CHAPTER III

PROCEDURE AND TECHNIQUES
CHAPTER XIII

Procedure and Techniques

The present investigation is designed to study the effects of test anxiety, self-concept (perceived self), level of aspiration and intelligence (verbal measures) on the academic achievement of Xth class both male and female subjects in different school courses.

3.1 Design of the study:

A 3x3x2x2 factorial design (Table 3.1) was used which consisted of three levels of test anxiety, high moderate and low test anxiety, as measured by Hindi Version of SaFron's Test Anxiety scale for children (TASC) developed by Brijbaw (1972), and two levels of each of the other main effects i.e. high and low self-concept, as measured by Hindi version of Pratibha Deso's (1971) Personality Word List (Rating); two levels of intelligence, high and low intelligence, as measured by Hindi version of Mundal's General Mental Ability Test (A verbal group test of intelligence); two levels of level of aspiration, high and low level of aspiration measured by Level of Aspiration Tasks (Letter cancellation task and Digit substitution task). This type of design is particularly useful in experiments involving comparisons of learning curves or of trends in training, since it permits the
use of matched groups in such studies. The design was applied to the total achievement scores as well as to different school courses. Academic achievement data consisted of marks secured in the annual Examination conducted by Himachal School Board of Education in aggregate and in four school courses i.e., Mathematics, English, Social Studies and General Science. The variables of age, grade level, residence were controlled as they have been shown to influence the pattern of relationship.

3.2 **SAMPLE**

3.2.1 **Preliminary Sample**

A sample of 600 subjects studying in 10th Class was drawn from various schools of Simla. The factors controlled in this was residence (Urban), age (i.e. 14 to 17 years), grade level (10th class) as they are important factors influencing the academic achievement of subjects. The schools selected for study were quite homogeneous, with regard to method of teaching, evaluating and socio-economic status, almost all the schools being government controlled schools population was preferred in order to get larger variability in intelligence, test anxiety, self-concept as well as level of aspiration.

3.2.2 **Final Sample**

149 subjects were rejected on the basis of their non completion of all the tests. 452 subjects for the final sample were selected on the basis of their scores on test anxiety, self-concept, intelligence and level of
3x2x2x2 FACTORIAL DESIGN

Table 3(a)
Total No. = 336

Test Anxiety
  A1
  A2
  A3

Self-concept
  S1
  S2

Intelligence
  I1
  I2

L.O.A.
  L1
  L2

In each group N = 14
aspiration tests, for the correlation, stepwise linear multiple regression analysis and factor analysis and 336 subjects were selected for the analysis of variance design, extreme groups i.e., high and low groups were formed by taking subjects scoring above and below median (Table 3b) on three tests i.e., self-concept, intelligence and level of aspiration, and the total group was divided into three test anxiety groups i.e., high (above P66), average or moderate (between P33 and P66) and low test anxiety (below 33). (Table No.3c). Thus 24 experimental group were formed. In each group there were 14 subjects (Table 3(a)).

A = Test Anxiety
A1 = High Test anxiety
A2 = Moderate test anxiety
A3 = Low test anxiety
S = Self-concept
S1 = High self-concept
S2 = Low self-concept
I = Intelligence
I1 = High intelligence
I2 = Low intelligence
L = Level of aspiration
L1 = High level of aspiration
L2 = Low level of aspiration
<table>
<thead>
<tr>
<th></th>
<th>Alphabetical Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A18111L4</td>
<td>High test anxiety, high self-concept, high intelligence and high level of aspiration.</td>
</tr>
<tr>
<td>2</td>
<td>A18111L2</td>
<td>High test anxiety, high self-concept, high intelligence and low level of aspiration.</td>
</tr>
<tr>
<td>3</td>
<td>A18121L4</td>
<td>High test anxiety, high self-concept, low intelligence and high level of aspiration.</td>
</tr>
<tr>
<td>4</td>
<td>A18121L2</td>
<td>High test anxiety, high self-concept, low intelligence and low level of aspiration.</td>
</tr>
<tr>
<td>5</td>
<td>A18211L4</td>
<td>High test anxiety, low self-concept, high intelligence, high level of aspiration.</td>
</tr>
<tr>
<td>6</td>
<td>A18211L2</td>
<td>High test anxiety, low self-concept, high intelligence, low level of aspiration.</td>
</tr>
<tr>
<td>7</td>
<td>A18221L4</td>
<td>High test anxiety, low self-concept, low intelligence and high level of aspiration.</td>
</tr>
<tr>
<td>8</td>
<td>A18221L2</td>
<td>High test anxiety, low self-concept, low intelligence and low level of aspiration.</td>
</tr>
<tr>
<td>9</td>
<td>A2811L4</td>
<td>Moderate test anxiety, high self-concept, high intelligence and high level of aspiration.</td>
</tr>
<tr>
<td>10</td>
<td>A2811L2</td>
<td>Moderate test anxiety, high self-concept, high intelligence and low level of aspiration.</td>
</tr>
<tr>
<td>11</td>
<td>A2812L4</td>
<td>Moderate test anxiety, high self-concept, low intelligence and high level of aspiration.</td>
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<tr>
<td>12</td>
<td>A2812L2</td>
<td>Moderate test anxiety, high self-concept, low intelligence and low level of aspiration.</td>
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<td></td>
<td></td>
<td></td>
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<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>13. A36211L4</td>
<td>Moderate test anxiety, low self-concept, high intelligence and high level of aspiration.</td>
<td></td>
</tr>
<tr>
<td>14. A36211L2</td>
<td>Moderate test anxiety, low self-concept, high intelligence and high level of aspiration.</td>
<td></td>
</tr>
<tr>
<td>15. A36212L4</td>
<td>Moderate test anxiety, low self-concept, low intelligence and high level of aspiration.</td>
<td></td>
</tr>
<tr>
<td>16. A36212L2</td>
<td>Moderate test anxiety, low self-concept, low intelligence and low level of aspiration.</td>
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</tr>
<tr>
<td>17. A36111L4</td>
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<td>18. A36111L2</td>
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<td>19. A36112L4</td>
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<td>22. A36211L2</td>
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<td></td>
</tr>
<tr>
<td>23. A36212L4</td>
<td>Low test anxiety, low self-concept, low intelligence and high level of aspiration.</td>
<td></td>
</tr>
</tbody>
</table>
### Table 3(a)

#### Mean, Median, S.D., and Variance for the
four variables:

<table>
<thead>
<tr>
<th>Statistics</th>
<th>T-Anxiety</th>
<th>Self-concept</th>
<th>Intelligence</th>
<th>Ldn.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>14.44</td>
<td>123.76</td>
<td>42.20</td>
<td>8.83</td>
</tr>
<tr>
<td>Median</td>
<td>14.13</td>
<td>124.50</td>
<td>42.19</td>
<td>7.30</td>
</tr>
<tr>
<td>S.D.</td>
<td>6.09</td>
<td>34.25</td>
<td>19.66</td>
<td>8.80</td>
</tr>
<tr>
<td>Variance</td>
<td>37.08</td>
<td>1172.30</td>
<td>113.66</td>
<td>77.46</td>
</tr>
</tbody>
</table>

### Table 3(c)

#### Z Value for Test-Anxiety Levels

<table>
<thead>
<tr>
<th>Test-Anxiety</th>
<th>11.45</th>
</tr>
</thead>
<tbody>
<tr>
<td>P33</td>
<td></td>
</tr>
<tr>
<td>P66</td>
<td>16.76</td>
</tr>
</tbody>
</table>
3.3 **Tools used:**

The investigation of the study was completed with the help of a number of tests for measuring all the variables included in the study. These measures are described below:

3.3.1 **Test Anxiety**

**Hindi version of Sarason's Test Anxiety Scale for Children (TASC)** developed by Nijhawan (1972) was used as the measure of test anxiety in school children. The test anxiety scale contains 30 items. The items of this scale relate to varied situations and contain an element of anticipation of dangerous or painful consequences. A 'yes' answer to a question denotes an admission of behaviour which is experienced as unpleasant and 'no' to an item denotes not admitting anxiety.

**Reliability**:

The reliability of the test anxiety scale was as calculated by Nijhawan (1972) by using the split-half and the KR-20. Richardson method is given in Table 3.3.1. It gives the reliability figures of the scale on boys and girls.

**Table 3.3.1**

<table>
<thead>
<tr>
<th></th>
<th>Split half</th>
<th>KR-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>.86</td>
<td>.89</td>
</tr>
<tr>
<td>Girls</td>
<td>.90</td>
<td>.83</td>
</tr>
<tr>
<td>Combined</td>
<td>.88</td>
<td>.83</td>
</tr>
</tbody>
</table>
Similarly, a study done by Pramod Sala on a similar sample, the reliability figures obtained were .88 (Split-half) 0.86 (K-R). These values are quite comparable to the reliabilities reported for other standardized personality inventories.

**Validity:**

Nijhawan worked out the validity of the scale. The item analysis was done by using bi-s serial correlation. The item-total correlations were computed for the combined sample. The criterion below which the correlations were to be considered of doubtful nature was arbitrarily fixed at .25. The correlations ranged from .20 to .91. Only four items (two for girls and two for boys) fell in the range of .20 to .25. These items were not eliminated as in the analysis of combined sample. The correlation values of these items were found to be above .25. Validity of the scale was also examined against the Teacher's ratings as an external criterion. Teachers' ratings were obtained in the form of an interview on the questionnaire for rating children as used by Sarson et al. This questionnaire was also item-analysed. The rating scores were dichotomized and the item-total correlation were computed. The items which had very low correlations with the total scores were eliminated. Correlations between the teachers' rating scores of 100 boys and 100 girls on the
12 questions and their anxiety scores were computed. Only one correlation out of six was not significant and one was significant at .02 level while other correlations were significant beyond .01 level. Keeping the reliability of the TASC and the bi-serial correlations in view the items of the TASC were judged as highly satisfactory.

**Administration of TASC:**

It was not possible for the investigator to administer all the tests in one sitting. So the investigation administered one test at a time. The subjects were tested in a group of 10 to 15. Group of 10 and 15 were preferred over the whole class because communication between the examiner and the examinee is an important factor in testing. It was felt that better communication between the children and investigator would yield more valid and more reliable results. The students were seated at a distance from each other on separate chairs and were provided with a pencil each.

The answer sheets of TASC were distributed to the subjects. The instructions as written on the title page of the scale (given in Appendix______) were read out as well as explained by the investigator. After being assured that all the students had followed the instructions, the questions were read to them one by one laying proper emphasis where ever required. It
was fully realized that the final value of the instruments could be ascertained only if the students properly and fully understood what was being asked of them. So the test items were read out very distinctly and very slowly and no pains were spared in making sure that each child (in a group of 15) did understand them. As each question was being understood by students they went on encircling 'Yes' or 'No' on their answer sheets while the investigator kept an eye over this. The answer sheets were collected after all the test items have been completed.

Scoring:

There are in all 30 items in TAEC expressing the different kinds of anxiety before and during the examinations. The subjects were instructed to respond according to how they generally feel by reporting the frequency that they have experienced a particular symptom of test anxiety. A 'Yes' answer denotes an admission of behaviour which is experienced as unpleasant. Adding all the 'Yes' answered items gave total test anxiety score.

3.3.2 Self-concept test-

Deo's Personality Word List-

PWL, which had been extensively used in many studies, was highly reliable and valid instrument for measuring perceived self and hence was used in the present study.
The revised PWL contains 90 words of every-day use (Appendix I). It is a self rating rather than a checklist, to be rated by the subject on five points from 'very much like' to 'not at all like this.' Out of 90 adjectives, it has 56 positive and 34 negative traits both to be scored with separate stenciled scoring keys. The self acceptance score is obtained by subtracting the tabulated negative scores from positive traits. The scores irrespective of positive and negative traits ranges from 4 to 0 along the scale from 'very much like this' to 'not at all like this'. The discrepancy scores are obtained by subtracting the score of one aspect from the other. The PWL is a quick measuring and quick scoring device. The PWL provides data for the three aspects of self viz., perceived, ideal and social self. But in the present investigation the investigator has taken only perceived self.

Reliability and validity of PWL I-

The test-re test reliability of PWL was established by Kamal Singh in 1966-67, with the time intervals ranging between 15 days and 2 months. Reliability coefficient obtained for these were in the range of .62 to .86.

The convergent validity was determined by Harbhajan Singh in 1968 on various traits in the list, which ranged from .40 to .65. The overall validity co-efficient of
PWL and SCL was .56. The discriminant validity co-efficient for the traits of PWL fell in the range of .12 to .80.

**Administration of Hindi version of PWL:**

The PWL was distributed to the subjects and were asked to fill the columns on the face page. Then the standard instructions were read out and made clear to them. They were given illustrations on black board about correct meaning of the space in front of each adjective. Difficult words were explained whenever needed. It was told that there was no time limit and no column should be left blank. It was stressed that answers should be honest so that the better results may be obtained. After instruction the subjects were asked to start answering the items serial wise. It was seen that no item was left unanswered before collecting the word list.

**Self-concept Score:**

There are 90 words in all out of these 56 were treated as showing positive qualities and 34 that of negative. Each word has been provided with 5 ratings. Scores of 4, 3, 2, 1 and 0 were assigned to the ratings from 'very much like this' to 'not at all like this.' The scores on positive and negative qualities were added separately
and the negative score was subtracted from positive score to get a final score of an individual as his self-concept score (perceived self).

3.3.3 Intelligence Test-

Hindi version of Hundal's (1972) General Ability Test (verbal test of intelligence) was used in the present study. It is a group test designed to measure the general mental ability of the Hindi-speaking students of 13 to 17 years. It consists of seven subjects of number series (NS), Analogies (An), classifications (Cl-V), Inference (In), Following directions (Fd), opposites (op), and Synonyms (Sy). In all there are one hundred items arranged spirally in ascending order. The time limit is 20 minutes. The test has been used by many investigators who have found it to be a fairly reliable and valid measure of general mental ability for school children and can satisfactorily be used for any research investigation.

Reliability and validity of CMAT.

The split-half reliability co-efficient ranges between .85 and .88 for the total test and between .43 and .84 for its subjects as reported by Singh (1966). Its test-re test reliability co-efficient for the IX class (n=175) is .71.
The validity of the test has been reported in terms of construct validity and content validity which also includes factorial validity. The factorial structures for different class group show that the contribution of the common factors, at each class level, virtually accounts for the total common variance. The Test is thus truely a measure of 'general mental ability.'

Administration of Hindi version of Mundal's Intelligence test:

For determining the mental ability of desired subjects, the Mundal's General Mental Ability test was used. The test consists of 100 items covering some items on numerical aspect, some on verbal aspect, some for similarities and dissimilarities and other for measuring the general mental ability of school going children. The test is completed in 20 minutes by an average subject, who belong to the target population.

After giving the general instructions, the subjects were asked to turn the page. The examples given in this were solved so that the subjects got familiar with the types of questions which they were going to face afterwards.
Each example was made clear. When it was certain that they are clear about what they have to do the actual performance as the test started. Exactly after 20 minutes they were asked to stop writing and their booklets cum-answer sheets were collected. No extra time was given to any student.

**Scoring of GMAT**

There is a key for scoring Hindi version of Mundal's intelligence test. There are total 100 items in the questionnaire. Every correct answered item was given one score, all the correct scores were added which gave the intelligence score of a subject. Unattempted items were treated as incorrect answers.

### 3.3.4 Level of Aspiration tasks:

To measure the level of aspiration of the subjects the investigator has used two level of aspiration tasks.

1. **Letter cancellation task:**

This task consists of 40 lines of letters of English alphabet arranged at random in each of the lines (appendix II-A-1.i) The subject has to cross out all the "a's" and "i's" by a horizontal stroke. In each line the number of a's and i's ranged from 4 to 8, making a total of 246 a's and i's on the sheet. The time limit is 60 seconds. The subject is to proceed
systematically line by line down the sheet. His score is the number of letters he crosses out within the time limit. If he leaves out any letter in a line, it will be deducted from his total scores for the trial. The score varies from 0 to 145. A few illustration from the task are given below:

```
asdimaopasditiv
goafigajiamnisa
```

Fig -3.3.4(a) Letter cancellation Task.

The letter cancellation task has often been found as a reliable and validated instrument in various situations. For example, in a study under Indian conditions, its split-half and test-re test reliability coefficients worked out to be 0.73 and 0.69 respectively and its validity coefficient in terms of its correlation with Finger-Dexterity as a level of aspiration task worked out to be 0.51 (Muthayya, 1959).

(2) Digit-Symbol Substitution task:

The sheets for digit-symbol substitution task are made up with 6 rows of digits, each row consisting of 20 digits (Appendix________). The subject has to substitute the digit by proper symbols by looking into the key given at the top of the sheet. The time limit is 60 seconds. The S's score for each trial would be the number of digits he substitutes by correct symbols within the time limit.
The correctness of symbol reproduced by the S would be determined by their gross resemblance to those provided in the key. The score range is 0 to 120. Error's if any would be deducted from the total score of each trial. A few illustrations from the task will be in order:—

\[
\begin{array}{cccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\
\wedge & \chi & \wedge & 0 & \gamma & = & \theta & \upsilon & \lambda
\end{array}
\]

\[
\begin{array}{cccccccccccc}
2 & 1 & 4 & 6 & 3 & 5 & 2 & 9 & 1 & 3 & 4 & 2 & 1 & 3 & 1 & 2 & 3 & 8 & 7 & 6
\end{array}
\]

Fig. 3.3.4(b) Digit-symbol substitution Task:—

The Digit-symbol Substitution task has also been found as a reliable and valid instrument in various institutions. For example, in the study under Indian conditions referred to before, its split-half and test-re test reliability coefficient came to be 0.49 and 0.45 respectively and its validity coefficient in terms of its correlation with Rotter's level of Aspiration Board come to be 0.51 (Muthayya, 1959).

Administration of level of aspiration tasks:—

The two level of aspiration tasks were administered by the investigator himself in a single session, with regular intervals of a few minutes between each task. The testing was conducted individually. The method followed to study
level of aspiration was similar to that followed by
Frank (1935).

To begin with, the task was explained to the
subject. After the subject had acquainted himself with
the task, he was allowed some practice trials. The
practice trials consisted of one trial in each of the two
tasks. This was followed by the actual trials, during
which the subject, after being informed of his performance
score in a preceding trial, was required to give an estimate
of his future performance. This procedure was followed for
every trial. After every performance the subject was made
to write his aspiration score on the sheet provided to him,
instead of the usual procedure of announcing the aspiration
score to the experimenter, in order to avoid any influence
from the experimenter on his decisions. The experimental
question used to elicit an estimate from the subject of his
future performance was, "What score you are going to make
in the next trial?" This question was made clear to the
subject by giving examples and when the experimenter was
certain of the subject's ability to make estimates, the
actual trials were started. This question was repeated
after every trial, if found necessary otherwise the subject
went on writing his estimates soon after his score for the
previous trial was announced.

By taking an actual example from one of the tasks,
that is, letter cancellation, specific procedure followed in each trial encompassed these steps:

First: $S$ performs letter cancellation, as instructed on the printed sheet for 60 seconds.

Second: $S$ scores the sheet and announces the scores to $S$, say 80.

Third: $E$ asks $S$, "what score are you going to make in the next trial?"

Fourth: $S$ trials his aspired score for the next trial, say, 90.

Fifth: $E$ calculates GDS by deducting 80 score made from 90, score aspired to. In this instance it will come to be 10.

Sixth: The above procedure is repeated 5 times, there being 5 trials in each task.

The final score will be the mean score of all the five trials.

Scoring of level of aspiration tasks:

Goal discrepancy score in case of level of aspiration was obtained by subtracting immediate past performance score from the new level of aspiration score announced by the subject. Five trial of each level of aspiration task were given to the subject and the mean score were calculated. The final goal discrepancy score
was calculated by taking the mean score of the two level of aspiration tasks score.

(5) Academic Achievement Score:

Academic achievement data consists of marks secured in the annual examination of 9th class conducted by Himachal School Board of Education, in aggregate and in various school courses i.e. Mathematics, English, Social Studies and General Science. Achievement scores were obtained from the record registers of the school concerned.

Personal data:

The personal data of the subjects were collected through a response sheet which the subjects filled before taking the test. Preliminary sample taken in this study was 600 subjects. Sample being large, a number of schools had to be taken, so it became very important to be sure of the uniformity in the school courses, methods of teaching, methods of conducting the examinations, academic standard of the schools, socio-economic status etc. In order to control these extraneous factors, mostly all the government controlled schools were taken, where homogeneity could be assumed safely.
3.4 Statistical Analysis

(a) Correlational Analysis

The term correlation (or co-variation) indicates the relationship between two such variables in which changes in the values of one variable, the values of the other variable also change. And coefficient of correlation is calculated to study the extender degree of correlation between two variables i.e., to what extent the variables are related to each other and to what extent variations in one go with the variations in other variables. So coefficient of correlation for different variables were computed by product moment correlation. The variables for the correlation analysis in the present study were test anxiety scores, self-concept scores, intelligence scores, level of aspiration scores, total achievement scores, scores in English, Mathematics, Social Studies and General Science.

(b) Step-wise Linear Multiple Regression Analysis

The coefficient of multiple correlation indicates the strength of relationship between one variable and two or more others combined with optimal weights. The multiple correlation is related to the intercorrelations between independent variables as well as to their correlations with the dependent variable. In the present
problem a correlational and step-wise linear multiple regression analysis was done to study the test anxiety, self-concept, intelligence and level of aspiration (Independent variable) as a predictors of academic achievement (dependent variable) in aggregate and in various school courses i.e. Mathematics, English, Social studies and General Science.

(c) Analysis of variance:

This is a composite test that gives an overall idea about the significance of differences among several means. The manifest of analysis of variance are that it analyses 'within' and 'between' variances simultaneously and takes into account all kinds of basic errors. Analysis of variance also makes it possible to study the interaction effects which are ascribable to none of the factors operating singly but to conjoint the effects of factors acting together. Thus, this technique made possible to study the main effects and international effects of the four factors included in the study i.e. self-concept, test anxiety, intelligence and level of aspiration. According to Garrett (1969) 'F' furnishes a comprehensive or overall test of the significance of the differences among means. A significant 'F' does not tell us which means differ significantly but at least one is reliable different from some others. If 'F' is not significant there is no reason
for further testing as none of the mean differences will be significant but if 'F' is significant we may proceed to test the separate differences by Duncan's Multiple Range Test.

(d) **Factor Analysis**

**Principal Axes Method**

This technique was employed to study the factor structure of all the independent as well as dependent variables.

The Principal-axes method of factoring the correlation matrix is of interest for several reasons. Each factor extracts the maximum amount of variance (i.e., the sum of squares of factor loadings is maximized on each factor) and gives the smallest possible residuals. The correlation matrix is condensed into the smallest number of orthogonal factors by this method. The method also has the advantage of giving a mathematically unique (least squares) solution for a given table of correlations.