CHAPTER IV

METHOD AND PROCEDURE
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The operational definitions of the relevant concepts employed in the present investigation have been given below:

PROCESS VARIABLES

The term 'process variables' includes Teacher Effectiveness Scale and Education Awareness Test. These have been briefly dealt with as follows:

Teacher Effectiveness Scale

This scale is constructed by Promod Kumar and D.N. Mutha of Jodhpur University. It consists of sixty-nine highly discriminating items. These items have been classified into thirteen subscales mentioned as below: (i) Information Source; (ii) Motivator; (iii) Disciplinarian; (iv) Adviser and Guide; (v) Relationship with Pupils, Fellow Teachers, Principals and Parents; (vi) Teaching Skills; (vii) Co-curricular Activities; (viii) Professional Knowledge; (ix) General Appearance and Habits in relation to Classroom; (x) Classroom Management and (xi) Personality Characteristics.
The total scores vary from 69 to 345, showing least teacher effectiveness to highest teacher effectiveness.

**Educational Awareness Test**

Good teaching depends upon the amount of educational awareness the teacher possesses. A teacher is an asset to his teaching community only if he is aware of educational problems, and techniques and strategies of teaching. To study the educational awareness of the teachers 'Educational Awareness Test' was used. It has been developed by Sharma and Paramjit. It includes the following areas of education:

1. Knowledge about contribution of great educationists, Indians as well as foreigners;
2. Knowledge of some important books on education and their authors;
3. Knowledge about educational journals;
4. Knowledge about education reports and commissions;
5. Knowledge about vital statistics in education;
6. Knowledge of educational abbreviations;
7. Knowledge of important slogans in education;
STRUCTURE VARIABLES

The term 'structure variables' includes Teacher Attitude Scale, Rigidity-Flexibility Scale and an opinionnaire to study the institutional variables. These have been briefly dealt with as follows:

Teacher Attitude Scale

Teaching attitude is reflected by scores of teacher-trainees on Grawal’s Teacher Attitude Scale. Since attitude is only a relative concept which cannot be measured in an absolute sense, it has been identified in terms of favourable and unfavourable responses of individual teachers towards educational issues. The teachers scoring high on teacher attitude scale are deemed to have more favourable attitude towards teaching than teachers scoring low on this scale. It contains seven sub-scales to measure the teacher’s attitude towards (i) teaching profession; (ii) professional growth; (iii) school students; (iv) methods of teaching; (v) school discipline; (vi) co-curricular activities and (vii) self-concept.

Rigidity-Flexibility Scale

Rigidity and flexibility are two traits lying on the lines of the same bipolar continuum varying only in degree and not in kind. It refers to trainees’ scores on
Rigidity-Flexibility Scale. It was constructed by John M. Rehflisch for the purpose of measuring rigidity-flexibility.

The original scale was translated into Hindi by F.J. Ansari and was corrected by well known scholars in Psychology, Hindi language and English language. Care was taken that items in Hindi conveyed exactly the same meaning and sense to the subjects as the items did in English. Ansari used the Hindi version by following the same instructions and scoring procedure. In the present study also, its Hindi version had been used.

According to Rehflisch, the subjects with high scores on the scale are rated for being socially and emotionally constricted, anxious, intolerant of disorder, irregularity and unpredictability, lacking in self-confidence, slow in making decisions, preservative, conservative, conventional, socially-introverted, submissive and emphatic in the expression of their complaints. On the other hand, the subjects with low scores on the scale are known to be judged as outgoing in social situations, fluent in thought and speech, impulsive, original and self-indulging. These characteristics of low scores on the scale are clearly indicative of flexibility trait of their personality.
An Opinionnaire to Study the Trainees' Reactions towards the Institutional Variables of Government Inservice Training Centres

It consisted of 25 'yes'/No' items pertaining to institutional variables, i.e., (i) building facilities; (ii) equipment facilities; (iii) library facilities; (iv) subject-room facilities; (v) hostel accommodation; and (vi) audio-visual aids of teaching.

Scoring was done by giving one mark to the 'yes' response to each of the positive statements.

PRODUCT VARIABLES

The term 'product variables' includes two Achievement Tests for Teachers, i.e. (i) Achievement Test in Social Studies and (ii) Achievement Test in Mathematics, School Results of Social Studies and Mathematics Teachers and a questionnaire to study the impact of in-service training programme upon the trainees.

Achievement Test in Social Studies for Teachers

To evaluate the initial behaviour and terminal behaviour of the trainees with regard to their professional competence in social studies, the Achievement Test in Social Studies for Teachers was constructed.
Achievement Test in Mathematics for Teachers

To evaluate the initial behaviour and terminal behaviour of the trainees with regard to their professional competence in mathematics, the Achievement Test in Mathematics for Teachers was constructed.

School Results of Social Studies
and Mathematics Teachers

Academic achievement refers to the knowledge attained and skills developed in the academic subjects. It is assessed by the school, school-board or college authorities with the help of achievement tests which are in the form of school, school-board or university examinations. The results of the pupils in their achievement tests depend upon the teaching by the teachers concerned in their respective fields. Inservice training centres aim at acquainting the teachers with new ideas which stimulate them to improve in the teaching of their subjects.

The term 'School Results of Teachers' refers to the difference in the percentages of middle standard public examination results for two consecutive academic years, i.e., 1984-85 and 1983-84, of the teachers who have undergone inservice training for two weeks in the
A Questionnaire to Study the Impact of Inservice Training Programme upon Trainees

A questionnaire was constructed and used to study the impact of inservice training programmes upon the trainees. It consists of forty-five statements. Each statement is followed by a five-point scale. The total scores vary from 45 to 225 showing least impact of inservice training to highest impact of the same.

EDUCATIONAL ENVIRONMENT

Educational environment refers to the lectures delivered by the teacher-educators and the resource persons. It also includes the institutional variables, namely, building and equipment facilities, library facilities, subject-room facilities and hostel accommodation.

GOVERNMENT INSERVICE TRAINING CENTRES

Government Inservice Training Centres are the institutions in which inservice education and training programmes were conducted for reorienting the teachers of different subjects who were already in service. The duration of these courses was two weeks.
DEVELOPMENT OF PROFESSIONAL COMPETENCY

Professional competency has been defined on the basis of multiple criteria operationally. It has been reflected by the scores on Teacher Effectiveness Scale, Educational Awareness Test, Rigidity-Flexibility Scale, Teacher Attitude Scale and Achievement Test for Teachers. The professional competency of teachers has also been reflected by the School Results of Teachers as depicted by middle class examination conducted by the Punjab School Education Board.

SOCIAL STUDIES AND MATHEMATICS TEACHERS

Social studies and mathematics teachers are the trained graduate teachers of government secondary schools who teach the subject of social studies and mathematics respectively to the eighth class students.

EXPOSED AND UNEXPOSED GROUPS OF TEACHERS

Exposed group comprises of teachers who were exposed to in-service training programmes for two weeks during 1984-85 academic session. Unexposed group comprises of teachers who were not exposed to any such training during 1983-84 and 1984-85 academic session.
The various groups of teachers have been classified as under:

<table>
<thead>
<tr>
<th>Group No.</th>
<th>Group</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Exposed Patiala Mathematics</td>
<td>E.PTA. Maths.</td>
</tr>
<tr>
<td>II</td>
<td>Exposed Patiala Social Studies</td>
<td>E.PTA. S.S.</td>
</tr>
<tr>
<td>III</td>
<td>Exposed Jalandhar Mathematics</td>
<td>E.JLN. Maths.</td>
</tr>
<tr>
<td>IV</td>
<td>Exposed Jalandhar Social Studies</td>
<td>E.JLN. S.S.</td>
</tr>
<tr>
<td>V</td>
<td>Unexposed Patiala Mathematics</td>
<td>U.PTA. Maths.</td>
</tr>
<tr>
<td>VI</td>
<td>Unexposed Patiala Social Studies</td>
<td>U.PTA. S.S.</td>
</tr>
<tr>
<td>VII</td>
<td>Unexposed Jalandhar Mathematics</td>
<td>U.JLN. Maths.</td>
</tr>
<tr>
<td>VIII</td>
<td>Unexposed Jalandhar Social Studies</td>
<td>U.JLN. S.S.</td>
</tr>
</tbody>
</table>

**GAIN SCORES**

The term 'gain scores' refers to the difference between post-test scores and pre-test scores.

**DESIGN**

In the present investigation, pre-test and post-test design was followed. Eight groups of trained graduate teachers serving in government secondary schools in two divisions of Patiala and Jalandhar were taken. Four groups were treated as exposed groups and four groups as unexposed groups. The four exposed groups were exposed to training programmes organised at inservice training...
centres at Patiala and Jalandhar separately. Unexposed groups were not exposed to any such training. All the eight groups were pre-tested and post-tested in concern with the Teacher Effectiveness Scale and Educational Awareness Test as process variables, Teacher Attitude Scale and Rigidity-Flexibility Scale as structure variables and Achievement Test for Teachers and School Results of Teachers as the product variables of professional competency. Besides, an opinionnaire to study the reactions of the trainees towards the institutional variables of Government Inservice Training Centres as structure variable and a questionnaire to study the impact of inservice training upon the trainees as a product variable were used only once for the trainees.

SAMPLE

As it was not feasible for the investigator to conduct the study on many a thousand of trained graduate teachers working in all the secondary schools of the Punjab, so out of the three divisional-level Government Inservice Training Institutions of the State, only two, namely, Government Inservice Training Centre Patiala and Government Inservice Training Centre Jalandhar were randomly selected. Furthermore only 480 trained graduate teachers,
240 from Patiala and Jalandhar division each, who had been teaching the middle standard classes at the school level were included in the sample. At each centre, exposed and unexposed groups each comprised of 120 teachers in all such that sixty belonged to mathematics group and sixty to social studies group as well. It is clearly depicted in Table No. 4.1.

### Table No. 4.1
**TOTAL NUMBER OF TEACHERS IN EACH GROUP**

<table>
<thead>
<tr>
<th>Jalandhar Groups</th>
<th>Patiala Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed</td>
<td>Exposed</td>
</tr>
<tr>
<td>Math. Group</td>
<td>Math. Group</td>
</tr>
<tr>
<td>Social Studies</td>
<td>Social Studies</td>
</tr>
<tr>
<td>N = 60</td>
<td>N = 60</td>
</tr>
<tr>
<td>Unexposed</td>
<td>Unexposed</td>
</tr>
<tr>
<td>Math. Group</td>
<td>Math. Group</td>
</tr>
<tr>
<td>Social Studies</td>
<td>Social Studies</td>
</tr>
<tr>
<td>N = 60</td>
<td>N = 60</td>
</tr>
</tbody>
</table>

**TOOLS USED**

The tools used in the present study are given as below:

1. **Teacher Effectiveness Scale (TBS)**
2. **Teacher Attitude Scale (TAS)**
3. **Rigidity-Flexibility Scale (RIS)**
4. Educational Awareness Test (EAT)
5. Achievement Test for Teachers (ATT)
   i) Social Studies
   ii) Mathematics
6. School Results of Teachers (SRT)
7. An Opinionnaire to study the opinions of the teachers of exposed groups about the physical resources of Government Inservice Training Centres
8. A questionnaire to study the impact of inservice training upon the teachers of exposed groups.

TEACHER EFFECTIVENESS SCALE

Teacher effectiveness scale is developed by Promod Kumar and D.N. Mitha. It consists of sixty-nine statements. To measure teacher effectiveness it contains thirteen subscales given as follows:

(i) informative source; (ii) motivator; (iii) disciplinarian; (iv) adviser and guide; (v) relationship with pupils, fellow teachers, principals and parents; (vi) teaching skills; (vii) co-curricular activities; (viii) professional knowledge; (ix) general appearance and habits in relation to classroom; (x) classroom management and (xi) personality characteristics.
Each of the statements is followed by a five-point scale, that is, 'strongly agree (SA), agree (A), undecided (U), disagree (D), and strongly disagree (SD) respectively. Scoring was done on the basis of scale product technique by giving weight for each response category in usual Lickert Fashion. The cumulated score on the scale yielded a measure of teacher effectiveness. The total score varies from 69 to 345, showing least teacher effectiveness to highest teacher effectiveness. Weight for each response category was as follows:

\[
\begin{align*}
SA & = 5 \\
A & = 4 \\
U & = 3 \\
D & = 2 \\
SD & = 1
\end{align*}
\]

Reliability

The split-half reliability (correlating the odd even items) of the scale, applying the Spearman-Brown formula is found to be .67 (N = 100) where an index of reliability is equal to .82.

The test re-test reliability of the scale is also studied. It is found to be .75 (N = 60) with an index of reliability of .86, with two months interval time.
Validity

Only highly discriminating items are included in the scale. The upper 27 per cent and lower 27 per cent served as criterion groups (Garrett, 1960). Discriminating value of each item has been determined by calculating 'C R' on the basis of the respondents of upper and lower groups.

The face validity of the measure is fairly high. The content validity is ensured as the items for which there has been 100 per cent agreement amongst judges regarding their relevancy to teacher effectiveness are included in the scale.

Further, the scale has been validated against principals' ratings. The correlation between principals' ratings and self-ratings is found to be .77 (N = 50).
Teacher Attitude Scale

Teacher attitude scale developed by Greval (1975), includes seventy statements. It contains seven sub-scales to measure teacher attitude towards (i) teaching profession; (ii) professional growth; (iii) school students; (iv) co-curricular activities; (v) method of teaching; (vi) school discipline; and (vii) self-concept. Each of the statement is followed by a six-point scale, that is, strongly agree (SA), agree (A), mildly agree (MA), mildly disagree (MD), disagree (D) and strongly disagree (SD).

Scoring was done on the basis of scale product technique by giving weight for each response category in usual Likert Fashion. Weight for each response category for the positive statements was as follows:

- \( SA = 6 \)
- \( A = 5 \)
- \( MA = 4 \)
- \( MD = 3 \)
- \( D = 2 \)
- \( SD = 1 \)

For the negative statements the scoring was reversed. The weight for the response category of each statement was multiplied by the scale value of that statement. The cumulated score on the scale yielded a measure of teacher attitude.
Validity of Sub-Scales

Correlations between the total scores and scores of each of the sub-scales for 200 teachers were computed, which ranged from .622 to .800. High correlations show that the sub-scales are internally consistent with the total inventory.

Factor Validity

To validate this scale, factor analysis was used. The final form of the TAS was administered to 200 trained graduate teachers especially to establish the factorial validity.

Inter sub-area correlations were computed by product moment technique on 'IBM 1620 Computer.' The obtained correlations on 200 teachers ranged from .292 to .601.

The range of loadings in Factor I was found to be from .576 to .807 for all the seven sub-scales of the Teacher Attitude Scale. This factor accounted for 53 percent of the common factor variance. It may be identified with a general factor of 'Teacher Attitude Scale' in view of the high loadings on each sub-scale. It speaks of high factorial validity of the scale.
Reliability

The split half and test-retest methods were used to establish the reliability of the scale on a sample of 100 teachers. The scale was split into odd and even statements for scoring only. The split-half reliability coefficients of the test as estimated by the Spearman-Brown prophecy formula for the seven sub-scales and whole of the scale were found to be .580, .700, .574, .731, .393, .997 and .860 respectively.

For test-retest reliability, 100 trained graduate teachers were given the Teacher Attitude Scale and were retested a couple of weeks after the first testing had been done.

Pearson’s ‘r’ between the two sets of scores was computed on the IBM 1620 Computer. The values of Pearson’s ‘r’ ranged from .104 to .793. How much large a reliability co-efficient should be required depends upon the nature of the test, the size and variability of the group. Considering these factors, a reliability co-efficient for the Teacher Attitude Scale is quite satisfactory.

RIGIDITY-FLEXIBILITY SCALE

This scale was constructed by John Rehflish for the
purpose of measuring rigidity-flexibility as a personality dimension. The original scale was translated into Hindi by F. Ansari. It consists of thirty-nine 'true-false' items which have been drawn from a large number of personality inventories of MMPI and IPAR.

The reliability of the scale was estimated by the split-half technique which is .72. On a sample of sixty air force captains, Alabama (U.S.A), the validity is .82.

For scoring a rigidity-indicating-response one score was given to the 'yes' responses for the items mentioned below:

Item Nos: 1, 3, 5, 6, 7, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 27, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39

For scoring a rigidity-indicating-response one score is being given to 'No' responses for the items mentioned below:

Item Nos: 2, 4, 8, 9, 10, 21, 26, 28, 29

A total score on the scale indicates person's rigidity scores.
Educational Awareness Test

Educational Awareness Test has been developed by T.R. Sharma and Paramjit Kaur in 1978. It contains fifteen questions in all. Each question is divided into some items. Question No. 1, 2, 5, 6, 7, 12, 14, 15, contain five items each whereas question No. 4, 9, 11 contain ten items each and question No. 3, 8, 10, 13 consist of 7, 8, 6, 4 items respectively. Questions were of objective type only. This questionnaire includes the following areas of educational awareness:

i) knowledge about contribution of great educationists;
ii) knowledge of some important books on education and their authors;
iii) knowledge about educational journals;
iv) knowledge about education reports and commissions;
v) knowledge of vital statistics in education;
vi) knowledge of educational abbreviations;
vii) knowledge of important slogans in education and knowledge of current issues in education.

Reliability

The reliability was established in two ways as shown in Table No. 4.3
TABLE NO. 4.3

RELIABILITY OF EDUCATIONAL AWARENESS TEST

<table>
<thead>
<tr>
<th>Techniques</th>
<th>N</th>
<th>Reliability co-efficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test-retest</td>
<td>20</td>
<td>r = .73</td>
</tr>
<tr>
<td>Split-half</td>
<td>140</td>
<td>r = .82</td>
</tr>
</tbody>
</table>

When Spearman Brown Prophecy formula was applied to the value came out to be .44. The reliability coefficient is fairly high. Hence the tool was accepted as reliable.

Validity

The constructor of this test discussed the test items, one by one, with fellow researchers and training college staff and it was felt that the items pertained to educational awareness only. As such they felt contented with content validity of the test.

Method of Scoring

The entire questionnaire contained 95 items embedded in fifteen questions. Every correct item was awarded one mark. The total score of a teacher could range anywhere from zero to 95.
ACHIEVEMENT TEST IN SOCIAL STUDIES FOR TEACHERS

To evaluate the initial behaviour and the terminal behaviour of the trainees with regard to their professional competence in social studies, the achievement test for teachers was constructed. First of all the behavioural objectives of the test were framed. The first step in the construction of criterion test was the content analysis of the topics of social studies. After the content analysis all items were listed in a sequence. Then two to four questions were framed on each item, giving more weightage to important items.

In all fifty questions were included in the achievement test in social studies for teachers. Three types of questions were framed viz., multiple choice type (MCT), short answer type (SAT) and completion type (CT).

.. 20 questions of MCT were included in part A
.. 10 questions of SAT were included in part B
.. 20 questions of CT were included in part C

In this way the achievement test for teachers was divided into three parts A, B and C.

The achievement test for teachers was set in Punjabi language. Then the instructions for the trainees were
given very lucidly to give them proper guide lines to take the test. These were adjusted in the beginning of the test.

For tryout, the achievement test for teachers was administered to a group of five trainees. No time limit was fixed for completing the test. Then in the light of this pilot study of the test and the confusions and ambiguities expressed by the trainees, during the test, it was modified by consulting the subject expert and the language expert in material and language as well. The time limit was fixed at one hour.

Finally the scoring key for the test was constructed. Maximum thirty marks were allotted to the test. For questions in part 'A' and also in part 'C' half mark for each right answer and zero for each wrong answer were given. For questions in part 'B' one mark for each right answer was given and zero for each wrong answer. Each question was designed to fulfil at least one of the three objectives of education, that is, knowledge, understanding and application of the learned material.

The objective-wise numbers of the test items are given below in the Table No. 4.4
<table>
<thead>
<tr>
<th>Objective to Measure</th>
<th>Number of Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>15</td>
</tr>
<tr>
<td>Understanding</td>
<td>20</td>
</tr>
<tr>
<td>Application</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

**Achievement Test in Mathematics for Teachers**

To evaluate the initial behaviour and the terminal behaviour of the trainees with regard to their professional competence in mathematics, the achievement test for teachers was constructed. First of all the behavioural objectives of the test were framed. The first step in the construction of achievement test for teachers was the content analysis of the topics of mathematics. After the content analysis, all items were listed in a sequence. Then two to four questions were framed on each item, giving more weightage to important items.

In all fifty questions were included in the achievement test in mathematics for teachers. Three
types of questions were framed, viz. multiple choice type (MCT), short answer type (SAT) and completion type (CT).

- 20 questions for MCT were included in Part A
- 10 questions for SAT were included in Part B
- 20 questions of CT were included in Part C

In this way the achievement test for teachers was divided into three parts A, B and C.

The achievement test for teachers was set in Punjabi language. Then the instructions for the trainees were given very lucidly to give them proper guidelines to take the test. These were adjusted in the beginning of the test.

For tryout the achievement test for teachers was administered to a group of five trainees. No time limit was fixed for completing the test. Then in the light of this pilot study of the test and the confusions and ambiguities expressed by the trainees during the test, it was modified by consulting the subject expert and the language expert in material and language as well. The maximum time was limited to one hour.

Finally, the scoring key for the test was constructed. Maximum thirty marks were allotted to the test. For question in part 'A' and also in part 'C', half
mark for each right answer and zero for each wrong answer were given. For questions in part 'B' one mark for each right answer was given and zero for each wrong answer. Each question was designed to fulfill at least one of the three objectives of education i.e., knowledge, understanding and application of the learned material.

The objective-wise numbers of the test items are given below in the Table No. 4.5.

TABLE NO. 4.5
OBJECTIVE-WISE TEST-ITEMS IN THE ACHIEVEMENT TEST IN MATHEMATICS FOR TEACHERS

<table>
<thead>
<tr>
<th>Objective of the Test</th>
<th>Number of Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>15</td>
</tr>
<tr>
<td>Understanding</td>
<td>20</td>
</tr>
<tr>
<td>Application of Knowledge</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

SCHOOL RESULTS

The term 'School Results' refers to the difference in the percentages of middle standard public examination results for two consecutive academic years, i.e., 1984-85 and 1983-84 of the teachers belonging to exposed groups.
who had undergone inservice training programmes for two weeks in 1984-85 and of the teachers of the unexposed groups who did not undergo any such training programmes during these two years.

AN OPINIONNAIRE TO STUDY THE REACTIONS OF THE TRAINEES TOWARDS THE INSTITUTIONAL VARIABLES OF GOVERNMENT INSERVICE TRAINING CENTRES

It contains twenty-five 'yes'/'No' items pertaining to institutional variables, that is,

i) building facilities;
ii) equipment facilities;
iii) library facilities;
iv) subject-room facilities (Social studies rooms and mathematics room);
v) hostel accommodation; and
vi) audio-visual aids of teaching

Due to non-availability of a readymade tool for measuring the responses of the trainees about the institutional variables of Government Inservice Training Centres, the researcher had to construct it herself.

Validity

In the absence of the availability of external criteria against which the tool could be validated, test
items were discussed one by one with the neighbouring training college staff and fellow-colleagues of the investigator. It was felt that the items pertained to institutional variables only. As such the researcher felt contented with content validity of the test. For scoring, one mark was given to each 'yes' response for all the items.

A QUESTIONNAIRE TO STUDY THE IMPACT OF INSERVICE TRAINING PROGRAMME UPON TRAINEES

The questionnaire consists of forty-five statements. Each of the statement is followed by a five-point scale, that is, 'strongly agree (SA), agree (A), undecided (U), disagree (D), strongly disagree (SD) respectively.

Scoring was done on the basis of scale product technique by giving weight for each response category in usual Likert Fashion. The cumulated score on the scale yielded a measure of impact of inservice training programme. Weight for each response category was as follows:

\[
\begin{align*}
SA & = 5 \\
A & = 4 \\
U & = 3 \\
D & = 2 \\
SD & = 1
\end{align*}
\]

The total scores vary from 45 to 225, showing least impact of inservice training to highest impact of the same.
Validity

All the statements of the questionnaire were discussed one by one by the investigator with the teacher educators of both the inservice training centres. It was agreed upon that the statements are strictly related with the various areas of knowledge comprising of the inservice education programmes. Hence it was felt that the questionnaire has content validity.

TREATMENT GIVEN

The teachers of the exposed groups were exposed to inservice education programmes which comprised of newness in the content, new trends in methodology of teaching, professional growth of the teachers, latest pedagogical strategies in the teaching-learning process with special reference to solving the day-to-day academic problems of the teachers in their respective fields. The teacher educators of Government Inservice Training Centres coupled with resource persons from outside were engaged in executing the inservice education programme at their respective centres, while the teachers of the unexposed groups were devoid of such like experiences as the teachers of the exposed groups did have.
Inservice education programmes employed: (i) lecture method; (ii) group discussion method; (iii) team teaching; (iv) teaching through panel discussion; (v) teaching through quiz competition; (vi) simulated teaching; and (vii) teaching through practical work/ workshop. In short it included the subject matter and the latest skills in the utilization of specific techniques and methods of teaching.

**Controls Employed**

Due attention was paid to different errors arising during the course of the study to make the investigation successful. The type 'S' error characterising sample and sampling was minimised while dividing the sample into eight groups, by matching the groups on the basis of qualification and experience of teaching to middle classes. The type 'G' error arises due to numerous factors in each group. The only way to minimise it was replication of the treatment by rotating the groups, but it was not feasible keeping in view the dimensions of the study. The type 'R' error could not arise because there was no replication of treatment in the conduct of the study.
In addition to the above precautions, attention was also paid to establish proper rapport with the teachers to ensure healthy interaction during teaching learning process, pre-test and post-test. There was no chance of any contamination as the four groups happened to be at different places and there was absolutely no chance for them to mix with the teachers of other groups.

STATISTICAL TECHNIQUES

The statistical techniques used for analysing the data in the present study are given object-wise as under:

1. For studying the nature of data, the measures of central tendency and dispersion were employed.

2. The analysis of variance was employed to study the impact of inservice training upon the exposed groups.

3. The F-ratios of gain scores were computed for studying the significance of difference in the initial behaviour and terminal behaviour among the eight groups of the sample.

4. The significant F-ratios were further analysed with the help of t-test to know the direction of difference. Besides these 't' values were also
used to study the significance of difference between the means of Teacher Effectiveness, Teacher Achievement and School Results with respect to the measures of physical resources of inservice training institutions and to study the significance of difference between means of the initial and terminal behaviours of teachers on TIS, TAS, RIS, SAT, ATT and SRT.

5. Multiple regression equation was used to study the maximum fraction of variance in achievement of teachers and school results of teachers that can be explained by any linear combination of the process and structure variables separately.