missing insert from six or eight given alternatives. The items are grouped into five series, each containing 12 matrices of increasing
difficulty but similar in principle. The earlier series require accuracy of
discrimination, the later, more difficult series involve analogies,
permutation and alternation of pattern, and other logical relations. The
test is administered with no time limit and can be given individually or in
small groups.

SPM was designed to cover the widest possible range of
mental ability and to be equally useful with persons of all ages, whatever
their education, nationality or physical condition. A person’s total score
provides an index of his intellectual capacity. The scale may be described
as a test of observation and clear thinking.

Reliability

Raven(1958) reported the retest reliability varying with age
from .83 to .93. Sinha (1950,1951) obtained a reliability coefficient of
.90. Dolke (1976) reported that the test retest reliability at one and half
months interval was .83; internal consistency reliability computed by K-R
formula was .67 and the odd- even reliability using Spearman-Brown
formula was .73

Validity

SPM correlated .86 with Terman-Merril Scale, and found to
have a ‘g’ saturation of .82 (Raven,1958). Sinha(1950) reported a validity
coefficient of .54. Bureau of psychology (1958) reported a validity
coefficient of .53 with the Terman-Merril Scale and .53 with General
Intelligence Test (verbal).
2) Sentence Completion Test (SCT)

The Sentence Completion Test (SCT) known as Forced Choice Test of Achievement Motivation, was used to measure verbalized need for achievement. It was developed by Dr. B.N. Mukherjee (1965). However, unlike the Thematic Apperception Test (TAT) designed by McClelland and his co-workers (1953), in which achievement motivation is measured by projective techniques of eliciting achievement imagery, the SCT was developed specifically for American college students to assess their consciously recognized achievement values. Achievement value refers to a continuum which is defined by the degree of importance that an individual attaches to competence in an achievement area. Thus, a high score on SCT is interpreted as a keen desire to compete successfully with a standard of excellence, an expressed interest in undertaking difficult and challenging tasks, and a strong sense of optimism.

The test consisting 50 forced choice traits purports to measure verbalized need for achievement. Each of the 50 items consists of a main sentence which can be completed by connecting it to any one of the three alternative sentences given. An example of the type of traits included in the SCT is given below.

A. accomplishing something great.

I often think of B. helping those who are hurt or sick.

C. being respected as a leader.

Choice of a particular alternative to complete the sentences indicates need for achievement.
The SCT has been found to correlate with McClelland’s n-Ach test based on fantasy material; one of the earliest measures of need for achievement.

The Kuder-Richardson reliability Estimate for SCT has been found to be .776 for a sample of 248 Indiana University students. The test-retest reliability of SCT after an interval of nearly two months has been found in various studies conducted in India to range between .71 and .83 (Mukherjee, 1968,1969) and Botkawar (1966).

The evidence for construct validity of SCT comes from three separate studies. In one of them, it was found that subjects with high SCT scores rate themselves significantly higher for perseverance (Mukherjee 1966). Another study showed that the high score on SCT was associated with high rate of performance on a simple perceptual speed task from the second trial to the end of the practice, as predicted (Mukherjee, 1966). A third study conducted in the frame work of level of aspiration experiment offered additional support for the validity of SCT as a measure of n-Ach (Mukherjee, 1968).

An individual’s score on the SCT is the number of times he has chosen a statement dealing with any one of the following aspects of achievement orientation;

a) hope of success b) fear of failure c) high standard of excellence d) sense of competition e) optimism f) perseverance g) concern for creative work h) preference for difficult and challenging tasks i) interest in making future plans j) identification with a successful authority.
The SCT which is self-administering may be given either individually or to a large group. Complete directions are printed on the cover page of the text booklet. There is no time limit. It has been found that it usually takes approximately 25 minutes to complete the test.

The SCT is scored by totaling the number of achievement related items that have been encircled in the keyed direction. Each triad has one achievement related item. The individual score is obtained by comparing his answer sheet with key and giving one point for each achievement-related item that is encircled. There is no partial credit or penalty for endorsing other items of the triad. The maximum possible score is therefore, 50. Although configural scoring of the SCT has some distinct advantages (Mukherjee 1964), the present system of its scoring is still of the conventional form since it does not allow for any credit of the entire configuration shown by the S in responding to a particular triad.

The usual procedure of classifying an individual as high or low on the SCT is to obtain the median of the group and classify those as above the median as high in n-Ach and those below the median as low in n-Ach.

A high score in SCT is interpreted as a keen desire to complete successfully with a standard of excellence, an expressed interest in undertaking strong and difficult tasks, and a strong sense of optimism. Thus, the higher the score the subject gets on this test, the more achievement oriented he is.
3) Locus of control scale.

This scale constructed and standardized by J.B. Rotter (1966) consists of 23 forced choice Internal-External items along with 6 filler items which help in disguising the nature of the scale. It is concerned with the differing expectations held by the people, regarding their general capacity to exert influence on the world around them.

Locus of control scores were obtained by using Rotter’s Internal-External Locus of Control Scale. Rotter (1966) devised a questionnaire that attempts to determine the degree to which a person generally attributes responsibility to himself rather than to other factors. The questionnaire consists of 29 pairs of statements of each pair with which he more strongly agrees. One statement presents responsibility within the person’s power (“The grades I get depend on how hard I study”), the alternative statement presents responsibility outside the person’s power (“Sometimes I cannot understand how teachers arrive at the grades they give”). One point is given for each ‘external’ statement selected. Six of the items are fillers (items designed to introduce other ideas to the questionnaire so that the questionnaire is not too transparent). Filler items are not scored. Thus, the possible range of scores is from 0 to 23. It is scored in external direction i.e., the higher the score the more external is the individual.

A considerable number of studies using a wide variety of subjects, obtained reliabilities of about .70 both, for internal consistency and for test-retest reliability (Fanelli, 1977). Franklin (in Rotter 1966) factor analyzed the scores of 1000 high school students and found that all
the items correlated significantly with one general factor and this general factor accounted for 53% of the total scale variance. Rotter (1966) labeled the tendency to attribute responsibility for outcomes to oneself as generalized expectancy for internal locus of control and the tendency to attribute responsibility for outcomes to luck, fate, chance or powerful others as a generalized expectancy for external locus of control. Subjects who demonstrate the former tendency are often referred to as internal while those who demonstrate the later tendency are often referred to as external.

As mentioned earlier test-retest reliability of this test is satisfactory and the scale correlates satisfactorily which other method of assessing the same variable such as questionnaire, Likert scale, interview, assessment and ratings from a story completion technique. Discriminant validity is indicated by the low relationships with such variables as intelligence, social desirability and political liberalness.

This test has been used in many studies and the data from these studies indicate that the test-retest reliabilities co-efficient of this scale ranges from .49 to .83. Discriminant validity with social desirability scale ranges from -.16 to -.41 and with intellectual measures range from -0.01 to -0.11.

Readymade Marathi translation of this test was available as this scale has been used in many studies in Maharashtra and also in India. The Marathi version of this scale was used in the present study, for the sake of convenience and to get proper responses from the Marathi speaking sample.
The Internal-External locus of control scale devised by Rotter has been most extensively used in the locus of control research. It is probably the best test available for use with adult population, undergraduates and upper high school students.

The scale is self-administering in nature. The instructions printed in the booklet for the subject were as follows:-

"This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered 'A' or 'B'. Please select the one statement of each pair (and only one) which you most strongly agree. This is a measure of personal belief. Obviously there are no right or wrong answers. In the column, opposite each item 'A' and 'B' letters are printed. If you think statement 'A' is correct then encircle statement 'A' and if you think statement 'B' is correct then encircle 'B'. Please answer these items carefully but do not spend much time on any one item. Be sure to find answer for every item. In some instances you may discover that you agree to both the statements in such cases be sure to select the one you are more strongly agree”.

4) Sinha W-A Self-Analysis Form.

Developed and standardized by Sinha. D. in 1968, this anxiety scale was designed to elicit self-rating on items descriptive of anxiety reactions to the following areas:-
I) health, appearance and injury,
II) ambition, (success or failure in work, money and occupation)
III) family,
IV) friendship and love,
V) social relations and social approval,
VI) worries regarding the future,
VII) worries about civilization, war and virtue,
VIII) guilt and shame,
IX) physical and physiological manifestations,
X) purely psychological manifestations.

This anxiety scale consists of 100 items in positive form of ‘Yes-No’ type. There is no time limit to complete this scale, but it takes approximately 20 to 30 minutes to complete.

Reliability

The split-half reliability of this tool is .92 on 239 university students whose ages ranged between 19 to 24 years. Its test-retest reliability on 88 university students was found to be .85.

Validity

Its validity with Taylor’s Manifest Anxiety Scale was found to be .69. Hundal (1968) in a study of 200 male Punjab university
students found scores on the Sinha Anxiety Scale to correlate .72 with Taylor’s Scale, against Dutt’s Anxiety Questionnaire it was .72 and against Cattel’s IPAT Anxiety Scale, it was .70.

5) The measure of Academic Achievement

Aggregate marks obtained by the students in all subjects of the SSC and HSC examinations of Board of Secondary and Higher Secondary Education, Aurangabad were taken as a reliable measure of academic achievement of the students, Because-

I) These examinations are conducted by Maharashtra Board.

II) They are public examinations.

III) The syllabus followed is same throughout the state.

IV) Papers are set and moderated by a board of moderators. The examiners are appointed by the Board.

V) Anonymity of students is maintained through their seat numbers.

Therefore a great deal of objectivity, impartiality and concordance can be expected on the part of the examiners in the evaluation of answer books.
3.6 Data Collection

The principals of the sampled colleges were contacted and explained the purpose of collecting the required information from the students. Tentative dates and time were obtained from them to administer all the four tools.

The researcher first administered the Raven's Standard Progressive Matrices on 480 students individually or in small groups, according to the instructions given in the manual of the scale. The subjects were asked to write down the total marks obtained by them in their SSC and HSC examination. They were also asked to write their seat numbers at the bottom of their answer sheets. To cross-check these marks, the researcher tallied them from the result registers taken with the permission of the concerned authorities. Observed discrepancies in the reported marks were corrected. They were very few.

After a few days, SCT, LOC and Anxiety Scales were administered to subjects who obtained Grade III (Intellectually Average) on SPM. (N=412). They were asked to read the instructions printed on the cover page carefully and to furnish the information about them in various columns on the cover page. Then, they were requested to record their answers honestly on the test booklets. The booklets were collected from the subjects after they had checked all the items. The investigator, too, confirmed that they have answered all the items of three tests.
Scoring

After the administration of the tests was over, the scoring of all the tests was done by the investigator according to the manual instructions.

The SCT protocols were scored with the help of the key provided by author of the test, giving one point for each item if the answer of the respondent is indicative of need for achievement. The maximum score of SCT was 50, the minimum being 0.

Locus of Control Scale was scored in external direction. One point was given for each ‘external’ statement. Only 23 items were scored and remaining 6 filler items were not scored. The maximum score was 23, the minimum being 0. The higher the score, the more external the individual would be.

The scoring of Anxiety Scale was done as given by D.Sinha (1968). One mark was awarded for every ‘Yes’ and zero for ‘No’. The total of all these marks gave composite anxiety score. The higher the score, the more anxious the person would be.

3.7 Statistical Treatment of Data

The sample of the present data is divided into four groups: group I- arts – male subjects, group-II- arts-female subjects, group III – science- male subjects and group IV – science- female subjects. For every subject, there are scores on five continuous variables, n-achievement, locus of control, anxiety, SSC marks and HSC marks. The data were carefully
scruinized, separately for the four groups as well as for the entire sample, by employing frequency distributions, descriptive statistics and diverse plots to evaluate the distributions of the above variables (Norsis/ SPSS, Inc, 1988 a,c). Means, standard deviations, minimum and maximum scores are reported for n-Ach, Locus of Control, anxiety, SSC marks and HSC marks, the last two variables providing measure of academic achievement. The above statistics are reported group wise, faculty wise and gender wise as well for the entire sample.

To evaluate the faculty wise and gender wise differences in the various variables employed in this research, two-way multi-variate analysis of variance (MANOVA) has been carried out with faculty and gender as the independent variables and n-achievement, locus of control, anxiety, SSC marks and HSC marks as the dependent variables. To assess the suitability of the MANOVA in this research, the pooled within–cells correlations were computed among the dependent variables.

Multiple correlations of SSC marks and HSC marks with n-achievement, locus of control and anxiety have been calculated separately for the four groups and for the entire sample.

At the end, two multiple regression analysis have been carried out using SSC marks and HSC marks as the dependent variables.