Chapter IV

Research Design and Methodology

4.0 Introduction

This chapter introduces and describes the methodological approach and procedures including the research design best suited to address the research hypotheses posed in this study. This chapter is divided into four major sections. The first section of the chapter includes a review of the purpose of the study and a restatement of the research hypotheses. The second section gives overview of the research design, mentions the variables and describes the pre-service teachers (sample). The third section provides the details of the new materials, it also throws light on the details of the research tools used for the study, measures taken for validation and a description of the data collection procedures. Finally, the last section gives an account of series of action researches.

4.1 Emergence of the Research Study

The researcher has been practicing classroom teaching at H. M Patel Institute of English Training & Research, Vallabh Vidyanagar for the past 6 years. He has observed that a large number of students have low proficiency in English in spite of their graduation or post-graduation. This affects their performance in various practice teachings such as Stage Teaching, Block Teaching, Off-campus and Internship. The researcher felt that if they were good at English, they would perform classroom teaching more effectively and also develop confidence.

One more reason that motivated the researcher to undertake this research was the present status of English Language Teaching in Gujarat. Through his personal visits to various schools as part of Block Teaching and Off
Campus programmes, he observed that English language teaching is not given appropriate justice at Primary, Secondary and Higher Secondary schools. To improve education on the whole in our country, therefore, we need to start it again from the Pre-service teachers because reconstruction of Pre-service teacher is highly essential for teacher’s professionalization and empowerment. It is a corroborated fact that the progress of any nation squarely rests on the teachers, so that pre-service teacher has to act as a facilitator and mentor in organizationally focused active learning in order to keep pace with the growing needs of the society. For maintaining quality and achieving excellence in pre-service teacher education the researcher thought to experiment action research and reflective teaching on pre-service teachers of English.

4.2 Research Design and Methodology

Method refers to the process of determining the most effective way of performing a particular job; while ensuring that the processing of job is accomplished within time and in a most cost-effective manner (Khullar, S. 2011). It is an established, habitual, logical or prescribed practice of systematic process of achieving certain ends with accuracy and efficiency (business Dictionary, 2011).

John Lee Cook Jr. (1998) states that procedure is a set of actions or operations which have to be executed in the same manner in order to always obtain the same result under the same circumstances. It is a set of prescribed actions or events that must be enacted or implemented to achieve certain result. Business Dictionary (2011) defines “procedures” as a fixed, step-by-step sequence of activities or course of action that must be followed in the same order to correctly perform a task. Repetitive procedures are called routines.
As the study aimed to improve classroom performance of pre-service teachers of English, the experimental research was employed to be the research design.

Herbert W. Seliger and Elana S. (1989) point out that “Experimental research is carefully constructed so that variables can be controlled and manipulated.” Experimental research is analytic and deductive. All experimental approaches involve the control or manipulation of three basic components of the experiment: the population, the treatment, and the measurement of the treatment. Experimental research is concerned with studying the effects of specified and controlled treatments given to subjects usually formed into groups. Treatment refers to anything done to groups in order to measure its effect. Treatments are the independent variable in the research which observes the change in the dependent variable(s). Measurement or observation refers to how the effects of the treatment will be evaluated or observed (p.137).

Experimental research design may be grouped into several categories, all of which have a number of variations, depending on the conditions under which the research is being conducted. Herbert W. Seliger and Elana S. (1989) talked about four different research design:” single group designs, in which research might be conducted with only one group; control group design, in which one group receives a treatment while the other, representing the same population as the experimental subjects, does not receive a treatment; factorial designs, which allow for the investigation of a number of independent variables at the same time; and quasi-experimental designs, in which experimental research is conducted in situations which cannot be completely controlled or manipulated”. (p.137)
Earawan (1999) illustrate three different types of experimental research design which are as follow:

(1) Pre-experimental research:
   The design of this experimental research is divided into four main designs i.e.
   a) The single group, post-test-only - design or one short case study
   b) The single one group, pre-test - post-test design
   c) The single group, pre-test – post-test time series design
   d) The static group comparison design

(2) Quasi-experimental research:
   The design of this experimental research is divided into two main designs i.e.
   a) None-equivalent group, pre-test – post-test design
   b) None-equivalent group, pre-test – post-test design for several times

(3) True-experimental research:
   The design of this experimental research is divided into two main designs i.e.
   a) The true control group, post-test – only – design (randomized control group, post-test – only – design)
   b) The true control group, pre-test – post-test design (randomized control group, post-test design)
   c) The Solomon four group design

An experimental type of research consists of three basic characteristics, the presence of a control group; random selection and assignment to groups; and an administration of a pre-test to capture the initial differences in between the groups. However, when conducting research for language learning or applied linguistics, for all practical purposes, the
feasibility of carrying out a true experiment which fulfills the criteria of all the three basic characteristics may not always be viable, especially when it comes to the random selection and assignment of subjects. It is not realistic to limit researches to true experimental designs only. As Hatch and Farhady explain “the reason is that we are dealing with the most complicated of human behavior, language learning and language behavior” (1982). So, while it may still be desirable to proceed with the study, it would be practicable to conduct a pre-experiment instead of a true experiment (Nunan, 1992). Hence, to meet the requirements, the present study uses one group pre-test – post-test research design, also known as pre-experiment as it lacks a control group (Nunan, 1992). According to Herbert W. Seliger and Elana S. (1989), the one group pre-test – post-test design “attempts to use the subjects as their own controls and to eliminate the need for a control group design”. Herbert W. Seliger and Elana S. (1989) further state that “the design is efficient because it controls a number of extraneous variables which can affect the homogeneity of subjects when more than one group is involved”. The design can be represented as follows:

Table 4.1

PRE-EXPERIMENTAL DESIGN
(THE SINGLE ONE GROUP, PRE-TEST – POST-TEST DESIGN)

<table>
<thead>
<tr>
<th>PRE-TEST</th>
<th>TREATMENT</th>
<th>POST-TEST</th>
</tr>
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<tbody>
<tr>
<td>X1</td>
<td>T</td>
<td>X2</td>
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</table>

Designate: X1 = Pre-test

X2 = Post-test

T = Treatment, that is the series of action researches
4.2.1 Data Validity Measures

According to Seliger and Shohamy (1989), the data collection procedures create some effect on the data as it is difficult to say that is any data collection procedures that do not affect the data. “All data collection procedures have some effect on the type of data elicited. However, it is more important that the researcher is aware of these effects in explaining the results obtained” (Gohil, 2012, p. 106). Seliger and Shohamy (1989, p. 184) state “Over the years, researchers have developed a number of techniques’ to assure the quality of the research and the quality of data collection procedures used in the research.”

“Validity is an important criterion for assuring the quality of the data collection procedures for any piece of research. Validity provides information on the extent to which procedures really measures what it is supposed to measure” (Hiradhar, 2012, p. 103). Seliger and Shohamy (1989, p. 105) note that “the internal validity of a research study concerns with being able to state that relation between the independent and dependent variables is unambiguous and not explainable by extraneous variables.” Perry (2005) states that, the extent to which the internal validity is influenced. Therefore, the internal validity refers to the results that are because of the factors that the researcher has not controlled. “Factors that could influence the internal validity of a research study are usually related to the participants and the instrumentation” (Gohil, 2012, p.106). The present research has ensured internal validity of the study for various aspects of the study.

4.2.1.1 Sample

Hatch and Farhady (1982) point out that the internal validity of the participants in a study could be affected by various factors such as
history, maturation, differential selection, and attrition. “The history factor refers to the influence if events that take place different points in time on the dependent variable other than the independent variable” (Hiradhar, 2012, p. 104). Perry (2005) notes that any study that takes considerable amount of time to complete can be affected by this if care is not taken. The present research was divided into different practice teaching phases, excluded theory. So actual research was conducted over a period of two months (practicum only) and therefore the threat due to the history factor did not exist.

“The threat related to the maturation of participants is similar to that posed by history, but deals with natural changes taking place over time in the participants such as emotional states, physical coordination and strength, or cognitive structures (Hiradhar, 2012, p. 104). It is an influencing and significant factor with younger subjects than with older ones (Seliger and Shohamy, 1989). Studies that take place over longer periods of time are potentially subject to this interference. However, this potential threat was avoided in the present study as it spanned a period of two months only.

Another factor that might have an effect on the internal validity is attrition or experimental morality. “In a longitudinal study that takes place extended time to complete research procedures, the subjects may lose interest and drop out or may remain absent due to health problems. To avoid this problem, it is sometimes preferred to begin with a larger than necessary number of subjects (Gohil, 2012 p. 107). The present study could retain all the participants (32 participants) throughout.

Finally, the factor related to differential selection could occur whenever a researcher does not randomly select the sample when formatting different
Since the present study was an intact single group pre-experimental study, the issue about pre-existing differences among different groups of participants did not arise.

### 4.2.1.2 Tests

Validity is an important characteristic of a test. It depends upon the efficiency with which it measures that it attempts to measure. Phumphuang (2012, p. 136) points out “the term validity and purpose are very closely associated with each other. A test which fulfills the purpose for which it is designed is called a valid test.

**Types of validity**

Phumphuang (2012) describes the following techniques of validity:

- **Construct validity**: The subject represents an operational definition of the construct that is associated with the subject.
- **Content validity**: All intentions are applicable to the domain for which the subject is designed, and cover that domain completely.
- **Criterion-related-validity**: Applications of the subject accurately predict the behavior of the domain to which it is applied.
- **Face validity**: Face validity might be viewed as an indication of how all other people will accept the subject immediately as valid.
- **Incremental validity**: Applying the subject will provide added value to the knowledge about the domain.
- **Convergent validity**: When two different subjects are applied to the same domain, the results do not contradict (convergent validity). When different subjects are applied to different domains, the results should not correlate strongly (discriminate validity) if there is no explanation for that.
For the present study, the content validity, construct validity and face validity were employed.

“An important factor which needs to be considered for the validity of the tests as a data collection instrument is content validity” (Hiradhar, 2012, p.105). Content validity is quite paramount in any language teaching research. It is essential to find out if the data collection procedure is a good representation of the content which needs to be measured (Seliger and Shahomy, 1989). An acceptable level of content validity was established both for the pre-test as well as post-test by having them reviewed by the experts to determine whether the tests thoroughly and accurately measured various aspects covered in the series of action researches to improve classroom performance of the pre-service teachers of English.

Hatch and Lazarton (1991) explain that if the research begins with a pre-test, the test could affect performance on future tests since the test alerts the students as to what teachers expect them to learn. As a result, the pre-test could influence the final outcome. This factor is known as test effect. The time span between the pre-test and post-test was that of seven months. Although the pattern of the pre-test and the post-test remained the same, in view of the above discussed points, it can be said that the validity of the tools was maintained in a satisfactory manner.

4.2.1.3 Self-evaluation checklist

For the present study self-evaluation checklist was prepared by the researcher. In order to know whether the pre-service teachers of English were making any progress in their classroom teaching and it was administered after completing each phase of practice teaching i.e., Stage teaching, Block teaching, Off-campus and Internship programme.
Validity was established for this self-evaluation checklist by having them reviewed by the experts followed by certain necessary modifications.

4.2.1.4 Questionnaire for study evaluation

An established means to ascertain the validity of a questionnaire is conducting an item analysis. As pointed out by Seliger and Shahomy (1989), an important procedure used to examine the quality of items or questions on an instrument questionnaire is item analysis. Hiradhar (2012, p.107) says that “by using this procedure, the researcher can obtain information on whether the items are well phrased and easily understood by the respondents.” For the present study, question based on classroom teaching, diary writing, reflective teaching were designed. Pre-service teachers of English were asked a few open-ended questions so that they can comment on and give feedback the way they feel comfortable within and open way.

4.2.1.5 Opinionnaire

The researcher felt that it was necessary to find out opinion of the pre-service teacher of English in terms of whether action research and reflective teaching really helped them to improve their classroom performance. So the researcher prepared opinionnaire and administered it by the end of the practice teaching. Validity was established for this opinionnaire by having them reviewed by the experts followed by certain necessary modifications.

4.3 Population of the Study

It is very essential to define the population in a research study. Unless the population is properly defined, it becomes impossible to get to the findings based on the selected sample. According to Dalen (1966) “A
population is a whole all the units (subjects, objects or events) in a group.” In a nutshell, it can be said that population is that mass on which the findings derived as a result of an experiment generally become applicable.

In the present study, the population is all the students who have completed their graduation or post-graduation with English Language Teaching (ELT) or English Literature as a principal subject and are studying in a one year pre-service programme called B.Ed. (English).

4.4 Sample of the Study

For a true experiment to take place, a random selection and assignment of subjects is important for casual claims resulting from the research. However, in classroom research, neither random selection nor random assignment is possible since students have already been assigned on the basis of some principle such as test score, course requirements, or merely through self-selection of course by them. In such circumstances, the researcher is required to work with an established class of students. This is called an intact group. Thus in classroom research where researchers wish to see the effects of an action research and reflective teaching, the design often uses the intact group. Hatch and Lazarton (1991), state that “while such designs will not allow us to make casual (cause – effect) statements about the findings, they will allow us to give evidence in support of links between variables for these particular cases.”

The purpose of the study is to improve pre-service English teachers’ classroom performance by using action research and reflective teaching. In order to test hypotheses, a simple random sampling was impracticable for data collection in order to test hypotheses. The present study hence uses intact groups of subjects. Since the groups were intact, the sample
for the study is considered to be purposive sampling. Kothari (2009) “Non-probability sampling is that sampling procedure which does not afford any basis for estimating the probability that each item in the population has of being included in the sample. Non-probability sampling is also known by different names such as deliberate sampling, purposive sampling, and judgment sampling” (p, 59).

The purposive sample was formulated by students taught by the researcher. To further define the group, the participants constituted B.Ed. (English) trainee teachers of the academic year 2012-2013 at H. M. Patel Institute of English Training & Research, affiliated to Sardar Patel University, Vallabh Vidyanagar, Gujarat. A total 32 students participated in the experiment. Out of these 20 female and 12 male, 10 had completed their graduation and 22 had completed their post graduation with English Literature or ELT as their principle subject from any recognized university in India. Thus, the sample, that is, the participants for the present study were controlled in the sense that they belonged to an intact group and had similar linguistic and educational background.

4.5 Variables of the Study

Best and Khan (2002), point out that “Variables are the conditions or characteristics that the experimenter manipulates, controls, or observes. The independent variables are the conditions or characteristics that the experimenter manipulates or controls in his or her attempts to ascertain their relationship or observed phenomena. The dependent variables are the conditions or characteristics that appear, disappear, or change as the experimenter introduces, removes or changes independent variables (p.137).
In educational research an independent variable may be a particular teaching method, a type of teaching material, a reward, or a period of exposure to a particular condition, or an attribute such as sex or level of intelligence. The dependent variable may be a test score, the number of errors, or measured speed in performing a task. Thus, the dependent variables are the measured changes in pupil performance attributable to the influence of the independent variables.

The experimental design, as stated earlier, explore the strength of relationship between variables. “A research in language and linguistic includes language proficiency, aptitude, motivation”, etc as variables. (Nunan 1992) “The variable that the experimenter expects to influence the other is called the independent variable. The variable upon which the independent variable is acting is called the dependent variable” (Nunan, 1992). In other words, the independent variable can be defined as the major variable that the researcher hopes to investigate. It is the variable which is selected, manipulated, and measured by the researcher. The independent variable in the present study is series of action researches to improve classroom performance of pre-service teachers of English.

On the other hand, the dependent variable can be defined as, the variable which the researcher observes and measures to determine the effect of the independent variable. The dependent variables therefore in the present study were the difference between overall score on the pre-test and the post-test; and the difference between the scores on the pre-test – and the post-test with respect to overall classroom performance.

4.6 Construction of the Tools

As the researcher has mentioned earlier in 4.2 Seligar and Shohamy (1989), opines that all experimental approaches involve the control of the
three basic components of the experiment: the sample, the treatment, and the measurement of the treatment. The present study therefore involves the control of the three components namely, the sample, that is described in 4.4, the treatment that is action research and reflective teaching, and the measurement of the treatment, that is the pre-test and post-test.

The primary research tools used to determine the effectiveness of the action research and reflective teaching to improve classroom performance of pre-service teachers of English include the treatment, the pre-test and the post-test, Self-Evaluation checklist, diary writing, video recording, questionnaire in the form of feedback and opinionnaire to evaluate the study. A detailed description of each tool is given below:

4.6.1 Pre-test of personal attributes

They were given a test for personal attributes as a diagnostic test by the end of block teaching programme. There were 33 statements regarding practice teaching and to which they were to respond each. Pre-service teachers’ of English marked appropriate option against each statement. The options were: No 1: never, no. 2: rarely, no. 3: not sure, no. 4: some times and no 5: always. (Appendix 2)

4.6.2 Post-test of personal attributes

In addition to the pre-test, another significant tool used for the data collection was the post-test provided towards the end of the experiment. A similar pattern of the questions that was used in the pre-test was adopted for the post-test. The post-test of personal attributes was administered as an achievement test during the second semester by the end of practice teaching programme i.e. internship programme. (Last phase of practice teaching in school) There were 33 statements regarding practice teaching which they were to respond each. Pre-service teachers
of English marked appropriate option against each statement. The options were: no 1: never, no 2: rarely, no 3: not sure, no 4: some times and no 5: always. (Appendix 3)

4.6.3 Self-evaluation Checklist

According to Carol Rolheiser and John A. Ross “Self-evaluation is defined as students judging the quality of their work, based on evidence and explicit criteria, for the purpose of doing better work in the future. Self-evaluation is a potentially powerful technique because of its impact on student performance through enhanced self-efficacy and increased intrinsic motivation. Evidence about the positive effect of self-evaluation on student performance is particularly convincing for difficult tasks (Maehr & Stallings, 1972; Arter et al., 1994), especially in academically oriented schools (Hughes et al., 1985) and among high need pupils (Henry, 1994). Perhaps just as important, students like to evaluate their work.” In order to check pre-service English teachers’ progress after each phase of practice teaching self-evaluation checklist was prepared. The researcher administered the self-evaluation checklist after each phase of practice teaching. There were various statements regarding classroom management, teaching, methodology, syllabus and lesson planning and use of English language. The pre-service teachers of English were asked to put following sign in front of each statement:

✓ : Confident

X : Don’t know enough

? : Not sure

(Appendix 4)
4.6.4 Diary writing

Richards (2005) pointed out “A Journal is an ongoing written account of observations, reflection, and other thoughts about teaching, usually in the form of a notebook, book, or electronic mode, which serves as a source of discussion, reflection, or evaluation” (p. 68). This Diary may be used as a record of incident, problems, and insights that occurred lessons. Pre-service English teachers’ delivered 40 lessons during the practice teaching; they reflected on their lesson and answered following type of questions: questions about the session, questions about students and, questions about oneself.

4.6.5 Video Recordings

Natalia (2009) points out “observing, analyzing, and discussing classroom performance is enhanced by the use of videotaping.” Recording lessons for self observation:

- Allows students to distance themselves and be dispassionate about their teaching (Van Lier, 1988);
- Helps trainees notice and respond to both strong and weak aspects of their teaching;
- Allows trainees to view a DVD immediately and re-examine it many times; and
- Has a well-known motivating effect (Wallace 1981; Murphey 2000; Bailey, Curtis, and Nunan 2001; Maclean and White 2007). (p. 31)

Among the many options for self-reflection, video recording has a large number of advantages, video recording proved much supportive to the pre-service teachers, which made a permanent record of contextual and
paralinguistic data, such as blackboard work, the layout of the classroom, movement, gestures, facial expressions. The researcher recorded 14 lessons of each pre-service teacher. The researcher gave them self-reflection questions for videotaped lessons. (Appendix 5)

### 4.6.6 Questionnaire

Questionnaires are printed forms for data collection, which include questions or statements to which the subject is expected to respond, often anonymously. In questionnaires the answers are usually expressed in a written form. In order to evaluate the effectiveness of action research and reflective teaching, a feedback sheet was adopted in the form of a questionnaire. “Collecting data through the use of a questionnaire has the advantage of ensuring stability of response across a range of questions of interest to researchers” (Hiradhar, 2012, p. 99). As Seligar and Shohamy (1989, p.172) point out “questionnaires have a number of advantages:

a) They are self-administered and can be given to large groups of subjects at the same time. They are therefore less expensive to administer than other procedures such as interviews.

b) When anonymity is assured, subjects tend to share information of a sensitive nature more easily.

c) Since the same questionnaire is given to all subjects, the data are more uniform and standard.

d) Since they are usually given to all subjects of the research at exactly the same time, the data are more accurate.”

Questionnaires have been recommended to collect data for phenomena that are not easily observed such as attitudes” (Gohil, 2012, p. 104) for the present research, a questionnaire was prepared to get authentic information and opinion about the action research and reflective teaching
which pre-service teachers of English attempted. The researcher wanted to find out what was the impression of the pre-service teachers of English in general about the action research and reflective teaching. The researcher wanted to know whether it was useful and meaningful to them. He also wanted to find out what their expectations were and whether the action research matched their expectations. The questionnaire was divided into three sections which covered the following points: section – I profile, qualification, exposure of English language. Section – II, overall impression about reflective teaching, relevance of action research and reflective teaching, teaching techniques and classroom performance, feedback given by supervisor and peer colleague, use of English language in the classroom. Section – III, covered lesson planning, peer discussion, discussion with supervisor, video recording, classroom performance, sessions of action research, diary writing and action research. (Appendix-6)

4.6.7 Opinionnaire

An opinionnaire is a form containing a list of statements, each of which the members of a selected group are asked to endorse or reject; the purpose being to gather information for a survey. As Seligar and Shohamy (1989, p.173) noted “The Likert Scale asks individuals to respond to a series of statements by indicate whether they ‘strongly agree’ (SA), ‘agree’ (A), ‘are undecided’ (U), ‘disagree’ and ‘strongly agree’ (SD) with each statement.” The researcher administered an opinionnaire by the end of practice teaching programme in order to collect their opinions about the action research and reflective teaching. There were 25 statements regarding action research, diary writing, classroom performance, practice teaching and to which they were to respond each. Pre-service teachers’ of English marked appropriate option
against each statement. The options were: (a) strongly agree, (b) agree, (c) undecided (d) disagree and (e) strongly disagree. (Appendix 7)

4.7 Orientation programme of Action Research

A fifteen hour orientation programme of action research was designed; before the Stage Teaching programme seven sessions of action research were conducted and then, after the completion of the Stage Teaching programme eight sessions were conducted during the first semester in the academic year 2012-2013 with B.Ed. (English) pre-service teachers of H.M. Patel Institute of English Training & Research, Vallabh Vidyanagar, Anand, Gujarat. The action research programme was divided into two weeks. Before the stage teaching programme the researcher introduced action research, during the first two sessions the researcher talked about the following points:

- What is action research?
- What is not action research?
- What does teacher researcher do?
- Five phases of action research
- Reasons for undertaking action research
- What is reflective teaching?
- Techniques for gathering data

Then after during the following sessions each point was discussed in detail with illustration. They were provided reading material about action research and reflective teaching. So before the stage teaching programme they were made aware about how to identify classroom problem, peer observation, diary writing, and trainee teachers’ discussion. After stage teaching programme again sessions were conducted where the researcher talked about various classroom problems and how action research and
reflective teaching help to overcome and improve classroom performance of trainee teachers. (Appendix 1)

4.8 Data collection

The researcher for this study was also the primary instructor of B.Ed. (English) class used for the present study. The researcher was responsible for instructing the group of the research participants, delivering to pre-service teachers’ of English an orientation to the study, issuing the pre-test and the post-test, conducting the experiment with the administration of series of action researches and reflective teaching, and delivering the self-evaluation checklist at the regular interval of the practice teaching programme.

A t-test was used to determine if there was any significant difference between the mean scores on the pre-test and the post-test of the pre-service teachers’ of English who underwent the series of action researches to improve their classroom performance.

The following null and directional/positive hypotheses guided the study:

1. There will be no significant difference between the mean scores of pre-test and post test of personality attributes of pre-service teachers of English.

2. There will be no significant difference between the mean scores on the pre-test and the post-test of the personality attributes of male pre-service teachers of English.

3. There will be no significant difference between the mean scores on the pre-test and the post-test of the personality attributes of female pre-service teachers of English.
4. There will be no significant difference in the overall performance of pre-service teachers.
5. Pre-service teachers will develop a professional attitude towards teaching by conducting action research.

4.8.1 The Experiment

The researcher, before the experiment was conducted required informing the pre-service teachers of English about the study and briefing them about various aspects of action research and reflective teaching. The pre-service teachers’ of English were also briefed about the schedule of the experiment in terms of orientation programme of action research, pre-test, self-evaluation checklist at regular interval of practice teaching, post-test, questionnaire, and opinionnaire.

4.8.1.1 Pre-test

In the light of the norms of pre-experimental design of the research study, a pre-test was administered to the pre-service teachers of English as the part of the first phase of the experiment. This was done with a view to gaining evidence about the trainee teachers errors in classroom practices before the participants undertook the series of action research and reflective teaching. Since the cohort of 32 students belonged to the same class, the pre-test was administered to all of them at the same time.

The researcher provided the background information and purpose of the test to pre-service teachers of English. The total duration of the test was half an hour. After the pre-service teachers of English completed the pre-test, the scripts were collected for grading by the researcher. The results of the pre-test were used for gathering information for the statistical data analysis procedures of t-test.
4.8.1.2 Post-test

In the light of the norms of pre-experimental design of the research study, a post-test was administered to the pre-service teachers of English as the part of the completion of the experiment. This was done with a view to gaining evidence about the trainee teachers errors in classroom practices after the participants undertook the series of action research and reflective teaching. Since the cohort of 32 students belonged to the same class, the pre-test was administered to all of them at the same time.

The researcher provided the background information and purpose of the test to pre-service teachers of English. The total duration of the test was half an hour. After the pre-service teachers of English completed the post-test, the scripts were collected for grading by the researcher. The results of the post-test were used for gathering information for the statistical data analysis procedures of t-test.

4.8.1.3 Self-evaluation checklist

The researcher administered self-evaluation checklist in order to know the progress of pre-service teachers of English. The researcher administered self-evaluation checklist by the end of stage teaching, block teaching, off-campus, and internship programme.

4.8.1.4 Diary Writing

Pre-service English teachers delivered 40 lessons during the practice teaching; they reflected on their lesson and answered following type of questions. They responded questions about the session, questions about students and, questions about oneself.

4.8.1.5 Video Recording

The researcher recorded video lessons of the pre-service teachers of English. Which made a permanent record of contextual and paralinguistic
data, such as blackboard work, the layout of the classroom, movement, gestures, facial expressions. Total 14 (Fourteen) lessons were recorded. Two lessons during stage teaching, two lessons during block teaching, five lessons during off-campus and five lessons during internship programme.

4.8.1.6 Questionnaire

The questionnaire was papered based in form and it was distributed among the pre-service teachers of English the very next day of the administering the post-test. A descriptive analysis of the responses to the items in the questionnaire was conducted for the evaluation of the action research and reflective teaching.

4.8.1.7 Opinionnaire

After administering the orientation, pre-test, self-evaluation checklist, post test, questionnaire the final stage of the experiment constituted the administering of an opinionnaire for the evaluation of the overall study. The opinionnaire was paper based it was distributed among the pre-service teachers of English on the same day when questionnaire was given. This stage marked the end of the experiment. The researcher was now prepared for a detailed analysis of data and findings of the results after having collected all the data and required information from the experiment.

4.9 Data Analysis and Interpretation

The data collected for the present study was quantitative and qualitative as well. The researcher, therefore, required statistical analysis and qualitative to interpret the data. Following are the details regarding the techniques/methods used by the researcher for both the types of analysis.
### 4.9.1 Statistical Analysis

The objective of the study was to find the effectiveness of the series of action researchers and reflective teaching on pre-service teachers of English on their classroom performance. In light of this, it was necessary to know the difference between the mean scores on the pre-test and the post-test. The researchers used t-test for the same. To apply t-test, it is necessary to find out the Standard Deviation (SD) and Standard Error of Difference (SED). The researcher used the following equations:

1. **Mean (M)**

   \[ M = \frac{\sum X}{N} \]

   Here, \( X \) = Score obtained on test
   \( N \) = Total Number of Students

2. **Standard Deviation (SD)**

   \[ SD(\sigma) = \sqrt{\frac{\sum(X_i-M)^2}{N-1}} \]

   Here, \( X_i \) = Scores
   \( M \) = Mean
   \( N \) = Total Number of Students

3. **Standard Error of the Difference between Means**

   \[ SE_D = \sqrt{\frac{\sigma_1^2}{N_1} - \frac{\sigma_2^2}{N_2}} \]

   Here, \( \sigma_1 \) = Standard Deviation of the Pre-test
   \( \sigma_2 \) = Standard Deviation of the Post-test
   \( N_1 \) = Total number of student in pre-test
   \( N_2 \) = Total Number of Student in Post-test
t-ratio

\[ t - ratio = \frac{|M_1 - M_2|}{SE_D} \]

Here, \( M_1 \) = Mean of the Pre-test
\( M_2 \) = Mean of the Post-test
\( SE_D \) = Standard Error of the Difference between Means

4.9.2 Qualitative Analysis

The researcher used the following tools which fetched the qualitative data to be analyzed.

- Self-evaluation checklist
- Diary writing
- Video recordings
- Questionnaire
- Opinionnaire

For the analysis of the qualitative data availed through the above tools, the researcher has used content analysis method mainly. In case of self-evaluation checklist, questionnaire and opinionnaire the researcher has also used percentage for particular response to specific items.

4.10 Summary

This chapter began with a note on how research study emerged. Then the chapter focuses on the research design and methodology. It further described the hypotheses, population, sample and variables for the present study. There was a discussion on construction on various tools, orientation of action research and reflective teaching followed by the
experiment. The researcher ended with a brief note on data analysis and interpretation procedures. The next chapter presents the analyses and interpretation of data gathered from the research study through various tools used at various stages of the study. It describes the details of the quantitative as well as qualitative analysis and interpretation of the data. The personal observations of the researcher are incorporated in the next chapter.