Chapter – III

Method
and
Procedure
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METHOD AND PROCEDURE

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.

3.1 DESIGN OF THE STUDY

The present research was designed to compare the effects of two modular strategies and conventional method on students’ achievement and retention of English Grammar at secondary stage in relation to achievement motivation and cognitive style. To study the teaching of English Grammar the instructional strategies involved preparation of self-instructional material viz., two types of modular strategies for teaching of English language to 9th class students. For the purpose of investigation, experimental method was employed in the form of pre-test and post-test factorial design by involving three groups - two experimental groups and one control group.

Group I (Experimental group I) was presented with self-learning modules; Group II (Experimental group II) learning modules with teacher intervention and group III (control group) for learning English through conventional method. In order to analyze the data, three way (3X3X2) analysis of variance was used for three independent variables:

(A) Instructional treatment as self-learning modules, learning modules with teacher intervention and conventional method of teaching
(B) Achievement Motivation
(C) Cognitive Style
The variable of teaching strategies was studied at three levels, viz. self-learning modules, learning modules with teacher intervention and conventional method of teaching. The variable of achievement motivation was studied at three levels, namely high, average and low achievement motivation. The variable of cognitive style was studied at two levels, i.e. field-dependent and field-independent.

In this study, the instructional strategies remained the treatment variable. Achievement motivation and cognitive style were used as classifying variables and achievement and retention in English Grammar 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 three different strategies of instruction and retention was found by administering the achievement test for each treatment after an interval of three weeks.

Pictorial presentation of the design for the present study has been given in Table 3.1.
Table 3.1
The Schematic Layout 3 x 3 x 2 Factorial Design

<table>
<thead>
<tr>
<th>Performance gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group (I)</td>
</tr>
<tr>
<td>A1</td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td>Average</td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>B1</td>
</tr>
<tr>
<td>B3</td>
</tr>
<tr>
<td>F-D</td>
</tr>
<tr>
<td>F-I</td>
</tr>
<tr>
<td>C1</td>
</tr>
<tr>
<td>C2</td>
</tr>
<tr>
<td>C1</td>
</tr>
<tr>
<td>C2</td>
</tr>
<tr>
<td>C1</td>
</tr>
<tr>
<td>C2</td>
</tr>
<tr>
<td>C1</td>
</tr>
</tbody>
</table>

Where:

A1 stands for Group Exposed through Self-learning Modules
A2 stands for Learning Modules with Teacher Intervention.
A3 stands for Conventional Method of Teaching.
B1 stands for High Achievement Motivation.
B2 stands for Average Achievement Motivation.
B3 stands for Low Achievement Motivation.
C1 stands for Field-Dependent
C2 stands for Field-Independent.

From the Table 3.1, it can be derived that the treatment variable of instructional strategies was given code A, achievement motivation was given code B and cognitive style was given code C. The total number of combinations was 3x3x2=18 are given in Fig.3.1.
Figure 3.1

Figure Showing Number of Combinations in 3X3X2 Design

A1

B1

C1  A1B1C1
C2  A1B1C2

B2

C1  A1B2C1
C2  A1B2C2

B3

C1  A1B3C1
C2  A1B3C2

A2

B1

C1  A2B1C1
C2  A2B1C2

B2

C1  A2B2C1
C2  A2B2C2

B3

C1  A2B3C1
C2  A2B3C2

A3

B1

C1  A3B1C1
C2  A3B1C2

B2

C1  A3B2C1
C2  A3B2C2

B3

C1  A3B3C1
C2  A3B3C2
3.2 SAMPLE OF THE STUDY

The study was conducted on a sample of 300 students of 9th class, both boys and girls, drawn from two Government Model Senior Secondary Schools situated in the urban areas of Chandigarh (U.T.). Purposive random sampling technique was used for the selection of the sample. The two schools were selected from the total schools of Chandigarh having at least three sections. In each school out of three intact groups (50-55 students in each section) two experimental groups were exposed to modules with and without teacher intervention and third group acting as control group was taught in the conventional way. The school-wise breakup of the sample is given in Table 3.2.

Table 3.2
School-wise Break-up of the Sample

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the School</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Govt. Model Sr. Sec. School Sec. 16-D, Chandigarh</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>2</td>
<td>Govt. Model Sr. Sec. School Sec. 22-C, Chandigarh</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>300</td>
</tr>
</tbody>
</table>

Another sample of 160 students was raised from two schools of Govt. Model Senior Secondary School, Sector 20, Chandigarh and Govt. Model Senior Secondary School, Sector 46, Chandigarh for standardization of Achievement Test and Reaction Scale.

A sample of 150 students was raised from Govt. Model Senior Secondary School, Sector 10, Chandigarh to find out the reliability of the achievement test and reaction scale. Apart from this, 18 experts were selected for finding the validity of the achievement test and 15 experts for finding the validity of the reaction scale. The breakup of the sample is given in Table 3.3.
Table 3.3
Break-up of the Sample for the Standardization of the Tests

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Test/Scale</th>
<th>First Draft</th>
<th>Try Out of Second Draft</th>
<th>Final Try Out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Name of School</td>
<td>No. of Students</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GMSSS, 20-D,Chd</td>
<td>30 (15 boys + 15 girls)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GMSSS, 46-D, Chd</td>
<td>30 (15 boys + 15 girls)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GMSSS, 10, Chd</td>
<td>100 (50 boys + 50 girls)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GMSSS, 10, Chd</td>
<td>50 (25 boys + 25 girls)</td>
</tr>
</tbody>
</table>

3.3 TOOLS USED

In the present study, following tools were used to collect the relevant data:

1. Self-Learning Modules in English grammar were developed by the investigator on four Topics of ninth class, namely, The Modals, The Passive, The Reported Speech and The Prepositions out of the eight topics prescribed by the C.B.S.E.

2. An Achievement Test on the same units of English grammar developed and standardized by the investigator was used to test the performance of the learner before and after the treatment.

3. Achievement Motivation Scale constructed and standardized by Deo, P. and Mohan, A. (1985) and published by National Psychological
Corporation, Agra, was used to classify students into various levels of achievement motivation.

4. The Group Embedded Figure Test (GEFT) by Philip, K. Ottman, Evelyn Raskin and Herman, A. Witkin (1971) was used to identify the cognitive style of the students.

5. The retention was measured by administering an achievement test after three weeks.

6. Module Reaction Scale to know students’ reaction towards the modular strategy was prepared by the investigator.

3.4 DESCRIPTION OF THE TOOLS

3.4.1 Self-learning Module

Self-learning modules in English Grammar were developed by the investigator to study the effectiveness of modular strategy in relation to self-learning module with and without teacher intervention and conventional method.

Four grammatical topics- The Modals, The Passive, The Reported Speech and The Prepositions - were selected from CBSE syllabus for the students of 9th class. Their knowledge of the selected items was tested, analyzed and result reported to find out the effectiveness of modular instructional strategies viz.-a-viz. conventional method.

The detail of the development of self-learning module is discussed in Chapter IV.

3.4.2 Achievement Test

To measure knowledge, understanding and acquisition of English Grammar, an achievement test was constructed by the investigator. The test consisted of four sections, each section comprising of 25 items. Section "A" deals with correct and incorrect statements in the form of true and false items; Section "B" consists of fill in the blanks items; Section "C" consists of sentences with a grammatical error in each and section "D" also consists of sentences with one part of the sentence carrying some error.
The detail of the development of achievement test is discussed in Chapter IV. Each right answer carries 1 mark. The reliability of the test was calculated by test-retest method and was found to be 0.82. The validity of the test was determined as content validity.

3.4.3 Reaction Scale Towards Modular Strategy

A Reaction Scale was developed by the researcher to test the effectiveness of the modules in terms of the reaction of the students towards the modules. The investigator selected 20 statements relating to different aspects of self-learning, viz. concept and understanding of the subject, language and contents of modules, testing at different levels etc. These statements are to be rated on a five point rating scale. The scale enabled the investigator to gauge the students' reaction whether they are in favour or against the self-learning modules.

3.4.4 Achievement Motivation (n-Ach) Scale

Achievement Motivation Scale constructed and standardized by Dr.(Mrs.) Pratibha Deo and Asha Mohan (1985) is standard verbal measure of achievement motivation in general. The scale consists of 50 items (13 negative and 37 positive) based on 15 factors as cues of achievement imagery. The factors are:

1. Academic motivation
2. Need for achievement
3. Academic challenge
4. Achievement anxiety
5. Importance of grades/marks
6. Meaningfulness of tasks
7. Relevance of school/college to future goals
8. Work methods
9. Attitude towards teachers
10. Interpersonal relations
11. Individual concern
12. General interest
13. Dramatics
14. Sports
15. Self-rating type and can be administered individually as well as in a group with 5 points to rate, viz. Always, Frequently,
Sometimes, Rarely and Never. It has no time limit. The scale is handy and convenient for administration and scoring.

Scoring

Two stencil keys are used for scoring – one for positive items and the other for negative items. A positive item carries the weights of 4, 3, 2, 1 and 0 respectively for the categories of Always, Frequently, Sometimes, Rarely and Never. The negative item is to be scored 0, 1, 2, 3 and 4 for the same categories respectively that are given above. The total score is the summation of all the positive and negative items scores. The minimum scores obtained can be 0 and maximum can be 200, other scores ranging in between.

Reliability of the Scale

Test-retest method was applied to obtain the reliability coefficient of the scale on different sets of sample. The reliability coefficients of scale are entered in Table 3.4.

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>Interval</th>
<th>r</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Group</td>
<td>51</td>
<td>4 weeks</td>
<td>0.69</td>
<td>0.01 Level</td>
</tr>
<tr>
<td>Males</td>
<td>33</td>
<td>5-6 weeks</td>
<td>0.67</td>
<td>0.01 Level</td>
</tr>
<tr>
<td>Females</td>
<td>50</td>
<td>5-6 weeks</td>
<td>0.78</td>
<td>0.01 Level</td>
</tr>
</tbody>
</table>

These coefficients of reliability for the total group as well as for the separate male and female groups are sufficiently high and the scale can be considered very satisfactory and taken as reliable for use.

Validity of the Scale

As far as the validity of the scale is concerned, the item validity established by the high-low discrimination method was accepted as the validity for the whole measure. Concurrent validity of the scale was found by coefficient
of correlation between the scale and the projective test which was 0.54 and the scale correlated with the Aberdeen Academic Motivation Inventory of Entwistle, N.J. (1968) yielding a coefficient of correlation as 0.75 which supports the results of the present scale of achievement motivation to be sufficiently valid for use for measuring achievement motivation.

3.4.5 The Group Embedded Figure Test (GEFT)

Group Embedded Figure Test (GEFT) by Philip, K. Ottman, Evelyn Raskin and Herman, A. Witkin (1971), an adaptation of the original individually administered Embedded Figure Test (EFT) was preferred as a suitable instrument to measure the cognitive style dimension of field independence/dependence of the sample primarily because it makes group testing possible and scores for a large number of individual can be conveniently obtained in a single test session of 20 minutes. It consists of one format and has 18 complex figures, 17 of which are taken from EFT.

GEFT required the subjects to locate a simple visual figure embedded within a more complex one. Besides the seven simple forms (A, B, C, D, E, F, G) that have to be located, the test has three sections, first section comprising of a seven-item practice set which served the purpose of providing practice to the subjects and is not to be scored, second and third sections are comprised of nine difficult figures which are arranged in ascending order of difficulty within each section. Thus, the test has a scored set of 18 items administered in two equal parts and for which subjects are allowed a time limit of 5 minutes each whereas for the practice set only two minutes are to be allowed.

Scoring

The total number of simple forms correctly traced in 2nd and 3rd sections combined is the individual scores, since the items in practice set are not scored but merely scanned to ensure that the instructions have been understood properly by the subjects. Omitted items are scored as incorrect. In order to receive credit for an item, all lines of the sample forms must be traced. All incorrect lines must be crossed. No extra lines are added. Those students
getting above eight marks are indicative of field-independence while those students getting eight or below marks are denoted as field-dependent.

**Reliability of the Scale**

Since GEFT is a speed test, an appropriate method of estimating reliability is the correlation coefficient between parallel forms with identical time limit. Correlation between the 2nd and 3rd sections was calculated by Spearman Brown formula, producing a reliability of 0.82 for both males (N=80) and females (N=97) from an eastern liberal arts college (as reported in GEFT Manual, 1971).

Moreover, the value of Pearson’s product moment coefficient of correlations between scores obtained on two administrations of GEFT (as reported by Vasesi, R.; 1985) on a representative sample of the school students (Classes 9th and 10th, N=50) is 0.86 indicating a high reliability of the test.

**Validity of the Scale**

The validity of GEFT was assessed by criterion measure. The validity coefficients are presented in Table 3.5.

<table>
<thead>
<tr>
<th>Population</th>
<th>N</th>
<th>Criterion Variable</th>
<th>r with GEFT scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male undergraduates</td>
<td>73</td>
<td>Individual EFT solution time</td>
<td>-0.82</td>
</tr>
<tr>
<td>Female undergraduates</td>
<td>68</td>
<td>Individual EFT solution time</td>
<td>-0.63</td>
</tr>
<tr>
<td>Male undergraduates</td>
<td>55</td>
<td>PRFT, error</td>
<td>-0.39</td>
</tr>
<tr>
<td>Female undergraduates</td>
<td>68</td>
<td>PRFT, error</td>
<td>-0.34</td>
</tr>
<tr>
<td>Male undergraduates</td>
<td>55</td>
<td>ABC, degree of body articulation</td>
<td>0.71</td>
</tr>
<tr>
<td>Female undergraduates</td>
<td>68</td>
<td>ABC, degree of body articulation</td>
<td>0.55</td>
</tr>
</tbody>
</table>

*r's with the EFT or the PRFT should be negative because the tests are scored in reverse fashion.

The combined evidence suggests that the GEFT may prove to be a useful substitute for EFT when individual testing is impractical.
3.5 Procedure of the Study

After the selection of the sample, the experiment was conducted in five phases.

Phase I:

Achievement Motivation Scale and Group Embedded Figure Test were administered in each school in order to identify the level of Achievement Motivation and cognitive styles of students.

Phase II:

A pre-test was administered to the students of the treatment groups and control group to know information regarding the previous knowledge of the students.

Phase III:

The students were given three treatments on the basis of three instructional strategies in the respective groups.

Group I was exposed through self-learning modules.

Group II was exposed through learning modules with teacher intervention.

Group III was taught through conventional method by the investigator herself.

The teaching was carried out for a period of 4 weeks (5 periods/week).

Phase IV:

At the end of the treatment, all the three groups were tested by administering achievement test as post-test. The two experimental groups were administered the Reaction Scale to know students reaction towards the modular strategy.

Phase V:

After 3-weeks, again same achievement test was administered to the students of two treatment groups and control group to get a measure of their retention. The answer sheets were scored with the help of scoring key. The time limit for test was 40 minutes.
3.6 **SCORING OF TEST**

The tests were scored strictly in accordance with the instructions given in the respective manuals. The data yielded the following set of scores:

1) Pre-test (Achievement Test) Scores
2) Achievement Motivation Scores
3) Cognitive Style Scores
4) Post-test (Achievement Test) Scores
5) Retention Scores
6) Reaction towards Module Scores

3.7 **STATISTICAL TECHNIQUES USED**

Descriptive statistics such as mean, median, mode, standard deviation were worked out to study the general nature of the sample in relation to dependent variable, i.e. achievement and retention and independent variables, viz., instructional treatments as self-learning module, learning module with teacher intervention and conventional method; achievement motivation and cognitive style.

Skewness, kurtosis and their standard error were worked out to see the trend of departure of the sample distribution from the normal probability curve.

Analysis of variance (ANOVA) was used to test the hypotheses related to strategies of teaching, for achievement test scores and retention test scores, achievement motivation and cognitive styles.

`t`-test was applied to find out the significance of difference between means related to different groups and different variables.

3.8 **OPERATIONAL DEFINITIONS OF THE TERMS USED**

3.8.1 **Self-learning Module**

Self-Learning module is an instructional unit of learning, which includes a set of activities to facilitate the learners' achievement of specific objectives. It is
relatively self-contained unit designed for specific purpose and consists of six components as the rationale, objectives, pre-assessment test, varied activities, post-assessment test and feedback mechanism.

3.8.2 Achievement Scores

Achievement is the extent to which learner is profiting from instructions in a given area of learning. Achievement refers to the knowledge, attainment or skill which has been acquired by the pupil's from the training imparted to him in the school subject which is assessed by the authorities with the help of achievement test.

In the present study, achievement scores are obtained as the total marks of the ninth class students on all the four sections of the standardized achievement test for English Grammar.

3.8.3 Achievement Motivation

In this study, achievement motivation has been operationally defined as a desire to attain a high standard of excellence and to accomplish unique objectives. It is a measurement of self-imposed requirement for good performance or need to accomplishing something worthwhile and the scores obtained by students in the Deo and Mohan's achievement motivation scale determine the level of achievement motivation.

3.8.4 Cognitive Style

Cognitive style refers to the modes an individual employs in perceiving, organizing and labeling various dimensions of the environment. Cognitive style in the present study refers to the field dependence-independence variable as measured by Group Embedded Figure Test by Witkin, et.al. (1971). A person with field-independent way of perceiving tends to experience his surroundings analytically with objects experienced as discrete from their backgrounds. The person with field-dependent way of perceiving tends to experience his surroundings in a relatively global fashion, passively confirming to the influence of the prevailing field or context.
3.8.5 Retention

Retention is considered as persistence of after-effects experiencing which are implied in learning and memory. The organism continues to perform certain learned act after an interval in which the performance has not taken place. In the present study, retention scores are obtained as marks on the achievement test administered again after three weeks of time interval.

3.9 LAYOUT OF THE THESIS

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