CHAPTER-IV

PROCEDURE AND DESIGN OF RESEARCH
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4.0.0 Introduction:

In the earlier chapter, concept of mastery learning, strategies for mastery learning, planning, teaching and grading for mastery has been described. The chapter also deals with the discussion of entire procedure of I.S.D. with reference to common steps and principles involved in the development of Instructional system. Different media of instruction advantages and limitations of each medium is also discussed. Finally, the progressive development of prototype and the brief outline of the final draft is given.

The present chapter deals with the procedure and design of the study, and it is divided into eight major sections. The sections are as below:

1) Selection of the appropriate Research Method.
2) Selection of the appropriate Experimental Design.
3) Controls of threats to internal and external validity.
4) Dependent and independent variables involved in the study.
5) Preparation for the experiment.
6) The conduct of the experiment.
   6.1 Sample and sampling procedure
   6.2 Tools
   6.3 Implementation of the programme
4.1.0 Selection of appropriate method:

Educational research is a formal, systematic and intensive process directed towards discovery and development of an organized body of knowledge. It requires to undergo many stages in a well-regulated and clearly defined order, which are categorized as '4Ps', viz.:

a) Preparatory stage
b) Problem developing stage
c) Planning stage
d) Problem attacking stage. (Van Dalen, 1973)

In the preparatory stage steps of acquisition of knowledge and skills are to be followed. The problem developing stage consists of identification and analysis of problem, statement, clarification and justification of problem, and hypothesizing.

In the light of the analysis, the researcher then selects steps like, selection of procedure of research, data processing, outline of research, time-schedule and preparatory phase. This is called 'planning stage'. The last, i.e. 'Problem attacking stage', deals with development and administration of instrument, employing strategies, data analysis and report writing.

The researcher had followed the above steps in the present study, as the purpose of the study was to find out the effect of mastery over theory and planning in teaching skills on performance. To ensure such causal references and verified functional relationship, experimental study is the best method of educational research.
4.1.1 The Experimental Method:

The experimental method enables to improve the conditions and arrive at more precise results. Further, these studies aim at improving theoretical understanding and seeking a pragmatic comparison of different instructional programmes.

Campbell and Stanley (1963) are of the opinion that the experiment is the only mean for setting disputes regarding educational practice, and the only way of verifying educational improvement.

Experimental evidence is the most solid evidence we can obtain as to the functional validity of a new programme or plan.

This view is also supported by Ennis. He says, "it is legitimate and essential for educational researchers to have causal concerns," and to pursue "questions about what brings about, and what has brought about matters of educational significance." (Ennis, 1982, p. 27 as quoted by Linn R.L., 1986)

However, the researcher has to think about the appropriate experimental design for the present study.

4.1.2 Experimental Designs:

Campbell and Stanley, (ibid) in their classical article, thoroughly discussed the issue of experimental designs, and categories the designs into three groups, viz. : (a) Pre-experimental, (b) True experimental, and (c) Quasi-experimental designs. The true experimental designs are categories the designs of rigorous control. (Van Daleon, 1973). Out of these three, true experimental designs are better as they employ randomization to provide for control of equivalence of groups and exposure to treatment.
Pre-experimental and quasi-experimental designs are less effective, and hence, they are used when use of controls group is not possible and randomization is not feasible. (Best, J.W. and Khan, J.V., 1989, p.24). Hence, the researcher decided to opt for true experimental designs. The issue of controlling threats to internal validity in the true experimental designs has been discussed here. The sources of invalidity of the true experimental designs are presented in Figure No. 4.1.

There are three true experimental designs. The strong points, i.e. factors controlled; weaknesses and sources of concern are symbolically presented in the chart. The sources of validity have been classified in two classes viz. : internal and external threats of validity. There are ten threats of internal validity and three threats of external validity.

It is clear from the figure 4.1, that almost all the threats are controlled in Solomon Four Group design and Post-test only - Control Group design; whereas, in pre-test - post test - control group design, the external threat of interaction of testing is not controlled. Hence, these two designs may be considered as superior to Pre-test - Post-test - Control Group design.

However, Pre-test - Post-test - Control Group design has certain advantages over the other two designs. These advantages are as follows:

1) It involves only two groups, and therefore, it is more convenient and feasible than the Solomon-Four-Group design.

2) Pre-test - Post-test - Control Group design makes it possible to do the adjustment for the effect of differential refusal by the subjects or of data due to attribution. (Linn, R.L., 1986)
### Sources of Invalidity For Designs 1 Through 6

<table>
<thead>
<tr>
<th>Designs</th>
<th>Sources of Invalidity</th>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>History</td>
<td>Maturity</td>
<td>Testing</td>
</tr>
<tr>
<td>1. One-Group Pretest-Posttest Design</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. One-Group Pretest-Posttest Design</td>
<td>X</td>
<td>O</td>
<td>-</td>
</tr>
<tr>
<td>3. Static-Group Comparison</td>
<td>+ ?</td>
<td>+ + + -</td>
<td>-</td>
</tr>
<tr>
<td>4. Pretest-Posttest Control Group Design</td>
<td>+ + + + + + +</td>
<td>-</td>
<td>?</td>
</tr>
<tr>
<td>5. Solomon Four-Group Design</td>
<td>+ + + + + + +</td>
<td>+</td>
<td>?</td>
</tr>
<tr>
<td>6. Posttest-Only Control Group Design</td>
<td>+ + + + + + +</td>
<td>+</td>
<td>?</td>
</tr>
</tbody>
</table>

**Note:** In the tables, a minus indicates a definite weakness, a plus indicates that the factor is controlled, a question mark indicates a possible source of concern and a blank indicates that the factor is not relevant.

*Fig. No. 4-1 True Experimental Designs.*
3) The most important advantage of use of Pre-test - Post-test - Control Group design over Post-test only design, is that, it helps in identifying interaction between the levels of premeasures and the treatment condition. (ibid)

4) The studies on teaching and teacher education are conducted on relatively smaller sample size. The statistical power becomes major concern under such conditions. Hence, importance of obtaining premeasures that are expected to be related to post-test is especially greater. (ibid)

Therefore, in the view of all the merits of pre-test - post-test - Control group design, the researcher decided to select the same for the study.

4.1.3 Pre-test - Post-test - Control Group Design:

As depicted in Fig. No. 4.1, in this design, the experimental group experiences treatment, while the control group does not. The use of control group takes care of history and maturation. Group assignment is made on the random basis which controls selection and mortality. Administration of pre-test assures that control group and experimental group are at equal level before the treatment. Thus, many threats to validity are controlled in this design. In the above described design the researcher has included one additional experimental group, so the modified design could be depicted as follows in Fig No. 4.2.

\[
\begin{array}{ccc}
R & x_1 & 0 \\
R & x_2 & 0 \\
R & c & 0 \\
\end{array}
\]

Fig. No. 4.2: Pre-test - Post-test - Control Group Design used for the study.
After selecting the design the ways to control internal and external validaties are described below:

4.2.0 Validity of the Design used:

The design of an experiment should ensure adequate validity or truthfulness of conclusions. Cook and Campbell (1979) have identified four different validities associated with causal relationship between treatment and outcome constructs. They are as follows:

1) Statistical Conclusion Validity.
2) Internal Validity.
3) Construct validity of cause and effect.
4) External Validity.

In the present study an attempt has been made to obtain a balance between internal and external validity.

Careful attempt has been made in this study to control the sources of invalidity using appropriate techniques. The procedure of controlling these sources has been described below.

4.2.1.1 History:

History refers to events occurring in the environment at the same time that the experimental variable is being tested. Specifically, materials, conditions and procedures used within the experiment expect of the variables manipulated must be identical.

As a part of design selected control group was located which took care of history.
4.2.1.2 Maturation:

Maturation refers to the process of change within the experimental subjects as fatigue, hunger, loss of interest. The changes are biological and psychological from within and external sources - as location, duration of experiment, etc.

As the duration of the experiment was just eighteen days meagre possibility of biological changes in the trainee which might have affected dependent variables.

Every day the trainees worked for three hours, hence there was no problem of fatigue or loss of interest. Besides, during the time of the experiment the college teachers were on strike, hence the trainees were free from lectures and could fully devote to the experimental task. They had no other additional work to share.

The control group set also had the same maturational and developmental experiences. Thus, maturation was controlled.

4.2.1.3 Testing:

Testing refers to the effects of taking a pre-test on post-test performance of individuals if the tests are identical. It was controlled by using control group and the same tests were used for control and experimental groups.

4.2.1.4 Instrumentation:

Instrumentation refers to changes that occur in the measurement or observation procedures during an experiment. Changes may occur in rators or in the basis of ratings from one group to another or testing conditions.
To control the changes in observer raters, they were oriented in using PASTE. Interobserver reliability was established prior to the experiment. The same raters were used to observe the lessons of all the three groups. The testing conditions were the same and finally the same testing tool, i.e. PASTE was used. For measuring the skill performance, the lessons were recorded and then analyzed by the researcher.

4.2.1.5 Selection:

It means biases resulting from differences in the selection of subjects in the compared groups as personal reactions and behaviours of individuals. The problem of selection was minimized by random selection of the subjects and random assignment of the groups to experimental and control group.

4.2.1.6 Regression:

When groups are chosen on the basis of extreme scores on a particular variable, problem of statistical regression occurs. The lack of perfect correlation is due to the unreliability of tests.

Groups of extreme scores were not selected. The sample was not purposive, but random; hence, there was no problem of regression.

4.2.1.7 Mortality/Attrition:

It is related to the loss of subjects during an experiment and also the condition of the experiment.

In order to check mortality, personal appeal was made to the student-teachers included in the experiment and their consent was sought. It was also pointed out to them that, the work done for the experiment
would be counted as a part of their practice-teaching and it would not be an additional work. This helped to maintain high motivation level in all the three groups and no student-teacher left the experiment till the end.

4.2.1.8 Interaction of Selection and Maturation:

Interaction effects are attributable to selection and maturation affect internal validity. A source of invalidity might be a selection maturation interaction.

The duration of the experiment was very short i.e. eighteen days only. Similarly the control group was set, thus most of the combined sources of invalidity of selection and maturation were controlled.

To summerize this, the sample was unbiased. The duration was less as stated earlier and the experimental conditions were not leading to the lack of interest and fatigue. The use of control group ensured that there will be no interaction effect. Thus, the interaction effects due to age, intelligence, sex and time were eliminated.

4.3.2 Controls for External-Validity:

Campbell and Stanley (1963) use the term 'external validity' to refer to the generalizability or representativeness of the study. In order for findings to have any generality and, therefore, to be more broadly useful it is necessary to consider external validity. Four factors are related to external validity, they are as follows.
4.3.2.1 Interaction of Testing and Treatment:

Pre-test may have effects confused or confounded with treatment effects and can engender attitudes and intellectual skills which would remain latent without the occurrence of post-test. Moreover, the pre-test may alert the experimental group to some aspect of the interventions that is not present in control group.

This threat was controlled by using a control group and assigning the treatments through randomization.

4.3.2.2 Interaction of Selection and Treatment:

This is one of the threats to external validity which should be source of concern to the researcher, hence, she took special care to control this threat.

Having selected the design, the ways to control threats to internal and external validity were determined. The variables involved in the study were identified and finalized. The spelt out variables related to experiment are given here in order to add precision and avoid ambiguity.

4.4 Variables:

Variables considered in this study are of three types: (i) independent variables, (ii) dependent variables, and (iii) moderator variables. All the variables are discussed below.

4.4.1 Independent Variables:

Independent variables are inputs which are measured and manipulated to determine the relationship and affect on another variable. The independent variables in the present study were as below:
1) Mastery over theory of skill Reacting and skill Narration
2) Mastery over planning in skill Reacting and skill Narration
3) Mastery over theory followed by microteaching in each skill
4) Mastery over planning followed by microteaching in each skill
5) Traditional microteaching in each skill.

80/80 mastery over theory of skill Reacting and skill Narration achieved through training for mastery. This was followed by modelling, training in planning and practice in microteaching setting.

Second independent treatment is training in theory of both the skills which was followed by training for mastery over planning in both the skills followed by practice in microteaching setting.

The third treatment was traditional, consisting of two standard microteaching cycles in each skill.

4.4.2 Dependent Variables:

It is a responsible variable or output which is measured to determine the effect of the independent variable. The dependent variables in the present study were as follows:

1) General Teaching Performance
2) Skill Performance.

4.4.2.1 General Teaching Performance:

General teaching performance was the scores achieved by trainees on PASTE while teaching in real classroom situation.
4.4.2.2 **Skill Performance**:  

Skill performance was the use of skill in real teaching. It was measured in two ways: (a) total use of the skill in a lesson; and (b) use of each component of the skill in each lesson. The skill performance was measured after analysis of audio-recorded lessons.

4.4.3 **Moderator Variables**:  

It is a special type of variable or secondary independent variable for the study to determine the effect of the relationship between the primary independent variable and dependent variables.

The moderator variables in the present study were as below:

1) Intelligence
2) Planning abilities
3) Attitude of Teaching

4.4.3.1 **Intelligence**:  

It was defined as the scores achieved by the teacher-trainees on group intelligence test (RSPM).

4.4.3.2 **Planning abilities**:  

They were defined as the summated scores achieved by the teacher-trainees in planning ability tests developed by Jnana Prabodhini, Pune; based on Guilford Model. The planning abilities comprise:

1) Figural cognition
2) Semantic cognition
3) Semantic convergent production
4) Symbolic divergent production
5) Figural divergent production
6) Semantic divergent production
4.4.3.3 **Attitude of-Teaching**:

It was defined as the scores achieved by the teacher-trainees on attitude inventory developed by Ahluwalla, S.P. (ATAI).

All the moderator variables were measured in pretesting.

After finalizing the variables the preparation for the experiment was made, which is discussed below.

4.5.0 **Preparation for Experiment**:

After the determination of variables necessary preparation required for the conduct of the experiment was made. It included the following:

1) Consent of the authorities concerned
2) Consent of the student-teachers
3) Support material needed
4) Testing Material - Tools
5) Try out of material
6) Determination of the suitable period for the experiment
7) Orientation of the colleagues for interobserver reliability
8) Tools
9) Preparation of Task-sheets
10) The time schedule of the experiment.

4.5.1 **Consent of the authorities concerned**:

Prior to the experiment, the permission of the authorities concerned was sought for.
a) The Principal and Chairman,
Mahaveer College, Kolhapur

The entire plan of the experiment was discussed with them. The problems regarding provision for rooms, duration of experiment, collaboration of other staff needed, the number of trainees involved in the experiment, etc. were discussed with them. The Principal was requested to kindly make available accommodation and resources needed. He heartily gave his consent.

b) The Heads masters of Practising Schools

For the real classroom teaching, students from VIIIth and IXth were needed. Hence, the Head masters of practising schools, namely, Private High School, New High School, N.M.V. High School and Pant Walawalkar High School, were requested to kindly make available the pupils for one day each. They gladly accepted the request and promised to extend their heartiest co-operation whenever.

4.5.2 Consent of student-teachers:

The student-teachers from second year B.A.B.Ed. Course, Mahaveer College, Kolhapur were consented for participation in the experiment. They accepted the invitations and were ready to participate in the experiment.

4.5.3 Support Material Needed:

As described in Chapter-III, self-instructional material on theory, modelling and planning of skill Reacting and skill Narration was prepared. It was tried and tested and the final product was cyclostyled, and 75 copies of each booklet were kept ready.
4.4.2.2 **Skill Performance**:

Skill performance was the use of skill in real teaching. It was measured in two ways: (a) total use of the skill in a lesson; and (b) use of each component of the skill in each lesson. The skill performance was measured after analysis of audio-recorded lessons.

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2) Semantic cognition
3) Semantic convergent production
4) Symbolic divergent production
5) Figural divergent production
6) Semantic divergent production
4.5.4 Testing Material Tools:

Testing materials included theory check up test, plan evaluation criteria, PASTE, Attitude scale for teachers, General mental ability tests (RSPM), General Ability Tests by Jnanprabodhini, Pune.

1) Theory Check up-Test:

In the light of theoretical part of the self-instructional material of both the skills, theory checkup tests were developed by the researcher. In order to make the tests more accurate, blue prints having two dimensions were prepared, first. The two dimensions are - a) Weightage to objectives, and (b) Weightage to content. The blue prints of theory check-up test for skill Reacting are given in the table No. 4.1 and 4.2.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Objective</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Knowledge</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Understanding</td>
<td>23</td>
<td>46</td>
</tr>
<tr>
<td>3.</td>
<td>Application</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>4.</td>
<td>Evaluation</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>
Table No. 4.2

Weightage to Content

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Content Points</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Psychological background and Research</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>2.</td>
<td>Components of skill Reacting</td>
<td>23</td>
<td>46</td>
</tr>
<tr>
<td>3.</td>
<td>Classroom Interaction</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>4.</td>
<td>Use of Reactings</td>
<td>15</td>
<td>30</td>
</tr>
</tbody>
</table>

Total: 50 100

It is clear from the above tables that the maximum weightage is given to objective understanding and to the content related to components of skill Reacting.

The blue prints of theory check up test for skill Narration are given in the table No. 4.3 and 4.4.

Table No. 4.3

Weightage to Objectives

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Objectives</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Knowledge</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>2.</td>
<td>Understanding</td>
<td>28</td>
<td>56</td>
</tr>
<tr>
<td>3.</td>
<td>Application</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

Total: 50 100
### Table No. 4.4
**Weightage to Content**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Content Points</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Objectives of Narration</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Difference between Narration description and explaini</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>3.</td>
<td>Criteria of Narration</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>Narration as a basic skill</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>5.</td>
<td>Components of other skills related to skill Narration</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>6.</td>
<td>Components of skill Narration</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>7.</td>
<td>Experimental work</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

**Total:** 50 100

It is clear from the above tables that the emphasis was given to objective 'Understanding' and to the content related to components of skill Narration.

2) **Plan Evaluation Criteria:**

It was developed by the researcher on the guidelines of planning booklet. All the criteria given for evaluation of plans are arranged in the form of a check-list, for both the skills. Hence, all the answers are of "yes/no" type.
The plan evaluation criteria for skill Reacting has thirty items. These criteria are related with selection of appropriate unit, maximization of all components and subcomponents of skill Reacting, proper use of each component of skill Reacting according to pupil's response, use of improper reactions, use of open and closed questions, time given to explanation and black-board writing, and repetitions of reactions.

The items of plan evaluation criteria of skill Narration are related with (a) selection of unit for a microlesson of skill Narration with respect to time, (b) maximization of each positive component and sub-component of skill Narration, (c) minimization of all negative components of the skill, (d) sequence of major points and sub-points of unit, and (e) format of the plan.

The plan - evaluation criteria of both the skills were tried and tested. The procedure of trial and testing the plan evaluation criteria of both the skills is thoroughly discussed in Chapter-III, along with the trial of self-instructional material of both the skills.

3) PASTE :

The scale used for observation of lessons in real situation. It was developed by Bhalwankar, A.G. and Joshi, A.N. (1981) for the appraising teaching performance. It was a standardized tool, and it was made available from Department of Education, Shivaji University, Kolhapur. Five hundred copies were printed.

4) ATA1 :

It is a standardized attitude scale for teachers, developed by Ahluwalia, S.P. (1980). The inventory was collected from Department
of Education, Shivaji University, Kolhapur. Fifty xerox copies of inventories along with answer sheets were kept ready.

5) RSPM:

It is a standardized general mental ability test developed by Raven, J.C. (1977). Fifteen copies of the test were made available from Department of Education, Shivaji University, Kolhapur.

6) Tests for planning abilities:

It was learnt that Jnan Prabodhini, Pune developed General Ability Tests based on Guilford Model of intellect. The authorities were contacted and requested for making the tests available. As the tests are sold only to research institutions, they were collected through Department of Education, Shivaji University, Kolhapur. After receiving the original tests, the copies of required answer sheets were xeroxed, and fifteen answer sheets of each test were kept ready. Each test is in the form of a booklet followed by a manual providing instructions in its use, scoring, ranking, etc.

The detailed description of each tool is discussed in this chapter later on. All the testing material, thus, was neatly typed and cyclostyled, and kept ready.

4.5.5 Tryout of the material:

After the preparation of the final draft of the support system, the researcher tried out the material in order to decide the time and its outcome. From the tryout the time required for reading the material, conducting the activities, solving the tests was estimated.
4.5.6 **Determination of suitable period for the Experiment:**

It was decided to conduct the experiment in the second term of the academic year 1988-89. In the meanwhile, the intelligence tests, general mental ability tests, attitude tests were made available.

For the success of the experiment, trained and skilled manpower was needed to handle the situation with ease. Hence, prior to actual experiment, there was a need to orient the colleagues.

4.5.7 **Orientation of the Colleagues:**

Two colleagues were selected as research collaborators. They were knowing about microteaching. However, in order to uniformity in observation of microlessons and common procedure of feedback, they were oriented.

In the orientation programme all the booklets of the two skills were given for reading and then frequent discussions were held. The discussions included theoretical part of the skills, planning steps, observational matrix of the skill. All the doubts and difficulties were clarified.

For the observation of teaching in real situation, each colleague was given a copy of observational scale - PASTE. Each component of the scale was discussed, and then their interobserver reliability was established. The procedure was given below:

**Inter-Observer Reliability:**

The researcher and her colleagues observed the practice lessons of two student-teachers simultaneously using scale PASTE. In order to
The scores of the three observers including the researcher while simultaneously observing two lessons of different teacher-trainees were first calculated. Coefficients of correlations were computed comparing the scores of each colleague with the researcher and finally between two colleagues using Scott’s Pie Method. The steps used to calculate the coefficient of inter observer reliability using the Scott’s Pie Method are as below:

**Steps of Scott’s Pie Method**:

1) The original tallies of two observations (observation of a lesson by two, or two observations by one) are recorded in the first two columns of table.

2) First two columns are added to find total tallies.

3) The tallies in first two columns are converted to percentage and written into column 4 and 5.

4) Difference between column 3 and 4 is calculated and entered in column 5 as percentage difference and summed up.

5) Average percentage of column 3 and 4 is calculated, squared and entered in column 6. Column 6 is summed up and divided by 100.

6) \[ P_o = 100 - \text{Sum of column five (\% difference)} \]
   \[ P_e = \text{Sum of Column 6 (AVE \%)}^2 \cdot 100, \]
   \[ P_e = \frac{P_o - P_e}{100 - P_e} \]

One example of calculating inter observer reliability is given below:
assess the accuracy of these ratings for their further use in the measurement of teacher fidelity it could be necessary to find inter observer reliability.

Medley and Mitzel, (1963, p. 253) discussed three types of coefficients for the reliability of observation by any observational technique.

1) **Reliability coefficient:**
   A correlation between the scores based on observations made by different observers at different times.

2) **Stability coefficients**:
   A correlation between scores based on observations made by the same observers at different times.

3) **Coefficient of observer agreement**:
   A correlation between scores based on observations made by different observers at the same time.

According to Midley and Mitzel (1963), the coefficient of observer agreement tells us something about the objectivity of an observational technique; the coefficient of stability tells us something about the consistency of behaviour from time to time. The reliability coefficient tells us how accurate our measurements are.

In order to find reliability, for the purpose of this study, coefficient of observer agreement inter observer reliability and stability were, therefore, the appropriate types among three.
Coefficient of Interobserver Reliability of Using Scott’s Pie Method

<table>
<thead>
<tr>
<th>Categories</th>
<th>Observer 1 (S.J. Baker)</th>
<th>Observer 2 (N.R. Patil)</th>
<th>Difference</th>
<th>Average Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>4</td>
<td>0</td>
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<tr>
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<td>2</td>
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<td>19</td>
<td>8</td>
<td>7</td>
<td>1</td>
<td>56.25</td>
</tr>
</tbody>
</table>

Total: 18 Total = 285

\[ P_o = (100 - 18) = 82 \]

\[ P_e = \frac{285}{100} = 2.85 \]

\[ \frac{P_o - P_e}{100 - P_e} = \frac{82 - 2.85}{97.15} = 0.82 \]

As the tallies of the scale are out of 100, it is not necessary to convert them into percentage.
Table No. 4.5
Inter Observer Reliability

Coefficient of Agreement

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Pair of Observers</th>
<th>Coefficient for Lesson 1</th>
<th>Coefficient of Lesson 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N.R. Sapre - S.J. Baker</td>
<td>0.84</td>
<td>0.88</td>
</tr>
<tr>
<td>2</td>
<td>N.R. Sapre - N.R. Patil</td>
<td>0.79</td>
<td>0.86</td>
</tr>
<tr>
<td>3</td>
<td>N.R. Patil - S.J. Baker</td>
<td>0.82</td>
<td>0.90</td>
</tr>
<tr>
<td>4</td>
<td>N.R. Sapre - S.P. Deshpande</td>
<td>0.79</td>
<td>0.85</td>
</tr>
<tr>
<td>5</td>
<td>N.R. Patil - S.P. Deshpande</td>
<td>0.77</td>
<td>0.81</td>
</tr>
<tr>
<td>6</td>
<td>S.J. Baker - S.P. Deshpande</td>
<td>0.78</td>
<td>0.82</td>
</tr>
</tbody>
</table>

Coefficient of Stability

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of observer</th>
<th>Coefficient of stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N.R. Sapre</td>
<td>0.86</td>
</tr>
<tr>
<td>2</td>
<td>N.R. Patil</td>
<td>0.87</td>
</tr>
<tr>
<td>3</td>
<td>S.J. Baker</td>
<td>0.90</td>
</tr>
<tr>
<td>4</td>
<td>S.P. Deshpande</td>
<td>0.84</td>
</tr>
</tbody>
</table>

Observations:

It is evident from the table No. 4.1, that the coefficient is above 0.80 in second lesson. In case of some observers, it is also above 0.80.
Hence, it was considered as adequate evidence of inter observer reliability and stability.

4.6 **Sample and Sampling Procedure**:

Sampling procedures involve a number of considerations which must be clearly understood if adequate results are to be obtained. The size of sample is a most discussed issue in the experimental research, especially in the areas of research on teaching and teacher education. Majority of the researches in teacher education were conducted with a limited number of students. The steps involved in sampling, and the procedure is described below.

Fox, D.J. (1969, pp. 319-322) gives the procedure for selecting sample for educational research. According to him, there are five steps in sampling process and there are corresponding five levels of samples, viz. : (a) Universe, (b) Population, (c) The invited sample, (d) Accepting sample, and (e) Data Producing sample.

a) **Universe**:
   It includes all possible respondents of a certain kind.

b) **Population**:
   It is that portion of universe to which a researcher has access.

c) **The invited sample**:
   It is defined as all elements of the population to which an invitation to participate in research is extended.

d) **The accepting sample**:
   It is that portion of invited sample that accepts the invitation and agrees to participate.
e) The data producing sample:

It is defined as that portion of the accepting sample that actually produces data.

The five steps of selecting sample are as follows:

1) Identification of the universe.
2) Identification of population to which researcher has access.
3) Deciding size of the sample and selecting representative sample.
4) Inviting the sample and extending invitation until sufficient number accepts invitation, so that the sample size is of desired size.
5) Applying the treatment and data gathering techniques finally for data production. All or most of the accepting respondents generally produce the required data.

The findings and generalization of the study based on data producing samples can be applicable and generalizable for whole of the universe or at least to those populations in the universe which are similar in nature to that population, from which the sample was drawn. The sampling cycle is given in Figure No. 4.3.
Fig. No. 4.3: The Sampling cycle

I.S. = Invited sample
A.S. = Accepting sample
D.P.S. = Data producing sample

So far as the generalization of the findings of the study to the universe is concerned, the representativeness is the recurring concern throughout the sampling process. Therefore, in sampling process the second step in particular and insuring representativeness at all stages, in general, is of utmost importance.

The second step relates to the decision of size of sample and its representativeness.

4.6.1 Issues Related to Size of Sample and Its Representativeness:

The size of sample is a controversial issue. The educational statisticians have different opinions. The size of sample varies inversely with the standard errors (SE) (Garrett, 1979). There are very few concrete suggestions regarding the size of the sample.
Statistically, all the samples above (N ≥ 30) are treated as large samples. (ibid, p. 186) According to Roscee, J.T. (1975, p. 185) 10% of the population is an adequate sample. He further says, "..... in simple experimental research with tight experimental controls successful research may be conducted with samples as small as 10 to 20 in size....... Generally, the choice of sample size is as much a function of budgetary considerations as it is of statistical consideration. Larger samples, when these can be afforded, will ordinarily be preferred over smaller ones; however, well-chosen small sample will ordinarily be preferred over poorly chosen larger ones."(p. 184)

This view is also supported by Williamson, K. and Gray, D. (1982); Harrison (1979) and Gay (1981).

These guidelines have already followed by many researchers. Especially, the studies related to microteaching, interaction analysis, etc. which involve large and rigorous treatments, require manageable size of sample, i.e. N = 10 to 40. [See, Jangira, N.K. 1972 (N = 20); Joshi, S.N. 1977 (N = 34); Passi, B.K. (1977) (N = 34); Lalitha, M. (N = 35); Pavansan, 1977 (N = 18); Sharma, K.K., 1976 (N = 32); Singh, L.P., 1974 (N = 20); Raijiwala, 1976 (N = 15); Raka, S.D., 1976 (N=9)]

Finally, the guidelines provided by Fox, (1969, p. 346) is more valuable. He says that the size of sample is far less important than sample representativeness. Thus, the issue of representativeness becomes the most concern.

The most trustworthy way of securing representativeness is to make sure that the sampling is random. (Garrett, 1979, p. 203). The use of tables of random numbers ensures randomness of sample. If the population is clearly defined, then it is easier to get random sample from the population.

Garrett, (ibid) further says that larger the N, larger the SD of sample and more inclusive (presumably) representative the sample comes of general population. (p. 208)

If N = 50, or around fifty, the, only 0.5% cases from both the extremities of the normally distributed population lie outside the range of the sample. It means that it represents 99% cases from the population. In case of the populations consisting of N around 80 (as in case of B.Ed. colleges) less than one individual from two extremities may not be represented by sample with N = 50 or so.

So, on the basis of the above guidelines, the researcher decided to have the sample size between, N = 36 to 30. The process of sampling for the present study was planned as follows.

The universe for the study was defined as Marathi medium experienced, inexperienced, male and female student-teachers of second year from four year integrated teacher-training course. The universe had at least the following common features.
1) They had passed in H.S.C. or equivalent examination and the first year university examination from the four years.

2) They had opted for teacher training course.

3) They had some background of observation of teaching, but do not have experience of actual teaching.

4) They had opted for teaching practice to be conducted through Marathi medium.

5) They had screened according to the uniform rules of University.

The universe had physical boundaries of Shivaji University. The student-teachers enrolled for Second Year B.A.B.Ed. from Karmaveer Hire College of Arts, Science, Commerce and Education, and Mahaveer College, Kolhapur are represented as universe of present study.

The population of the universe, is the student-teachers admitted in any one of the colleges.

For the present study, the researcher selected the population from Second Year B.A.B.Ed., Mahaveer College, Kolhapur; for the purpose of convenience and feasibility as she was one of the faculty members of the college. The programme of practice-teaching begins in second year in four year integrated course, hence, the student teachers in second year had no prior teaching experience.

The size of sample decided was about 50% of the population which came out to be thirty-six. The invitation, therefore, was sent to thirty-six student-teachers from the Second Year B.A.B.Ed. batch in 1988, they were randomly selected from the batch of seventy-eight.
students. All the thirty-six student participants accepted the invitation and consented to involve in the programme. The participants responded fully as the researcher earlier appealed to them to share an opportunity to learn new teaching strategy likely to be involved in the system of education, soon. Further, the trainees were made aware that it would be the part of their training programme and not any load of additional work. Thus, the selected thirty-six students constituted the 'Accepting sample.'

There was no loss in the number of participant student-teacher during the experiment. So, the whole accepting sample i.e. thirty-six student-teachers became the 'data producing sample' for the study.

The data were collected from the data producing sample using the tools described below.

4.7.0 Tools:

As mentioned earlier, the tools to be used were - (a) Theory check up Test, (b) Plan evaluation criteria, (c) PASTE, (d) Attitude Scale of Teachers, (e) RSPM, and (f) General Ability Tests.

4.7.1 Theory check-up Test:

As discussed earlier the researcher had developed the theory check up tests for both the skills. The test of skill Reacting consisted of forty-five items; whereas, that of skill Narration had fifty items. All the items are of objective type. Both the tests carry fifty marks each.
4.7.2 Plan Evaluation Criteria:

The researcher had developed the self-evaluation criteria to evaluate the lesson plans. There are thirty criteria in case skill Reacting; whereas, twenty-five criteria in case of skill Narration. All the criteria are organized in the form of check-list.

4.7.3 Process-Process-Appraising Scale of Teacher Effectiveness (PASTE):

PASTE was developed by Bhalwankar, A.G. and Joshi, A.N. (1981), for the appraising teaching performance of teacher and student-teacher as well. The silent features of PASTE are as follows:

i) In PASTE unique combination of high and low interference variables is achieved.

ii) It takes into account both teacher as well as pupils' behaviour (i.e. the immediate product variables), so that it becomes a tool of measuring teacher effectiveness.

iii) The combination of rating and counting makes the tool more objective than the rating scale and more feasible than category system.

iv) It focusses on both qualitative as well as quantitative aspects of teaching.

The PASTE could be used in different ways for the purpose of research on teaching and teacher education as given below:

i) As an objective tool to measure and evaluate teaching, teaching competency and teacher effectiveness.

ii) As a source of feedback in teacher education.
iii) For the improvement of perception and performance of the teachers and student-teachers.

iv) For diagnosing the teachers.

The scale was extensively used in an exploratory study on teacher effectiveness and in a few Colleges of Education in Maharashtra. It was found to be very useful instrument and the results are encouraging and promising.

The PASTE consists of fourteen components, each one has one or more sub-components. Each sub-component includes many teacher behaviours. Each teacher behaviour is to be rated on five points scale. Similarly there are student behaviours listed as the consequent behaviours of teachers' activities. The total number of students behaviours is seventy-nine. Each students behaviour is to be rated on three points scale. The final rating of each sub-component is done on the basis of teaching behaviour and consequent students behaviour. This is done on six points scale. There are eighteen sub-components. Therefore, the score will be out of ninety and ten marks are assigned for general impression. So, the total scores will become hundred.

Reliability:

The PASTE is highly reliable and valid tool. The coefficient of stability is 0.62, the content validity is high, the coefficient of equivalence is 0.69, and the coefficient of validity is 0.68. The index of decision making accuracy is 0.91.
Ahluwalia's Teacher Attitude Inventory (ATAI):

The attitude inventory developed by Ahluwalia, S.P. (1980) consists of ninety items distributed over six-sub scales constructed on the lines of Likert summated rating procedures. Each sub-scale has fifteen statements related to a particular aspect of professional attitude of teachers. The six areas covered by the sub-scales are the attitude towards: (i) Teaching performance, (ii) Classroom teaching, (iii) Child-centered practice, (iv) Educational process, (v) Pupils, and (vi) Teachers.

Out of ninety statements fifty six are positive declarative statements and thirty four are in negative form. Forty three statements are meant for accessing attitude in favourable direction and forty seven in unfavourable direction. Each item is assigned a weight, ranging from 4 (strongly agree) to 0 (strongly disagree) for favourable items. In case of unfavourable items, range of assigned weight is reversed i.e. from 0 (SA) to 4 (SD).

The attitude scale is sum total of all the six sub-scales. The theoretical range of the scores is from 0 to 360, with the higher scores indicating the more favourable attitude towards teaching profession. The split half reliability is found to be 0.79 (N = 239). The test re-test reliability after interval of three months and nine months are found to be 0.59 (N = 102) and 0.69 (N = 290). The inventory has satisfactory Marathi content validity. ATAI is enclosed in Appendix-III.

Raven's Standard Progressive Matrices (RSPM):

The standard progressive matrices set A to E is a test of person's capacity, at the time of the test, to apprehend meaningless figures presented for his observations; see the relations between them,
conceive the nature of the figure completing each system of relations presented and by doing so develop a method of reasoning.

The scale is developed by Raven, J.C. (1977) and consists of sixty problems divided into five sets of twelve. In each set the first problem is as nearly as possible, self evident. The problems which follow become progressively more difficult. The sets provide five progressive assessment of a person's capacity for intellectual activity. Every one whatever his age is given exactly the same series of problems in the same order and asked to work out at his own speed. The scale can be given either as an individual a self-administered or as a group test. A person's total score provides as an index of his intellectual capacity whatever may be his nationality of education. The test, not a test of general intelligence, but of observation and clear thinking. The scale has reliability varying with age from 0.83 to 0.93. It correlates with the Terman and Merill scale and has found to have a 'g' saturation of 0.82.

4.7.6 Tests related to the Planning ability:

Abilities are generally classified in terms of the kind of mental operation involved in the abilities and in terms of content areas of information. From this point of view, the major abilities as described by Guilford J.P. (1971) are as follows. (in terms of operations involved)

1) Cognition - knowing
2) Divergent production - generation of logical alternatives
3) Convergent production - generation of logic tight conclusions
4) Memory - learning
5) Evaluation - judging goodness of what is known or produced
Abilities in terms of content or areas of information

1) Figural concrete or perceived
2) Symbolic - signs, code elements such as numbers, letters
3) Semantic - thoughts, conceptions or constructs
4) Behavioural - psychological

The abilities involved in planning are briefly described below

1) Figural Cognition:
The operations are related to relations between pairs of figures that could be understood as changes or transformations, rotation of figure or a certain number of degrees. In this, a complex figure or set of figures is shown with a progressive change in three steps to select from five alternatives.

2) Semantic Cognition:
It includes vocabulary tests either in a multiple choice or in a definition form. The words given carry semantic content known as verbal comprehension. It helps to determine dependability of the factor. The test had been taught and also to tell a number of ways in which two objects are alike, to state the meanings of words and puzzle meanings

3) Semantic Convergent Production:
The individual is to generate the best alternatives from the given vocabulary, phrases, objects, etc. In these tests the emphasis is on achieving unique form or best outcomes.
4) **Semantic Divergent Production:**
The operations are related to translations from one content category of words to another. It involves transfer and recall. Sometimes the described situation is given to the individual, and he is to imagine what he will report after visiting the place. It also includes meaningful shifts of words, synonyms and puns upon words.

5) **Figural Divergent Production:**
It is the basis for creative thinking. Figure production has no immediate planning implication. In this simple line figures are presented such as an ellips to which other lines are to be added to make a familiar object. The achievement score is the number of different additions.

6) **Symbolic Divergent Productions:**
It emphasizes the production of alternative changes starting from the same information. Hidden word production tasks are involved. The information is in the form of denotative signs.

On this Guilford Model (1971) Jnan Prabodhini, Pune developed the tests in Marathi.

1) **Figural cognition consisting six items in which the figures from geometry, and other areas were included and the alternatives were given.**

2) **Semantic cognition has also six items based on recognition of vocabulary and meanings of words.**

3) **Semantic convergent production**
4) Semantic Divergent Production has eight items based on uses of certain objects.

5) Figural Divergent Production has nine items dealing with figural changes, imaginative figures, figure completion.

**Tests of Semantic Cognition:**

These tests measure cognition which is defined as immediate discovery, awareness, rediscovery or recognition of information in various forms: 'Comprehension or understanding'.

In this booklet there are six tests:

1) 131: Cognition of semantic units
2) 132: Cognition of semantic classes
3) 133: Cognition of semantic relations
4) 134: Cognition of semantic systems
5) 135: Cognition of semantic transformations
6) 136: Cognition of semantic implications

These tests need not be necessarily verbal. Meaningful pictures can also be used as test items. The tests were tried on urban and rural parts of Maharashtra. The time limit was 32 minutes and 38 additional minutes for administration, thus total time limit is 70 minutes.

**Tests of Semantic Divergent Production:**

Divergent production is generation of information from given information, where the emphasis is upon variety and quantity of output from the same source. Divergent production abilities are concerned with a broad kind of search for information to be received from the memory
store to meet given situations. It involves transfer of abilities and have creative potentialities.

This booklet comprises the following six tests:

1) 331: Divergent Production of Semantic Units
2) 332: Divergent Production of Semantic Classes
3) 333: Divergent Production of Semantic Relations
4) 334: Divergent Production of Semantic Symbols
5) 335: Divergent Production of Semantic Transformation
6) 336: Divergent Production of Semantic Implications

The time required to solve each test is ten minutes and additional ten minutes for administration and collection for each test. Thus, the total period was 120 minutes.

Tests of Semantic Convergent Production:

These tests measure convergent production which is defined as, 'generation of information from given information where the emphasis is upon achieving unique or conventionally the best outcomes.'

This booklet consisted of the following tests:

1) 431: Convergent Production of Semantic Tests
2) 432: Convergent Production of Semantic Classes
3) 433: Convergent Production of Semantic Relations
4) 434: Convergent Production of Semantic Systems
5) 435: Convergent Production of Semantic Transformations
6) 436: Convergent Production of Semantic Implications

Time required for the test was 30 minutes, 34 minutes were for administration and instructions. So, the total time for the entire test was 64 minutes.
Test of Symbolic Divergent:

Divergent Production is generation of information. In each divergent production test, there is one sample problem which has many correct answers generally four to five.

The booklet has the following six tests:

1) 321 : Divergent Production of Symbolic Units (5)
2) 322 : Divergent Production of Symbolic Classes (10)
3) 323 : Divergent Production of Symbolic Relations (10)
4) 324 : Divergent Production of Symbolic Systems (10)
5) 325 : Divergent Production of Symbolic Transformations (10)
6) 326 : Divergent Production of Symbolic Implications (10)

In these tests numbers as well as meaningful words are used in the problems. No deep knowledge of mathematics is required to solve the test, understanding the symbolic properties of numbers is enough. Problems based on words are of letter arrangement, and not related with meanings.

Time for each test is of ten minutes, except the first one which is of five minutes.

Thus, the total time required is 55 minutes, additional 55 minutes are given for administration. Hence, the total time is of 110 minutes.

Tests of Figural-Divergent Production:

It consists of the following six tests:

1) 311 : Divergent Production of Figural Units
2) 312 : Divergent Production of Figural Classes
3) 313 : Divergent Production of Figural Relations
4) 314 : Divergent Production of Figural Systems
5) 315 : Divergent Production of Figural Transformations
6) 316 : Divergent Production of Figural Implications

The time to be given is often minutes i.e. totally 60 minutes. Additional 55 minutes are given for administration; thus total time is 115 minutes.

4.8 Preparation of Task-sheets:

The task-sheets were prepared by the researcher for the research collaborator in each group, for the purpose of clarity, no confusion and smooth conduct of the experiment without consulting the researcher time to time.

The task-sheets were prepared as day-wise programme. Each sheet consisted of a list of support systems, activities to be performed, instructions to be given and home-assignments to be completed. A specimen copy of task-sheet is attached in Appendix No. IV.

After the selection of the sample and tools, the experiment was started on 12th December, 1988. The programme of the experiment is given in the Fig No. 4 and briefly described below:

The First Day:

All the student-teachers selected for the study, and the three research-collaborators were invited. They were explained the theoretical background and general idea of microteaching, purpose and procedure of the experiment, and instructions about testing. Paper-pencil tests
- ATAI and RSPM - were administered. Then, the sample was randomly divided into three groups - Theory Group, Planning Group and Control Group - according to alphabetic order.

**The Second Day:**

Same treatment was given to three groups. The treatment was as follows:

Each student-teacher gave a lesson of twenty-minutes in real classroom situation (IXth standard). The lesson was observed using PASTE by researcher and two collaborators, in the respective group. All the lessons were audio-recorded. No guidance regarding the selection of unit and planning was given to the trainees. Theory-booklets of skill Reacting were distributed among them.

**Home assignment:** Reading of theory booklet of skill Reacting.

**The Third Day:**

Same treatment to three groups.

The student-teacher from each group were asked to do the activities based on each component of skill Reacting, with the help of theory material. Then the theory check-up test was administered. The time allotted for test is one hour.

The modelling booklets were distributed in Control Group and Planning Group.

**Home assignment:** Student-teachers in Control Group and Planning Group were asked to read the modelling booklet.
The Fourth Day:

Treatment to three groups was different.

Control Group: The planning booklet of skill Reacting were distributed. The student-teachers were asked to read the planning material under supervision. They had to perform the activities given in each step of planning simultaneously while reading. Instructions about preparation of plan for microlessons were also given to them.

Home assignment: Preparation of lesson plan of skill Reacting.

Theory Group: The answer sheets of theory test were given back. The researcher had collected the common errors from all student-teachers in groups and prepared a lecture based on it. The lecture was delivered by the researcher. The student-teachers had given the activity of re-reading the theory material focusing on their errors. The activity of focused re-reading was completed under supervision.

Theory check up test was administered for second time.

Planning Group: Treatment was same as that in Control Group.

The Fifth Day:

Treatments to three groups were different.

Control Group: The student-teachers were asked to evaluate their lesson-plans according to the self-evaluation criteria. Each student-teacher taught a microlesson of five minutes. It was observed by peers and also by supervisor, by using observation matrix. Immediate feedback was given by peer-partner. At the end of the overall feedback was given by the supervisor. The peer-partners for observation and feedback, the time-keeper, and the role-playing peers were fixed prior to microteaching.
Home assignment: Replanning of skill Reacting according to the feedback given.

Theory Group: The evaluated answer-sheets of theory check-up test II were given back. The master-student-teachers were identified. The student-teachers in the group were distributed in quadro-group according to the scoring in test. The first three masters worked as the leaders of each group. The second three, nearer to masters, were assisted with the leaders, and the remaining two student-teachers were non-masters having the lowest scoring. The masters were given the training for coaching the non-masters. These masters helped the non-masters to understand and solve the unsuccessful items from the theory test. In this way, the programme of peer-tutoring was arranged.

After peer-tutoring the theory check-up test was administered for third time.

Home assignment: Reading of modelling booklets of skill Reacting.

Planning Group: The evaluated plans were given back. The researcher had noted down the errors of most of the student-teachers and delivered a prepared common-lecture based on these errors. Then the student-teachers were asked to re-read the planning booklet, focusing on the errors.

After focused re-reading the student-teachers had to correct the first plan and prepare another plan with new unit.

The Sixth-Day:

The treatments to three groups were different.
Control Group: The student-teachers evaluated the replans. The reteaching was conducted on the line of teaching session and feedback received.

Home assignment: Selection of unit and preparation of lesson plan for Post test-L.

Theory Group: The planning booklets of skill Reacting were distributed. The student-teachers were asked to read the planning material under supervision. They had to perform the activities given in each step of planning, simultaneously while reading. Instructions about preparation of plan for microlessons were also given.

Home assignment: 1) Preparation of plan for a microlesson of skill Reaction, 2) Selection of unit and preparation of lesson-plan for Post test L.

Planning Group: The evaluated lesson plans were given back. The master-student-teachers were identified. The student-teachers in the group were divided in quadro-group according to the scoring in planning test. The first three masters worked as leaders of each group. The second three, nearer to masters, were assisted with the leaders, and the remaining two student-teachers were non-masters having the lowest scoring. The masters were given the training for coaching the non-masters. These masters helped the non-masters to understand and solve the unsuccessful items from the plan evaluation-criteria, and to improve the plans. In this way, the programme of peer-tutoring was arranged.

After peer-tutoring the student-teachers were asked to prepare the third plan with new unit.
Home assignment: Selection of unit and preparation of lesson plan for Post test I.

The Seventh Day:

Same treatment to three groups.

Each student-teacher gave a lesson of twenty-minutes in real classroom situation as Post test I. (IXth standard). The lessons were observed using PASTE by the researcher and two collaborators in respective groups. All the lessons were audio-recorded.

The Eighth Day:

Same treatment to three groups.

As discussed earlier, the peer partners for observation and feedback, the time-keeper, and the role-playing peers were fixed, in each group. The procedure of observing the microlesson and giving the feedback was explained in each group.

Each student-teacher taught a micro lesson of five minutes. It was observed by the peers and also by the supervisor, by using observation matrix. Immediate feedback was given by peer-partner. At the end the overall feedback was given by the supervisor.

In this way the teach-session of microteaching was completed.

Home assignment: Replanning of skill Reacting according to the feedback given.

The Ninth Day:

Same treatment to three groups.
The student-teachers evaluated the replans. The reteaching was conducted on the line of the teaching session and feedback received.

**Home assignment**: Selection of unit and preparation of lesson plan for Post test-II.

**The Tenth Day**:

Same treatment to three groups.

Each student-teacher gave a lesson of twenty minutes in real classroom situation as Post test II (VIIIth standard). The lessons were observed by using PASTE by the researcher and two collaborators in respective group. All the lessons were audio-recorded.

Theory booklets of skill Narration were distributed among the student-teachers.

**Home assignment**: Reading the theory booklet of skill Narration.

**The Eleventh Day**:

Same treatment to three groups.

The treatment was similar to that on the Third Day, with activities related to each component of skill Narration.

**The Twelfth Day**:

Treatment to three groups was different.

**Control Group**: Treatments were same as that on the Fourth Day with planning booklet of skill Narration.

**Theory Group**: Activity of focused re-reading of theory booklet of skill Narration as discussed in the Fourth Day.
Planning Group: Treatment was same as that in Control Group.

The Thirteenth Day:

Treatment to three groups was different.

Control Group: Microteaching in skill Narration, was conducted as discussed in Fifth Day (teach session).

Theory Group: Peer-tutoring was conducted as discussed in Fifth Day with skill Narration.

Planning Group: Activity of focused re-reading was completed with planning material of skill Narration as discussed in Fifth Day programme.

The Fourteenth Day:

Treatment to three groups was different.

Control Group: Reteaching was conducted on the time of teaching of skill Narration.

Theory Group: Activity of reading the planning booklet and preparation of plan of skill Narration. The activity was completed as discussed in Sixth Day.

Planning Group: Programme of peer-tutoring was conducted as described in Sixth Day, with Planning material of skill Narration.

The Fifteenth Day:

Same treatment to three groups.
Each student-teacher gave a lesson of twenty minutes in real classroom situation as Post test III (VIIth standard). The lessons were observed by the researcher and two collaborators using PASTE. All the lessons were audio-recorded.

The Sixteenth Day:

Same treatment to three groups.

As discussed in the programme of eighth day, teach session of standard microteaching in skill Narration was completed.

The Seventeenth Day:

Same treatment to three groups.

As mentioned in the activities of nineth day, reteach session of standard microteaching in skill Narration was conducted.

The Eighteenth Day:

Same treatment to three groups.

Each student-teacher gave a lesson of twenty minutes in real classroom situation as Post test IV (IXth standard). The lessons were observed by the researcher and two collaborators. All the lessons were audio-recorded.

The Nineteenth and Twentieth Day:

Same treatment to three groups.

Tests of general mental abilities developed by Jnan Prabodhini, Pune, were administered.

The schematic representation of the experiment is given in figure
### Schematic Presentation of Experiment

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Nature of Activities</th>
<th>Time</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction and Orientation</td>
<td>11.00 a.m. to 12.00 noon</td>
<td>12-12-1988</td>
</tr>
<tr>
<td></td>
<td>Administration of ATAI and RSPM</td>
<td>12.30 p.m. to 2.30 p.m.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Teaching performance of 20 minutes lesson, observation using PASTE (Pretesting)</td>
<td>12.00 noon to 5.30 p.m.</td>
<td>13-12-1988</td>
</tr>
<tr>
<td>3.</td>
<td>a) Discussion on Theory of skill Reacting</td>
<td>11.00 a.m. to 12.00 noon</td>
<td>14-12-1988</td>
</tr>
<tr>
<td></td>
<td>b) Activities based on each component of skill Reacting</td>
<td>12.00 noon to 1.00 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Administration of Theory check-up</td>
<td>1.30 p.m. to 2.30 p.m.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>a) Control Group : Reading of planning booklet of skill Reacting and preparation of plan for microlesson of skill Reacting</td>
<td>11.00 a.m. to 2.30 p.m.</td>
<td>15-12-1988</td>
</tr>
<tr>
<td></td>
<td>b) Theory Group : A lecture followed by focused re-reading</td>
<td>11.00 a.m. to 1.00 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Administration of Theory Check up II</td>
<td>1.30 p.m. to 2.30 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Planning Group : Reading of planning booklet of skill Reacting and preparation of plan I for microlesson of skill Reacting</td>
<td>11.00 a.m. to 2.30 p.m.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>a) Control Group : Teach and feedback for skill Reacting (Standard microteaching)</td>
<td>11.00 a.m. to 3.00 p.m.</td>
<td>16-12-1988</td>
</tr>
<tr>
<td></td>
<td>b) Theory Group : Peer tutoring Administration of Theory Check up III</td>
<td>11.00 a.m. to 2.00 p.m. to 3.00 p.m.</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Nature of Activities</th>
<th>Time</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>c) Planning Group: A lecture followed by focused re-reading of planning material of skill Reacting. Preparation of Plan II for microlesson of skill Reacting</td>
<td>11.00 a.m. to 3.00 p.m.</td>
<td>17-12-1988</td>
</tr>
<tr>
<td>6.</td>
<td>a) Control Group: Reteach session for skill Reacting</td>
<td>11.00 a.m. to 3.00 p.m.</td>
<td>17-12-1988</td>
</tr>
<tr>
<td></td>
<td>b) Theory Group: Reading of planning material and preparation of plan for a microlesson of skill Reacting</td>
<td>11.00 a.m. to 3.00 p.m.</td>
<td>17-12-1988</td>
</tr>
<tr>
<td></td>
<td>c) Planning Group: Peer-tutoring. Preparation of Plan III for a microlesson of skill Reacting</td>
<td>11.00 a.m. to 3.00 p.m.</td>
<td>17-12-1988</td>
</tr>
<tr>
<td>7.</td>
<td>Teaching performance of twenty minutes of all the student-teachers. Lesson observation by using PASTE (Audio-recording) Post test I</td>
<td>12.00 noon to 5.30 p.m.</td>
<td>19-12-1988</td>
</tr>
<tr>
<td>8.</td>
<td>Standard microteaching-teach session with peer-feedback, for skill Reacting, (Simultaneously in all the groups)</td>
<td>11.00 a.m. to 2.30 p.m.</td>
<td>20-12-1988</td>
</tr>
<tr>
<td>9.</td>
<td>Standard Microteaching - reteach session for skill Reacting (Simultaneously in all groups)</td>
<td>11.00 a.m. to 2.30 p.m.</td>
<td>20-12-1988</td>
</tr>
<tr>
<td>10.</td>
<td>Teaching performance of 20 minutes of all student-teachers. Lesson observation by using PASTE (Audio-recording) Post test II</td>
<td>12.00 noon to 21-12-1988</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Nature of Activities</th>
<th>Time</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>a) Discussion on Theory of skill Narration</td>
<td>11.00 a.m. to 12.00 noon</td>
<td>22-12-1988</td>
</tr>
<tr>
<td></td>
<td>b) Activities based on each component of skill Narration</td>
<td>12.00 noon to 1.00 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Administration of Theory check-up</td>
<td>1.30 p.m. to 2.30 p.m.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>a) Control Group : Reading of planning booklet and preparation of plan for a microlesson of skill Narration</td>
<td>11.00 a.m. to 2.30 p.m.</td>
<td>23-12-1988</td>
</tr>
<tr>
<td></td>
<td>b) Theory Group : A lecture followed by focused re-reading</td>
<td>11.00 a.m. to 1.00 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Administration of Theory check up II</td>
<td>1.30 p.m. to 2.30 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Planning Group : Reading of planning booklet and preparation of plan I for a microlesson of skill Narration</td>
<td>11.00 a.m. to 2.30 p.m.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>a) Control Group : Teach and feedback of skill Narration (Standard microteaching)</td>
<td>11.00 a.m. to 3.00 p.m.</td>
<td>24-12-1988</td>
</tr>
<tr>
<td></td>
<td>b) Theory Group : Peer-tutoring</td>
<td>11.00 a.m. to 1.00 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Administration of Theory check up III</td>
<td>2.00 p.m. to 3.00 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) A lecture followed by focused re-reading, Preparation of Plan II for microlesson of skill Narration</td>
<td>11.00 a.m. to 3.00 p.m.</td>
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</tbody>
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</tr>
</thead>
<tbody>
<tr>
<td>14.</td>
<td><strong>a) Control Group</strong>: Reteach session for skill Narration</td>
<td>11.00 a.m. to 3.00 p.m.</td>
<td>26-12-1988</td>
</tr>
<tr>
<td></td>
<td><strong>b) Theory Group</strong>: Reading of planning material and preparation of Plan for a microlesson of skill Narration</td>
<td>11.00 a.m. to 3.00 p.m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>c) Planning Group</strong>: Peer-tutoring. Preparation of Plan III for a microlesson of skill Narration</td>
<td>11.00 a.m. to 3.00 p.m.</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Teaching performance of twenty minutes of all student-teachers.</td>
<td>12.00 noon to 5.30 p.m.</td>
<td>27-12-1988</td>
</tr>
<tr>
<td></td>
<td>Lesson observation by using PASTE. Audio recording. Post test III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Standard microteaching - teach 11.00 a.m. to 2.30 p.m. for skill Narration (Simultaneously in all groups)</td>
<td></td>
<td>28-12-1988</td>
</tr>
<tr>
<td>17.</td>
<td>Standard microteaching - reteach session for skill Narration (Simultaneously in all groups)</td>
<td>11.00 a.m. to 2.30 p.m.</td>
<td>29-12-1988</td>
</tr>
<tr>
<td>18.</td>
<td>Teaching performance of 20 minutes of all student-teachers.</td>
<td>12.00 a.m. to 5.30 p.m.</td>
<td>30-12-1988</td>
</tr>
<tr>
<td></td>
<td>Lesson observation by using PASTE. Audio recording. Post test IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Administration of general planning ability tests developed by Jnan Prabodhini, Pune</td>
<td>12.00 noon to 3.00 p.m.</td>
<td>31-12-1988</td>
</tr>
<tr>
<td>20.</td>
<td>Administration of general planning ability tests developed by Jnan Prabodhini, Pune</td>
<td>12.00 noon to 3.00 p.m.</td>
<td>3-1-1989</td>
</tr>
</tbody>
</table>
After completion of the experiment as discussed above, a large amount of data were obtained. The procedure of generation of data related to - a) general teaching performance, b) skill performance, and c) various tests; and analysis of data using various statistical techniques is thoroughly discussed in the next three chapters.