Method of the Study
CHAPTER – IV

METHOD OF THE STUDY

To carry out any research investigation, it is necessary to adopt a systematic method and procedure. By methodology of any research we mean the selection of the representative sample, applying appropriate research tools and techniques, collecting relevant data, analysis and interpretation of the same for the scientific investigation of the problem. The selection of appropriate method or methods to be employed, however, depends upon purpose of the study, nature of the problem and kinds of data necessary for its study.

In the present chapter method of the study will be discussed under following heads:

- Tools used
- Sample
- Design of the study
- Control of variables
- Procedure of the study
- Statistical Techniques used.

4.1 TOOLS USED

The following tools were used for collecting data:

- **Instructional Material Self Learning Modules (SLM):** developed and validated by the Investigator
- An **Achievement Test:** standardized by the investigator.
- **Personality Word List test for Self Concept** by Deo (1998).
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- **Scale of Attitude towards English**: developed and validated by the investigator.
- **State Trait Anxiety inventory (STAI)** by Spielberger (1985).
- **Self-Esteem Inventory** by Coopersmith (1987).

4.2 SAMPLE

Sampling is an important aspect of life in general and enquiry in particular. We make judgments about people, places, and things on the basis of fragmentary evidence (Garrett, 1966; 1981; Edwards, 1968; Smith, 1975). The adequacy of a sample i.e. its lack of bias, depends upon our knowledge of the population as well as the method used in drawing the sample. Population refers to all under investigation and a sample is an actual subset of observations drawn at random from a population (Calfee, 1975). A population is the theoretical set of all possible observations for a particular experiment (Calfee, 1975). If the observations are numbers, then the population is described by the distribution function of the observations, which gives the probability of occurrence for each possible numerical value. In statistical terminology, the terms that make up a test constitute a sample from a much larger collection, or population of items that might have been used in that test (Ebel & Frisbie, 1991).

The sample can thus be described by a distribution of proportions propelling the probability distribution of function. The sampling distribution can be thought of as the result of repeating a sampling operation many times with free sample size and calculating a statistic like mean from each sample. At the same time the sampling distribution of statistics gives us a way of relating the sample estimate to the population parameter. It provides a way of determining the significance level of a given result under the null hypothesis (Garrett, 1966; 1981; Ebel & Frisbie, 1991).

The size of the population places an upper limit on the size of the sample that can be drawn from it (Ebel & Frisbie, 1991). The sample cannot be larger than the population (Garrett, 1966; Calfee, 1975; Robson, 1996; Ebel &
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Frisbie, 1991). The larger the population, the more likely it is to be heterogeneous i.e. to include diverse and semi-independent areas of knowledge or ability. In order to achieve equally accurate results, a somewhat larger sample is required in a heterogeneous than in a homogeneous domain (Robson, 1996). A large sample will always yield a sample statistics closer to the population parameter than a more limited sample (Garrett 1966; 1981). The larger the sample, the smaller the sampling errors are likely to be and such errors are not caused by mistakes in sampling (Ebel & Frisbie, 1991).

Sampling procedure is representative if every sub-class eventually occurs with the same proportion in the sample as in the general population (Garrett, 1966). In probability sampling, statistical inferences about the population can be made from the respondents of the sample. It is therefore sometimes referred to as the representative sampling (Robson, 1996) where the sample is taken as a representative of the population (Garrett, 1966).

Various techniques have been devised for obtaining a sample, which will be representative of its population. Most commonly used sampling techniques are:

- Random Sampling
- Stratified or Quota Sampling
- Incidental Sampling, and.
- Purposive Sampling

Random Sampling: The descriptive term random is often misunderstood. It does not mean the sample has been chosen in an offhand, careless and haphazard fashion (Garrett, 1966; 1981). Random sampling means that we rely upon a certain selection called random to provide an unbiased cross section from larger group or population. This involves selection of the required number of person, cases from the sample. Random selection
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assures that the observations will be representative of the performance of the appropriate reference group and free of systematic bias. In random assignment, selection of the subjects is done in such a way that every subject in the population is equally to be selected and assigned to a particular experimental group. Thus, random sampling:

- Yields samples that are representative of the population and that are free of systematic bias;
- Avoidance of systematic bias which generally occurs when there is a non random selection procedure (i.e. a person is assigned to be in a condition depending on his particular characteristics);
- Ensures that for any sample of subjects, there is no bias in assigning any person to any particular treatment group.

The criteria for randomness are met when:

- Every individual in the population or supply has the same chance of being chosen for the sample;
- The selection of one individual or thing in no way influences the choice of another.

Thus, randomness in a sample is assured when we draw similar and well shaken up slips out of a hat or numbers in a lottery (provided it is honest) or a hand from a carefully shuffled deck of cards; In each of these cases, selection is made in terms of some mechanical processes and is not subject to the whims or biases (if any) of the experimenter.

- Stratified sampling is a technique designed to ensure representativeness and avoid bias by use of modified random sampling method. It is applicable when the population is composed of sub-groups or strata of different sizes so that a representative sample must contain individuals drawn from each category or stratum in accordance with the sizes of the sub-groups.


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Within each stratum or sub-group, the sampling is random or as nearly as possible. This involves dividing the population into a number of groups or strata where members of a particular group share a particular characteristic. Stratum A, may be females and stratum B, may be males of the same age group say 13+ to 16+ year who are studying in IX grade.

- **Incidental sampling** is sometimes referred to as accidental sampling. It is applied to those groups, which are used chiefly because they are easily or rapidly obtainable. School children, college students are readily available, and laboratory animals are also readily available at all times in numbers and under conditions none of which may be of the experimenter's choice. Such casual group rarely contributes random samples of any definable population.

- **Purposive sampling**, a sample is built up which enables the investigator to satisfy his specific needs in the project. The principal of selection in purposive sampling is the investigator's judgement of the typicality of his interest. A sample may then be expressed chosen because in the light of the available evidence, it mirrors some larger groups with reference to a given characteristic (Garrett, 1966; 1981; Stodola & Storodahl, 1967).

Investigators following the Grounded Theory Approach (Glaser & Straus, 1967; Straus, 1987; Robson, 1996) carry out initial sampling, and from analysis of the results, extend the sample in ways guided by their emerging theory sometimes referred to as the theoretical sampling. Random sampling formulae apply more or less accurately to purposive samples (Garrett. 1966).

The sample in the present investigation was drawn at two levels:

- The School Sample and
- The Student Sample
- **The School Sample:**

  The school sample was drawn from the representative secondary schools wherein the medium of instruction was English. A list of the Schools under the administration of the district Fatehgarh Sahib was procured from the Director
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Public Instructions (Schools) through the District Education Officer. In order to get relevant information from Schools; the investigator sought permission to visit Schools from the District Education Officer of Fatehgarh Sahib District (Punjab) following the normal proceedings.

In order to satisfy the real effort in experimental research, the logical social inference of purposive sampling was initially employed. Initially, permission was granted for nine Senior Secondary Schools whose medium of instruction was English. In order to arrive at the final sample, out of the nine schools for which permission was granted, the investigator employed the random sampling technique. This technique provided an unbiased cross section of the larger group (population). It involved the selection from the sampling frame the exact required number of samples from the population of C.B.S.E. affiliated Public Schools, which equally stood likely to be selected.

Thus, names of the nine schools were written down in separate sheets of papers of equal sizes. The names were folded into six symmetrical equal parts and put in an enclosed carton box. The lid was then sealed and the box was shaken up many times for easy shuffling to take place. Satisfied, the investigator carefully made a slit, which the hand can easily slide through in and out without any hindrance. Again another shuffling was done by hand as in the form of a lottery. Satisfied once more, the investigator drew out the first four cards one by one bearing the names of each school which represented the population under investigation. The Principals of these Schools were approached. Since the investigator had written permission from the District Education Officer (DEO), not a single Principal of these four schools objected to conduct this research experiment. Rather, they welcomed the investigator and showed keen interest in the instructional plans of mastery learning. The names of the schools along with the number of students selected for the experiment have been listed in the Table 4.1.
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Table 4.1

School Wise Distribution of the Initial Sample

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the School</th>
<th>Total Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Divine Light International School, Shemsher Nagar, Sirhind, Distt. Fatehgarh Sahib.</td>
<td>78</td>
</tr>
<tr>
<td>2.</td>
<td>Jesus Saviours School, Shemsher Nagar, Sirhind. Distt., Fatehgarh Sahib.</td>
<td>58</td>
</tr>
<tr>
<td>3.</td>
<td>St. Mary's School, Mahadian, Fatehgarh Sahib.</td>
<td>60</td>
</tr>
<tr>
<td>4.</td>
<td>Saffron City Smart School, Fatehgarh Sahib.</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>264</td>
</tr>
</tbody>
</table>

- The Student Sample

The study was conducted on 264 IX grade Secondary School Students studying in the schools at district Fatehgarh Sahib, which were affiliated to the Central Board of Secondary Education (CBSE) New Delhi. The age of these students ranged between 13+ to 16+ years.

Distribution of the Final Sample

In order to ensure that for any sample of subjects there was no bias great care was taken while assigning the sample to any particular treatment group. Two papers representing two treatments were written down in two separate sheets of papers of equal sizes. The papers were folded into six symmetrical parts and dipped into an enclosed carton box measuring 30cm x 30cm x 15cm. As had been stated earlier, the box was shaken-up many times for easy shuffling...
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to take place. The investigator personally drew out the first and second cards and accordingly allocated them to the treatment groups- One group was considered as experimental group, wherein; students were imparted instructions through self Learning Modules and second group was taught through Conventional Learning.

Group I was taught through Self Learning Modules (SLM). Group II was the control group, which was taught through Conventional Learning (CL) by the investigator. During the process of instruction, some students dropped out at one stage or the other. The structure of the final sample comprised of $N = 250$ students, has been shown below in Table 4.2.

Table 4.2

The Structure of the School Wise Break – Up of the Sample

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the School</th>
<th>Group I</th>
<th>Group II</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>St. Mary’s School Mahadian, Fatehgarh Sahib.</td>
<td>60</td>
<td>-</td>
<td>60</td>
</tr>
<tr>
<td>2.</td>
<td>Saffron City Smart School, Distt. Fatehgarh Sahib.</td>
<td>65</td>
<td>-</td>
<td>65</td>
</tr>
<tr>
<td>4.</td>
<td>Jesus Saviours School, Shemsher Nagar Sirhind, Distt. Fatehgarh Sahib.</td>
<td>-</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>125</td>
<td>125</td>
<td>250</td>
</tr>
</tbody>
</table>
4.3 DESIGN OF THE STUDY

A research design is the plan, structure, and strategy of investigation conceived so as to obtain answers to research questions and to control variance (Lindquist, 1956). Definition of the term experimental design is comparatively restricted (Brooter, 1999). The term is used in Fishers Tradition (1973); to state statistical principles underlying experimental designs and their analysis, wherein an experimenter can schedule treatments and measurements for optimal statistical efficiency. It contains activities like procedure for selection of factors and their levels of manipulation, identification of extraneous variables that need to be controlled, procedures for handling experimental units, selection of criterion measure, selection of specific design, and analysis of data (Brooter, 1999).

Winer (1971) has compared the design of an experiment to an architect's plan for the structure of a building. The designer of experiment performs a role similar to that of the architecture. The design is the general structure of the experiment, not its specific content (Myers, 1980). The designer of an experiment has to do the planning of the experiment so that the experiment, on completion fulfils the objectives of the research (Brooter, 1999). Educational research is therefore described as experimental if and when the researcher has:

- Firstly, specified the finite set of researchable hypotheses and
- Secondly has established a systematic programme of data gathering, under precisely defined conditions in an effort to test these hypotheses (Ingersoll, 1982).
- A good experimental designer should provide some information with respect to all the objectives of the experiment (Winer, 1971) and be kept as simple as possible (Montgomery, 1994).
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The present research was designed to compare the effects of modular strategies and conventional method on students’ Achievement and their Attitude towards English and Self Concept of IX graders in relation to Anxiety and Self Esteem. To study the teaching of English Grammar the instructional strategies involved preparation of Self-Instructional Material viz modular strategy for teaching of English language of IX class students. For the purpose of investigation, experimental method was employed in the form of pre-test and post-test factorial design by involving two groups – one experimental group and one control group.

Group I (Experimental group) was presented with Self-Learning Modules; and group II control group for learning English through Conventional method. In order to analyze the data, three way (2x2x2) analysis of variance was used for three independent variables:

- **Independent Variable:** The instructional mode was treatment variable which was studied at two levels:
  - Self-Learning Modules (SLM) and
  - Conventional Learning (CL).
- **Dependent variable:** Effect of independent variables was studied on dependent variables i.e. learning outcomes which include:
  - Achievement
  - Attitude towards English
  - Self Concept
- **Classifying Variable:** The students were classified at two levels:
  - Self Esteem
  - Anxiety
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The variable of teaching strategies was studied at two levels, viz. Self Learning Modules and Conventional Learning. The variable of Self Esteem was studied at two levels, namely High, and Low Self Esteem. The variable of Anxiety was studied at two levels, i.e. High and Low Anxiety.

In this study the Instructional Strategies remained the treatment variables, Self Esteem and Anxiety were used as classifying variables and Achievement, Attitude towards English and Self Concept acted as dependent variable.

The dependent variable, i.e. Achievement was calculated by administering the standardized Achievement test in English Grammar after the students were exposed to two different strategies of Instructions and retention was found by administering the same Achievement test (Post Test) for each treatment after an interval of three weeks.

Pictorial presentation of the design for the present study has been given in Fig. 4.1

Where:

A1 stands for group exposed through Self-Learning Modules.
A2 stands for Conventional Learning.
B1 stands for High Anxiety
B2 stands for Low Anxiety
C1 stands for High Self Esteem
C2 stands for Low Self Esteem.

From the Fig. 4.1 it can be derived that the treatment variable for instructional strategies was given code A, Anxiety was given code B and Self Esteem was given code C. The total number of combinations was 2x2x2 which is given by Fig. 4.1.
4.4 CONTROLS FOR EXPERIMENT

Control Variables

One of the main contestants in every empirical study is that conclusions always have to be inferred from observations (Norton, 1952; De-Klerk, 1979). Identification and control of relevant variables are two of the most critical tasks confronting most researchers (D’Amato, 1970). Although the control of known or potentially relevant variables is often not difficult to accomplish, their identification and fixation frequently requires insight and ingenuity (Church, 1964; Rescorla, 1967, Solomon & Lessac, 1968; Seligma, 1969). The matter of detecting unrecognized relevant variables rests entirely with the experimenter’s perceptiveness (Solomon & Lessac, 1968). The reason the experimenter wishes to control known and potentially relevant variables is to avoid repetition and contamination (Seligma, 1969). One goal of experimental research is to
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determine how the independent variables of the study affect the dependent variables (D'Amato, 1970). Most control measures fall into one of the three general types of control techniques: Matching, randomization and counterbalancing.

In matching techniques, the investigator obtains full control of the relevant variables for a particular experiment being investigated (Church, 1964; Scriven, 1967; D'Amato, 1970). Control is achieved by equalization of the effects of the relevant variables over all values of the independent variable of the study (Seligma, 1969). And this may be well equated in a particular experiment particularly if the number of the total sample involved is small (Rescorla, 1967). Counterbalancing techniques on the other hand, can provide either type of control i.e. equalization of the effects of the relevant variables in the single experiment or over the long run (Rescorla, 1967).

In the present investigation, the controls were exercised using sort of techniques.

- **Matching** of the groups was one control wherein all the relevant variables were controlled. The groups were matched on all the relevant variables like intelligence, age, gender, socio-economic status, and Entry Behaviour of the learners etc. This was essential also because; two instructional treatments were administered in four different schools to avoid contamination. The control of this experimental variable was also exercised by assigning the same teacher to all the treatment groups. Hence Pre-tests, Post-tests and instructions were imparted under similar conditions of classroom environment and instructions. The experimenter administered the treatment exactly in the same period of time for each school.

- **Randomization** was another control, which was exercised at two levels. Firstly, it was done for the for the selection of the school and second at the time of allocation of students to various treatment groups.
4.5 PROCEDURE OF THE STUDY

Two main stages were adopted as the procedure of the experiment. These stages were:

**Stage I: Selecting the sample,**

**Stage II: Conducting the experiment**

**Stage: I: Selecting the Sample:**

The sample was selected at two levels: The School Level and the student Level. Four Schools with 264 students were selected for conducting the experiment. The procedure adopted for the selection of sample have already been discussed under the heading "Sample".

**Stage II: Conducting of the Experiment:**

The experiment was conducted in four phases as stated below:

**Phase I: Administration of Pre-Test: Achievement test, Attitude towards English Scale, Self Concept List.**

**Phase II: Implementing the instructional programme: Implementing the Self Learning Modules (SLM) and Conventional Learning (CL).**

**Phase III: Administration of the Post – tests: Achievement test, Attitude towards English Scale, Self Concept List, Anxiety and Self Esteem Inventory.**

**Phase IV: Scoring of Achievement Test, Attitude towards English Scale, Self Concept List, Anxiety and Self Esteem Inventory.**

**Phase I: Administration of Pre-Test (Achievement test, Attitude towards English Scale, Self Concept List, Anxiety and Self-Esteem Inventory)**

Since the final analysis was done on the gain scores of the three dependent variables viz: Achievement Test, Attitude towards English, Self Concept was administered to all the selected groups. Separate answer sheets were provided for Achievement test. Scoring was done to obtain the information regarding knowledge of the students on the topics to be taught through the experimental treatment. No time limit was imposed for completing pre-test so that a clear and exact level of students regarding instructional content is assessed. Time limit would have forced the learners to leave the test even if they knew the
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content. The sequence of the test was the same in all the four schools. All the students were exposed through the two classifying variables i.e. Self Esteem and Anxiety.

Phase II: Implementing the Instructional Programme

The experimental group was taught through Self Learning Module (SLM). The control group was taught by the investigator herself in the conventional way.

The experimental group SLM and control group were taught by the investigator herself so that a finer strategic differences could be taken care of the sequence of events through SLM (Self Learning Modules) strategy of learning as well as CL (Conventional Learning).

For SLM

Step I: Students were motivated for the novel method of instruction.
Step II: Students were encouraged to participate.
Step III: Each lesson content was recapitulated and summarized at moderate intervals.
Step IV: Unit - wise formative tests were administered at the end of each unit.
Unit V: Peer tutorial as a remedial prescription was used for those students who needed it.
Unit VI: The investigator herself taught the group following the guidelines developed in the lessons earlier. (These have been discussed in details in Chapter II).
Step VIII: The time schedule for SLM was similar to that of Conventional Learning.

For Control Group:

Step I: This group was taught by the investigator herself (English) in the conventional manner. It generally refers to explaining rules on the black board explanations by the teacher with examples solving exercises and providing notes on all important rules of grammar related to the topic.
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Step II: Objectives and content of five topics were available with the investigator.

Step III: No unit summative test was conducted after the completion of each unit.

Step IV: The time schedule followed for this group was similar to that of the other group.

Phase III: Administration of the Post – Test

After completion of all the five topics, the Achievement test was administered to all the students. Answer sheets were scored and converted into percentages. Time limit was one – hour for 100 questions. Similarly the post-test was given to both the groups on Attitude towards English Scale; 15 minutes were given for 22 questions. Further Personality Word List (PWL) test was administered on both the groups for one hour. Students, the subject teachers and Block Wing (s) and Mistress (es) were thanked for their cooperation during the entire period of the experiment.

Phase IV: Scoring

All the tools were scored according to their prescribed scoring keys and data thus, obtained was subjected to statistical analysis.

4.6 STATISTICAL ANALYSES

The following statistical techniques were employed for the purpose of data analysis obtained from the experiment in order to test the hypotheses:

1. Graphical presentation: Bar diagrams, Line graphs, Frequency curves, were drawn.

2. Descriptive statistics (Mean, Median, Mode, Standard Deviation, Skewness, Kurtosis of data).

3. Inferential statistics includes t-test, ANOVA

4. Bivariate Coefficient's of correlation

5. Moderate - Multiple regressions.

6. Significant F-ratios were followed by t-test wherever required.

The analyses of data have been reported in the succeeding chapter.
Results and Discussion