"Technique is research what method is to teaching or in a sense, what logic is to thinking"

-R. Rusk

Chapter – III

METHOD AND PROCEDURE OF THE STUDY
CHAPTER-III

METHOD AND PROCEDURE OF THE STUDY

Methodology of research depicts the general pattern for organizing the procedure for gathering data for investigation. This chapter deals with the research approach, research design, setting, the population, sample, sampling technique, procedure followed, statistical analysis, precautions and constrains. So the present chapter would imply sub-heads like:

3.1 Design of the Study
3.2 Sample
3.3 Procedure Followed
3.4 Statistical Analysis
3.5 Precautions Observed
3.6 Constraints and Difficulties Faced

3.1 DESIGN OF THE STUDY

Research design is an overall plan for organizing a scientific investigation (Polit and Beck 2004). An educational research is described as experimental when the researcher first, specifies a set of researchable hypotheses and then, establishes a systematic programme of data gathering under precisely defined conditions in an effort to test the hypotheses. The hypotheses provide a network of statements relating the impact of independent variables on some outcome variables or dependent variables (Ingersoll, 1982).

According to Weiner (1977), the experimental method, which is suitable for testing hypothesis, is the strongest method for developing and understanding psychological concepts. Any experimental problem has two interrelated aspects, the design of the experiment and statistical analysis of the data. The latter aspect is directly dependent upon the former. Statistical methods can greatly increase the efficiency of an experiment and also strengthen the conclusions so obtained. (Montgomery, 1984)

A good experimental design should provide some explanation with respect to all the objectives of the experiment and be kept as simple as possible.
In the present study, a pre-test-post-test control group quasi experimental design was employed with a purposive sample in the form of two intact sections of B.Ed. class of the same college. It involved two groups of pre-service teacher experimental group and control group; the experimental group was taught through MMLP approach and control group taught through conventional approach.

Table 3.1
Design of the Study

<table>
<thead>
<tr>
<th>GROUP</th>
<th>BEFORE INTERVENTION OUTCOMES (Pre-Test)</th>
<th>INDEPENDENT VARIABLE</th>
<th>AFTER INTERVENTION OUTCOMES (Post-Test)</th>
<th>DIFFERENCE OUTCOMES</th>
<th>NET EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPERIMENTAL GROUP</td>
<td>E1</td>
<td>MULTIMEDIA APPROACH</td>
<td>E2</td>
<td>E = E2 – E1</td>
<td></td>
</tr>
<tr>
<td>CONTROL GROUP</td>
<td>C1</td>
<td>CONVENTIONAL APPROACH</td>
<td>C2</td>
<td>C = C2 – C1</td>
<td></td>
</tr>
</tbody>
</table>

E = Gross outcomes measures for experimental group.
C = Gross outcomes measures for control group.
E1, C1 = Measure of outcomes before the intervention.
E2, C2 = Measure of outcomes after intervention.

The design comprised three stages. The first stage involved pre-testing of all the pre-service teachers of two groups on achievement in Educational Psychology (their scores in Educational Psychology). The second stage, involved the experimental treatment, which consisted of teaching five units of B.Ed. syllabus of Educational Psychology through Multimedia Learning Package to experimental group and through conventional method to control group. In the third stage, the pre-service
Teachers were post-tested on achievement in Educational Psychology. A schematic view of the phases of experiment is presented in Table 3.2

<table>
<thead>
<tr>
<th>Stage</th>
<th>Control Group</th>
<th>Experimental Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-testing</td>
<td>Achievement in Educational Psychology</td>
<td>Achievement in Educational Psychology</td>
</tr>
<tr>
<td>2. Treatment</td>
<td>Teaching Educational Psychology through conventional method</td>
<td>Teaching Educational Psychology through Multimedia Learning method</td>
</tr>
<tr>
<td>3. Post-testing</td>
<td>Measurement of Achievement in Educational Psychology</td>
<td>Measurement of Achievement in Educational Psychology</td>
</tr>
</tbody>
</table>

**Study Variables**

In an experimental research, the relationship between two types of variables namely independent and dependent variables is studied. Independent variables are the causes, while dependent ones are effects. Another category of variables, which is equally important, is of the intervening variables. All these three kinds of variables, identified for the study are as discussed below.

**Independent Variables**

As the impact of Multimedia Learning strategy was to be studied, the method of instruction or teaching in Multimedia Learning Package was used as an independent variable. MMLPs are used to see its effect on the achievement of pre-service teachers in Educational Psychology. The experimental group was taught through MMLPs method of learning and the control group was taught through traditional method. Thus, multimedia method and the traditional learning method were the two independent variables for the study.
Dependent Variables
Achievement in Educational Psychology was taken as dependent variable. This variable was measured twice during the course of the study- first before beginning the experimental treatment, i.e., at the pre-test stage and then after completing the experimental treatment, i.e., at the post-test stage.

Intervening Variables
There are certain variables known as intervening variables which have their effect on the learning outcomes, and can influence both independent and dependent variables. Intervening variables such as nature of college, grade level, subject taught and teacher, etc were controlled experimentally.

Control Employed
It is necessary to control all those variables that may significantly affect the dependent variables. Hence such intervening variables were controlled by employing suitable controls.

1. Nature of College
The sample was selected from a single college (Pradeep Memorial Comprehensive College of Education), situated in Delhi

2. Grade Level
B.Ed. class pre-service teachers were selected for the study and grade level was thus kept constant during the study.

3. Teacher
Both the experimental group and the control group were taught by the researcher herself to avoid any variation.

4. Subject
The two groups were taught same five topics of Educational Psychology.
Table 3.3
Independent, Dependent and Control Variables

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
<th>Control Variables</th>
<th>Control Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method of Teaching</td>
<td>1. Achievement in Educational Psychology</td>
<td>1. Name of College</td>
<td>1. Administrative (Single College)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Grade level</td>
<td>2. Administrative (only pre-service teachers of B.Ed. class was taught)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Subject to be taught</td>
<td>3. Administrative (same units of Educational Psychology in the two groups were taught)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Duration of the instructional phase</td>
<td>4. The two groups were taught for 45 days of 50 minutes period.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Teacher</td>
<td>5. The groups were taught by the same teacher</td>
</tr>
</tbody>
</table>

3.2 SAMPLE
The primary purpose of research is to discover principles that have universal application, but to study the whole population in order to arrive at generalizations would be impractical, if not possible. Sampling is a technique by which a relatively small number of individuals or measures of individuals, objects or events is selected and analysed in order to find out something about the entire population from which it
In all types of researches, there are some inferences regarding a well specified and identifiable group known as population and the selected number of persons known as sample. Sample is the representative proportion of the population. Educational Researchers, because of administrative limitations in randomly selecting and assigning individuals to experimental and control groups, often use available classes as samples (Best & Kahn 1995). In the present study purposive sampling technique was followed for the selection of the college of Education, only one college i.e. P.M.C. College of Education, Delhi was chosen for the study. The sample of the study comprised of 100 pre service teachers studying in two sections of the B.Ed. class of P.M.C. college of Education, Delhi. One section formed the control group and the other section formed the experimental group. (Appendix A)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Groups</th>
<th>Total No. of Pre-Service Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Experimental Group</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>Control Group</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

3.3 PROCEDURE FOLLOWED

Procedure of the experiment comprised of two main stages, that is, selection of the sample and conducting the experiment.

Stage 1: Selection of the Sample.

The sample of the study comprised of 100 pre-service teachers of B.Ed. (50 as control group and 50 as experimental group) studying in Pradeep Memorial Comprehensive College of Education, Delhi.
Selection of Experimental Group
For the experimental group, which was subjected to MMLP, a total of 50 pre-service teachers in B.Ed. standard 'B' section were taken from Pradeep Memorial Comprehensive College of Education, Delhi

Selection of Control Group
The control group consisted of 50 pre-service teachers in B.Ed. standard 'A' section of the same college. The group was exposed to traditional method of instruction. No novel treatment was given.

Stage 2 Conducting the Experiment
The experiment was conducted to three phases as given below:
Phase 1: Administration of Pre-test
Phase 2: Conducting the Instructional Programme; and
Phase 3: Administration of Post-test

Phase-1 Administration of Pre-test
Before the start of the experiment, the sample subjects were contacted and rapport was established with them. They are oriented to the tests to be used with them and also with the methodology of the treatment to be followed e.g. MMLP method and Traditional method. Pre-test, i.e., Achievement Test was administered to the pre-service teachers of two groups by the researcher herself. The instructions pertaining to the tests were explained verbally in clear terms to the pre-service teachers before administering test. The administration of these tests was carried out as per norms and instructions contained in their manuals.

Phase 2: Conducting the Instructional Programme
To find out the efficacy of the treatment variable, the instructional treatment was manipulated in the form of teacher directed instruction followed by using self developed MMLPs. Learning objectives were listed by the investigator. (Appendix C).
The instructional treatment was given for about 45 days which included 5 Multimedia Learning lessons to the experimental group, whereas the control group
was taught by the traditional method. Same content was taught to both the groups. Pre-service teachers were motivated to learn through the novel method to instruction and were encouraged to participate in the experiment by exploring the objectives. Pre-service teachers were explained the steps of instructional treatment and they were also involved in setting the equipments in the class. (Appendix I)

**Phase 3: Administration of Post-Test**

Immediately after the instructional treatment was over, the subjects were assessed on criterion measures to know the effect of the treatment. The Achievement Test was administered to both the experimental and control groups. (Appendix D)

**Date Schedule of the Instructional Phase for both the Groups**

**Phase 1: Pre-test Stage**

07th December 2009 - Administration of Achievement Test in Educational Psychology

**Phase 2: Instructional Programme**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Topic</th>
<th>Date schedule of Instructional phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Growth and Development</td>
<td>08 Dec 2009 to 21 Dec 2009</td>
</tr>
<tr>
<td>2</td>
<td>Learning</td>
<td>04 Jan 2010 to 30 Jan 2010</td>
</tr>
<tr>
<td>3</td>
<td>Motivation</td>
<td>02 Feb 2010 to 04 Feb 2010</td>
</tr>
<tr>
<td>4</td>
<td>Personality</td>
<td>06 Feb 2010 to 15 Feb 2010</td>
</tr>
<tr>
<td>5</td>
<td>Basic Statistics</td>
<td>17 Feb 2010 to 24 Feb 2010</td>
</tr>
</tbody>
</table>

**Control Group**

The above chapters were taught by traditional group learning approach.

**Phase 3: Administration of Post-Test**

1. Achievement Test in Educational Psychology

Dates of administering the test for Control and Experimental Group were as follows:
Table 3.6
Date Schedule of the Achievement Test

<table>
<thead>
<tr>
<th>S.No</th>
<th>Topic</th>
<th>Date of Achievement Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Growth and Development</td>
<td>22 Dec 2009</td>
</tr>
<tr>
<td>2</td>
<td>Learning</td>
<td>01 Feb 2010</td>
</tr>
<tr>
<td>3</td>
<td>Motivation</td>
<td>05 Feb 2010</td>
</tr>
<tr>
<td>4</td>
<td>Personality</td>
<td>16 Feb 2010</td>
</tr>
<tr>
<td>5</td>
<td>Basic Statistics</td>
<td>25 Feb 2010</td>
</tr>
</tbody>
</table>

3.4 **STATISTICAL ANALYSIS**  
To achieve objectives of the study, the data collected was statically analyzed using the following techniques:

1. Descriptive statistics such as means and S.Ds were worked out on the score of achievement.

2. ‘t’ test was employed for testing the significance of difference between the means of pre-service teacher achievement in Educational Psychology on pre test, post test and gain scores. The value of ‘t’ was computed with the help of the following formula:

\[
t = \frac{D}{\sigma D}
\]

Where

\[
\sigma D = \sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}
\]

\[
\sigma = \text{standard deviation}
\]

\[
\sigma_1 = \text{standard deviation of first group}
\]

\[
\sigma_2 = \text{standard deviation of second group}
\]

\[
N_1 = \text{Number of frequency of first group}
\]

\[
N_2 = \text{Number of frequency of second group}
\]

\[
t = \text{Testing the level of significance}
\]
Mean scores in respect of achievement in Educational Psychology was pictorially presented in the form of bar graph. Bar graphs were drawn in respect of pre-test and gain scores of experimental group and control group.

3.5 PRECAUTIONS OBSERVED

Following precautions were observed during the course of experiment (Pre-test-Treatment-Post-test) for ensuring effectiveness and high precision in experimental condition which may have contributed to the results.

- No undue stress or control of any kind was imposed on the subjects at any time during the study and the experiment was conducted in a relaxed natural setting.
- Both the experimental and control groups were taught by the researcher herself to avoid any variation.
- The effectiveness of the experimental treatment was ensured by establishing rapport with pre-service teachers and educators, maintaining natural setting, harmonious atmosphere, providing sufficient time for various activities in the experimentation.
- It was ensured that the topics chosen as contents of treatment had not been previously taught to the pre-service teachers in both the experimental and control groups.
- During instructional treatment, attempt was made to stick to limits of the specific teacher directed instructions in both groups.
- Care was taken to keep the importance of content matter during the course of treatment and it was not underplayed while fitting into the instructional treatment.
- Separate material for achievement tests was provided to every pre-service teacher during experimentation so as to avoid any indiscipline or chances of unfair observations. So it was ensured that the material provided / number of computers available to the pre-service teachers for testing or during treatment was adequate to meet this demand.
- Teaching periods of 50 minutes duration were utilized fully for treatment and time was not wasted during treatment.
3.6 CONSTRAINTS AND DIFFICULTIES FACED DURING EXPERIMENT

It may not be improper to mention some of the difficulties faced or constraints of the experiment that need to be taken note of. These were sorted out by the researcher:

- Power failure
- Lack of proper infrastructure.
- Time-table related difficulties

Efforts were needed to convince other teacher educators and principal about importance of the experiment to make them agree to cooperate in the experiment. The researcher contacted the authority and briefed about the programme and its usefulness. It is an essential requisite for every experiment that the treatment should be fully provided to every student. It was ensured that the sample groups regularly attended the college. The experiment had to be adjusted as per the time-table as the pre-service teacher were pursuing a regular course of studies. Even the time-table in-charge was contacted for making some changes in the regular time-table. The method of MMLP takes more time in setting up and winding up. So some pre-service teachers were involved in setting the equipment in the class. Such pre-service teachers repeatedly needed encouragement, so it was made sure to encourage them from time to time. The pre-service teachers were motivated to take interest in teaching-learning activities. Despite these constraints the researcher carried out the experiment very smoothly to study the effectiveness of MMLPs for teaching of Educational Psychology.