CHAPTER III
THE RESEARCH DESIGN
The Research Design provides a picture of what and how to conduct the research. It has been established from time to time that suitable research designs guard against the collection of relevant data and gives more economy. Therefore, in any research, the research design provides the researcher a blue print of the research, establishes the boundaries of the research project and helps in controlling unnecessary labour to be done by the investigator. The researcher gives an idea of the method used in conducting research, tools used, sample and the procedure adopted for the collection of data and also the statistical techniques used by the researcher for the interpretation of the data for coming to the final conclusions.
For the present study, the investigator has used the normative survey method for the collection of data. This method provided an organised way to attempt a problem with suitable researches. Three types of information were collected by this method:

1. Of what existed (by studying and analysing important aspects of present situation).

2. Of what we wanted (by clarifying the goals and objectives positively through a study of the conditions exists)

3. Of how we got these through discovering the possible means of achieving the goals on the basis of experiences of others or the opinions of experts. The researcher collected the data by using the 3 performances i.e. Self-Concept scale, Attitude towards teaching and Human Value.

SAMPLE
The study comprised 500 B.Ed. pupil teachers. 250 of each stream including male and female students.

METHOD USED

Normative survey method has been used.

TOOLS USED IN THE STUDY

The following tools have been used in the present study for the collection of data :-

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>TOOLS USED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATTITUDE TOWARDS TEACHING</td>
<td>Dr. S.P. AHLUWALIA</td>
</tr>
<tr>
<td>SELF-CONCEPT SCALE</td>
<td>Dr. DUTT &amp; Dr. D.K. CHADDA</td>
</tr>
<tr>
<td>HUMAN VALUES</td>
<td>DR. D.K. DIWAN</td>
</tr>
<tr>
<td>ACHIEVEMENT TEST</td>
<td>DR. D.K. CHADDA &amp; YASHPAL SINGH</td>
</tr>
</tbody>
</table>
TEACHER ATTITUDE INVENTORY (TAI)

For measuring the attitudes of B.Ed pupil teachers towards teaching profession, Teacher Attitude Inventory (TAI) constructed and standardised by Dr. S.P. Ahluwalia has been used by the researcher.

The inventory has 90 items consisting of six subscales. Each sub-scale has 15 statements that pertain to a particular aspect of prospective and practising teacher's profession attitudes. The six aspects which deals with the inventory are, attitude towards:

(I) Teaching Profession
(II) Class-room Teaching
(III) Child-Centered Practices
(IV) Educational Process
(V) Pupils
(VI) Teachers.
Out of the 90 items, 56 items are in positive declarative form, 34 of them are in negative form, 43 meant to assess attitude in favourable direction and 46 in unfavourable direction. Thus the favourable and unfavourable items adequately measures the six selected areas.

The TAI consists of a bilingual (English and Hindi) reusable test booklet with a separate answer-sheet.

**Reliability**

Reliability of the inventory was estimated by the split-half (odd-even) method and found to be 0.789 (corrected to 0.80) for a sample of 239 prospective teachers.

The test-retest reliability coefficients after the interval of 3 months and 9 months are found to be 0.59 (N = 102) and 0.64 (N = 290).
Validity

The inventory appears to have content validity and the method of selecting items supports this supposition.

For determining the concurrent validity the scores on TAI were compared with the scores on the Hindi Adaptation of the MTAI developed by Dr. M.C. Joshi. The Obtained correlation coefficients for prospective teachers (N=79) came out to be positive but low.

The high discriminatory power of the items is a testimony of its internal consistency.

Response Mode

Likert continuum strongly agree, agree, undecided, disagree and strongly disagree has been provided for each item. The subject responds to each item by putting a tick mark (x) in the square of the chosen alternative against the
serial number of the attitude statement in the answer sheet. Subjects are required to respond to all the items likewise. They do not have the option to leave any item unanswered. The subjects are not permitted to make any mark on the test-booklets as they are reusable.

**Instructions for the Test**

The experimenter distributed the test-booklet and answer-sheet to each subject. After all subjects had received the proper test materials the experimenter said, "Don't open it unless told to do so. This inventory consists of 90 statements aimed to identify the professional attitudes of the teachers. There is considerable disagreement as to what these attitudes should be; therefore there are no right or wrong answers. What is wanted is your own individual feeling about the statements. Read each statement and decide how you feel about it. Then mark your answer in the space provided on the answer sheet.
Think in terms of the general situation rather than specific one. There is no time limit but work as rapidly as you can. Please respond to every item.

After giving the instructions the experimenter asked them to turn over the page and said,

"If you strongly agree, put tick (✓) mark in the space under Strongly Agree (SA). If you agree, put a tick (✓) mark in the space under Agree (A). If you are undecided or uncertain, put a tick (✓) mark in the space under Undecided (U). If you disagree, put a tick (✓) mark in the space under Disagree (D). If you strongly disagree, put a tick (✓) mark in the space under Strongly Disagree (SD)."

"Remember you have not to make any mark in this booklet. Now read each statement carefully and record your response on the answer-sheet".
Scoring

Each item alternative is assigned a weight ranging from 4 (Strongly Agree) to 0 (Strongly Disagree) for favourable items. In the case of unfavourable items range of weights is reversed i.e. from 0 (Strongly Agree) to 4 (Strongly Disagree). The attitude score of a subject is the sum total of item scores of all the six sub-scales. The theoretical range of scores is from 0 to 360 with the higher score indicating the more favourable attitude towards teaching and allied aspects.
SELF-CONCEPT SCALE

We have a number of tests, which measure mental health indirectly through assessment of anxiety, emotional disturbance, neuroticism etc. but the present scale is an attempt to assess mental health through its positive index. Self actualisers are known to possess optimum mental health, therefore Dutt Chadda Self-Concept Scale (DCSCS) measures the state of self-actualisation, which serves further as an index of mental health. It should form an excellent problem to study the relationship between positive and negative indices of mental health in a given sample with respect to their age, sex and other very important personality variables like extraversion-intraversion. Each person carries a self-concept about himself, an analysis of which can lead us to know a lot about that person. This shall always remain a lacuna in all personality inventories whether the reporting done by the subject agrees with the objective records or not. But decidedly the inventory
technique is a way of looking at the complex phenomena of personality.

The Process of Self-Actualisation

It begins as soon as intrinsic learning begins after proper development of 'self-concept'. All associationistic theories are concerned with extrinsic learning, where we go on adding information or skills. Intrinsic learning is the process of becoming, the best human being we are capable of becoming. Extrinsic learning is like erecting a building, whereas intrinsic learning is like growing of a tree. The dichotomy is not very sharp since both categories of learning go hand in hand to a large extent. Intrinsic learning, for which a lot of extrinsic learning may be essential, culminates in fourteen Being-Values (b-values), which cannot be reduced to anything more ultimate.

The Self-Concept scale consists of 80 items with a provision of three choices, 'YES', 'NO' and "CANNOT SAY".
It is designed on the assumption that intrinsic learning is the basis for self-actualisation and it influences the formation of self-concept in the most significant manner.

It is also postulated that intrinsic learning, for which a lot of extrinsic learning may be essential, culminates in fourteen Being-Values, which cannot be reduced to anything more ultimate. Thus, the present scale is drawn in consonance with the following fourteen values:

a) No work-enjoyment dichotomy - enjoys work as much as leisure.
b) Generally relaxed state of mind - enjoys life as a whole
c) Tolerance of loneliness.
d) Search for truth - a constant search for truth and sticking to that e.g. honesty.
e) Search for beauty - a highly developed sense of aesthetic appreciation.
f) Search for goodness - a sense of service and love for others constant search for goodness.
g) Striving for perfection-less-conflicts.

h) Simplicity-straight forwardness.

i) Comprehensiveness - an organised world view.

j) Creativity - an original, unique, risk taking behaviour.

k) Uni-directional, single pointed-concentration of mind and efforts.

l) Idealism - takes job as a calling in the priestly sense doing something very sacred as ordained by nature.

m) Sudden moments of illumination-peak experiences.

n) Self-direction, self-evaluation, self-analysis directed by one's own self.

The items of the scale were written with a view to adumbrate each of the fourteen different values as indicated above. The distribution of items in each sub-area of the self-concept is given in table is as follows :-
<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Name of the Sub-Area of Self-Concept B. Values</th>
<th>SR. No. of Items in Each Sub-Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No Work Enjoyment Dichotomy</td>
<td>15, 16, 19, 55, 58</td>
</tr>
<tr>
<td>B</td>
<td>Generally Relaxed State of Mind</td>
<td>1, 28, 40, 45, 50, 64, 65, 72</td>
</tr>
<tr>
<td>C</td>
<td>Tolerance of Loneliness</td>
<td>25, 47</td>
</tr>
<tr>
<td>D</td>
<td>Search for Truth</td>
<td>7, 23, 27, 36, 46, 48, 52, 61, 79</td>
</tr>
<tr>
<td>E</td>
<td>Search for Beauty</td>
<td>21, 39, 70, 76, 78</td>
</tr>
<tr>
<td>F</td>
<td>Search for Goodness</td>
<td>6, 13, 22, 56, 62, 66</td>
</tr>
<tr>
<td>G</td>
<td>Striving for Perfection</td>
<td>4, 8, 12, 26, 38, 43, 69</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Page ref.</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>H</td>
<td>SIMPLICITY STRAIGHT FORWARDNESS</td>
<td>29,30,67,74,75,77</td>
</tr>
<tr>
<td>I</td>
<td>COMPREHENSIVENESS</td>
<td>5</td>
</tr>
<tr>
<td>J</td>
<td>CREATIVITY-RISK TAKING BEHAVIOUR</td>
<td>31,37,49,59,63,73,80</td>
</tr>
<tr>
<td>K</td>
<td>UNI-DIRECTIONAL</td>
<td>11,41,42,44,51</td>
</tr>
<tr>
<td>L</td>
<td>IDEALISM</td>
<td>2,17,35</td>
</tr>
<tr>
<td>M</td>
<td>SUDDEN MOMENTS OF ILLUMINATION</td>
<td>18,24,34,68</td>
</tr>
<tr>
<td>N</td>
<td>SELF DIRECTION, SELF ANALYSIS SELF EVALUATION</td>
<td>3,9,10,14,20,32,33,53,54,57,60,71</td>
</tr>
</tbody>
</table>

A copy of the DCSC is available in appendix.
SCORING OF ITEMS

The scoring of items in the present scale follows a particular pattern. For the items in positive direction where 'yes' is assigned, a score point of 2, for 'cannot say' categorisation a score point of 1 and for negative endorsement a score point of zero is awarded. Thus two, one, zero pattern has been adhered throughout for the scoring of all the 80 items.

REALIABILITY AND VALIDITY OF THE SCALE

The scale has been developed jointly by the Professor N.K. Dutt of the Department of Education, Delhi University, Delhi and Prof. D.K. Chadda, Professor of Education, Department of Education, M.D. University, Rohtak. For obtaining the reliability of the scale a group of 185 subjects consisting of 104 males and 81 females in the age group of 24 to 30 years were employed. The coefficient of reliability established for this scale using 'odd-even' method is found
to be .77 and through Kuder-Richardson formula it is found to be 0.75.

Since no congruent or concurrent validity could be found out for this scale, the authors have considered the logical and psychological validity of the scale to be adequate as a research tool. Such validity was established using the opinion of the experts in the field of psychology. The DCSCS was thought of by N.K. Dutt in 1968 in consultation with A. Maslow, who soon after died in an air crash. Prof. D.K. Chadda assisted Dutt in finalising the test and in collecting some data on it.

Human Value Test and its Administration

The Human Value Test (HVT) could be administered individually as well as in group. It could also be self-administered. Simple and clear instructions have been printed on the test booklet. The responses have to be marked on a separate answer-sheet meant for this test. The
respondent has to select his answer out of the five responses and has to mark '✓' to response he/she likes most. The student teachers are asked not to leave any question unanswered and also it is clarified that there is no right or wrong response to the questions.

No time limit is set for filling the Human Values Test (HVT), therefore, as soon as the respondent completed it, it was taken back by the investigator.

SCORING

In all there are 125 items distributed over 25 questions on 5 Human values. For scoring these 25 questions, one weightage out of 0, 1, 2, 3, 4 is given to each question depending upon the response of the respondent. Then scores of each respondent on the five sub-tests (values) are calculated by simple summation of the respondent's item scores. Thus scores profile are prepared for each value of the Human Values Test.
A Human Values Test (HVT) Booklet along with the Answer-Sheet have been provided in Appendix No. 2 and 3.

**NORMS OF TEST (HVT)**

According to Freeman (1971) 'A norm is the average or typical score (mean or median) on a particular test made by a specified population'.

In this test four types of norms have been established for the Human Values Test (HVT) for student teachers. They are:

1. Mean
2. Mean Band
3. Standard Deviation
4. Correlation

**MEAN**

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The Mean or average norms were computed for each value of Human Values Test (HVT) on a sample of 400 student teachers.

MEAN BANDS

Mean Band is a range of scores with probable error, between which the score might vary. It is calculated with the following formula:

\[ \text{Mean} \pm 2.58 \times \text{SEm} \]

The mean bands were prepared for each value of Human Values Test (HVT).

STANDARD DEVIATION

Standard Deviation calculated on the basis of the scores obtained by 400 student teachers for all the five
values of Human Values Test (HVT) have been provided in Appendix.

**CORRELATION**

Coefficient of correlation of all the five values of HVT with one another calculated from the scores of 400 student teachers have been provided in Appendix.

**RELIABILITY OF HUMAN VALUES TEST**

According to Garrett (1973), the reliability of any test or measuring instrument depends upon the consistency with which it measures the ability when it is applied. The important characteristic of a tool is to measure accurately whatever it measures.

The reliability of Human Values Test (HVT) was calculated twice, by Test-Retest method. One, after a gap of
three months and the other, after a gap of 6 months. Thus two sets of reliability coefficients of HVT were calculated as given below.

**Reliability Coefficients for the Human Values Test (HVT)**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Values</th>
<th>Time gap 3 months</th>
<th>Time gap months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Co-operation</td>
<td>.76</td>
<td>.74</td>
</tr>
<tr>
<td>2.</td>
<td>Dedication</td>
<td>.70</td>
<td>.60</td>
</tr>
<tr>
<td>3.</td>
<td>Nationalism</td>
<td>.68</td>
<td>.66</td>
</tr>
<tr>
<td>4.</td>
<td>Scientific Outlook</td>
<td>.67</td>
<td>.68</td>
</tr>
<tr>
<td>5.</td>
<td>Tolerance</td>
<td>.71</td>
<td>.70</td>
</tr>
</tbody>
</table>

The above Table 3.02 reveals that the reliability coefficients determined by Test-Retest method with a time gap of 3 months were ranging from .68 to .76 and with the
time gap of 6 months ranged from .66 to .74. In both the cases the reliability coefficients were quite high.

Guilford (1973) says that the tool should be chosen even though their reliability may be of order of only .50. These reliability coefficients were appropriate for the purpose, being much higher than .50. Therefore, the Human Values Test (HVT) may be considered as a reliable tool for the assessment of Human Values of the Student Teachers.

VALIDITY OF HUMAN VALUES TEST

Validity means what the test measures and how well it does so. A test is considered to be valid if it measure effectively the property which it is meant to measure. The validity of Human Values test has been determined in the following ways:
FACE VALIDITY OF HVT

According to Anastasi (1958), Face Validity means what the test appears to measure not necessarily what the test measures. The present values test seems to have good face validity because it appears to be relevant to its objectives. This was the opinion expressed by twenty five experts in the field whose suggestions were sought by the investigator for this Human Values test.

CONTENT VALIDITY

The content validity of the present human values test was systematically analyzed to make sure that all major aspects were adequately covered by the test items and in the correct proportions. The analysis of content of concept of teachers and opinion of twenty five educationists confirmed that the Human Values Test was logically valid.
CROSS VALIDATION

Cross validation means how well the results of one test hold good in other situations. For this a group of twenty four student teachers of B.Ed. Colleges of Rohtak with more or less same socio-economic and cultural background and similar educational qualifications were taken as a sample for cross validation. Human Values Test was administered to this group and the results were compared with the ratings of six lecturers of colleges of Education. The co-efficient of correlation was obtained as +.76 which established the cross validation of the present Human Values Test i.e. HVT holds good in other situations also.

VALIDITY THROUGH CRITERION

Brown (1970) writes above the criterion validity that it is appropriate in practical situations where the
fundamental interest is in predicting some criterion behaviour. In these instances where the major interest is on the criterion, the test is useful to the extent that it predicts the criterion. The basic validation procedure threore, is to determine the relationship between test scores and the criterion measure in some relevant group. A few empirical evidences of the validity of HVT as criterion-oriented evidences are cited as under :-

HUMAN VALUE TEST SCORING KEY

1. Part I

Marks wise analysis is

1. 43210
2. 41320
3. 43201
4. 41230
5. 43210
Part II

6. 43201
7. 43210
8. 43210
9. 42310
10. 34201

Part III

11. 42310
12. 43021
13. 42310
14. 31420
15. 43120

Part IV

16. 43120
ACHIEVEMENT TEST

Multiple choice items can be used:-

1. To assess wide range of skills.
2. Large sample of knowledge can be assessed in a brief period.
3. Efficient to score even for a large number of takers.
4. Can be made highly reliable.

DISADVANTAGES

1. Multiple Choice type items are time consuming to write.
2. Measures complex skills indirectly.
3. Possible to answer correctly by guessing.

By studying and reviewing all the test items, the Multiple Choice items as a measure for the achievement test of the students of B.Ed. Although preparation of test items is very difficult, yet it is easy to score. Therefore, the Guide and the researcher has constructed the achievement
test in essential and optional papers as well, which are based on the Multiple Choice Tests.

**Preparation and Editing of Test Items**

1. Writing of items. The number of items framed was three times the number required for the final test.
2. Submission of items to authorities for critical evaluation.
3. Revision of items in view of suggestions received from the subject experts.
4. Preparation of experimental form of test.

Administration of Experimental Form and Preparation of Tentative Final Form:

1. Framing of different instructions to be given to the testes.

3. Deletion of ambiguous items and modification of the items which had language difficulty.

4. Revision and final editing of the items for tentative final form.

For this the following points were kept in mind:

i) The statements of the items were clearly and concisely worded.

ii) There was no ambiguity in meaning and construction of the statements.

iii) The statements were related directly to the topic.

iv) The irrelevant statements were avoided.

v) The statements were arranged properly and systematically under several problem areas.

vi) The sequence of the items was maintained in such a way that they were educationally sound.
vii) Efforts were made to test as much information as possible.

The number of items in the tentative final form was almost double the number required in the final form.

**Try Out of the Test**

The test was administered over a representative sample of **B.Ed. Pupil Teachers**. As for item analysis, 370 test papers were needed; the test was administered over 400 students so as to keep margin for discarding the spoiled ones.

The testes were given following instructions.

1. This is a test of what you have learned during the whole year. The results of this test will be used for research purpose only.
2. This test has six parts corresponding to the four essentials and two optional.

3. In each of the part, there are 25 multiple choice items. For each item select the answer that best completes the statement, or answers the question, and encircle the letter of that answer.

4. Do not make unnecessary haste/delay to finish the test.

5. Since your score will be the number of items answered correctly, be sure to answer every item.

6. The result of this test will be used for research purpose only.

**Time Limit**

For taking the try-out test no time limit was kept. The test was administered and was taken back from the students after they had completed the test. On an average the students took two and a half-hours to complete the test.
Scoring

The test papers were scored with the help of scoring key already prepared by the Guide and the researcher on the basis of 1 mark for a correct answer and a zero for an incorrect one.

MEASUREMENT OF DISCRIMINATION AND DIFFICULTY

VALUE OF THE TEST ITEMS

For measuring the difficulty value and discrimination power, the following procedure was adopted :-

1. Selected 370 test papers randomly.
2. All the 370 scored test papers were arranged in descending order from the highest score to the lowest score.
3. Counted off 27% of the total number of test papers from the top of the stack. This formed the upper group.

4. Counted off 27% of the total number of papers from the bottom of the stack. This formed the lower group.

5. Put aside the middle group i.e. 46% papers of the total number, since it is not used in the item analysis.

6. For each item counted the number of students, in the upper group and in the lower group, who answered the item correctly and recorded the same as Pu i.e. Proportion of students in the upper group who answered the item correctly and PL i.e. proportion of the students in the lower group who answered the item correctly.

7. Following formula was applied for determining the difficulty value $d_v$ of each item

$$D_v = \frac{Pu + PL}{2}$$
Where

\( D_v = \) Difficulty value of the item

\( P_U = \) proportion of correct responses to the item in the upper group

\( P_L = \) proportion of correct responses to the item in the lower group

8. The formula applied for determining the discriminating power is as follows:

\[
D = P_U - P_L
\]

Where

\( D = \) Index of discriminating power
PU = proportion of correct responses to the item in the upper group
PL = proportion of correct responses to the item in the Lower group

9. For determining the difficulty value and discriminating power, although our calculation is based on the upper and lower groups only and middle 46% are discarded, it provides a close approximation of the estimate that would be obtained with the total group.

In this regard, it becomes essential to quote that:

Davis (1951) computed the reliability coefficient of a group of typical item difficulty indicates estimated in this way and has found it to be 0.98, when the sample included 100 examinees in the highest 27% and 100 examinees in the lowest 27% group.
ITEM SELECTION FOR THE FINAL DRAFT

The items for the final tests were selected on the basis of the following criteria:

1. Difficulty Value

Since “Difficulty” refers to the percentage answering the item correctly, the smaller the percentage figure, the more difficult the item. Only those items were retained, the difficulty value of which ranged from 0.2 to 0.8 as the item having difficulty value below 0.2 are considered to be very difficult and above 0.8 very easy.

2. Discriminating Power

The “Discriminating Power” of an item is reported as a decimal fraction; maximum positive discrimination is indicated by an index of 1.00. This is obtained
only when all students in the upper group answer the item correctly and no one in the lower group does.

Zero is obtained when an equal number of students in each group answer the item correctly. Negative discriminating power is obtained when more students in the lower group than in the upper group answer correctly. Both of these types of items were deleted from the test and only those items whose discriminating power ranged from 0.1 to 0.6 were retained.

**RELIABILITY**

By reliability is meant the degree to which the test agrees with itself. To what extent can two or more forms of the test be relied upon to give the same results; or the same test to give the same results when repeated? If the scores on the test are stable under these conditions, the test is
said to be reliable. In other words, we can say the reliability means consistency.

The absence of reliability in a test is a sign of weakness. Although high reliability is no guarantee that the test is good, low reliability does indicate it is poor.

There are many ways by which reliability of a test can be found out. The reliability of this achievement test was found out by test-retest method.

This method has certain limitations, for example in the case of achievement test, this delay is likely to introduce other variables, the pupils may discuss the test between trials, do extra study or do other things that effect a change in the status of their knowledge. In addition to this, their physical and mental conditions may also effect the test. But inspite of these limitations the method has many advantages. Firstly, construction of two or more than
two forms is always not possible and usually it is a troublesome job. Secondly, even if there is only one form, the split-half technique may not be possible or feasible in all cases, as one to one matching is difficult to obtain.

The researcher used this method because of its superiority over other methods.

This method was used as only one form of the test was required, no matching between the items was required and it was easy to administer the test to the respondents even twice. Also, the gap between the first and second test would not make the difference because the respondents cannot talk with each other so easily.

The reliability of the measures of this achievement test was found out to be 0.73, using the test-retest method.
VALIDITY

'Validity' refers to the degree to which the test or other measuring instrument measures, what it claims to measure. We can say that validity means "Truthfulness". No matter what other merits the test may possess, if it lacks validity, it is worthless.

According to Lindquist (1951) "the content of an achievement test is often formulated by the analysis of curriculum and test books and by the pooled judgement of recognised authorities in the field. Under these circumstances, a well constructed test may constituted the best available measure to criterion in a sense that the test itself defines the function it is to measure. Such tests may be described as self defining."
Guilford (1954) also says here are some measures whose validity is taken for granted, for example: achievement test scores.

In view of the above view points the validity of the achievement test used for the present study was taken for granted, because it was an achievement test and was constructed, keeping in view the weightage of the different portions of the syllabi. Thus, the content validity method was used for determining the validity of the achievement test constructed by the investigator.

FINAL FORM OF ACHIEVEMENT TEST

1. All the papers consisted of 25 items each.
2. The scoring key were prepared for it.
3. The instructions to be given to the testees were printed on the cover page of the test.
4. The time limit for the test was two and a half hours.
(The Difficulty value and Discripency power of all the four essential papers and all the optional papers are appended in the appendix)

**STATISTICAL TECHNIQUES USED**

It is the rejection/acceptance of hypotheses, which ultimately determines the contribution of the investigation in the scientific development of a particular area. In the present investigation also, various statistical techniques have been employed, as per design of the study, for testing various hypotheses, so as to arrive at certain conclusions. The main techniques that have been employed include C.R. test, Pearson's Product Moment Method for computing coefficient of correlation, Multiple Correlation and Multiple Regression Equations. A brief rationale of these statistical techniques is as under :-
‘t’ TEST

‘t’ test is used to ascertain whether two observed statistics, such as two means, two correlation coefficients etc. indicate differences in a corresponding pair of parameters. The distribution of the ‘t’ is known to be normal around the true difference between the population mean.

In the present study ‘t’ tests have been employed to test the significance of difference between mean scores of B.Ed. pupil teachers of the campus based and distance teaching modalities in their scholastic performance, teaching aptitude, attitude towards teaching and reading interest. It has also been used for testing the significance of difference between the correlation coefficients.
**STANDARD DEVIATION**

It is used as a measure of the dispersion of scores in a distribution.

\[ SD = \sigma = \frac{\sqrt{N \sum x^2 - (\sum x)^2}}{N^2} \]

Where

\( \sum x^2 \) = The sum of squares of raw scores

\( N \) = Total number of observation

Standard Deviation is a very useful device for comparing characteristics that may be quite different or that may be expressed in different units of measurement. The Standard Deviation is independent of the magnitude of the mean and provides a common unit of measurement.