CHAPTER III

METHODS AND PROCEDURES
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This chapter presents the description of methods and procedures of the study regarding the design of the experiment, sampling procedure, data gathering tools, the procedure of data collection and statistical analysis of the data.

3.1 RESEARCH METHOD:

The present study was designed to compare the effects of individualized and conventional instructions on students achievement in relation to personality types, intelligence and levels of thinking. The nature of this investigation led to conduct an experimental study. A pre-test - post-test experimental design was employed. The study involved four independent variables and one dependent variable. Out of four independent variables, one variable namely instructional procedure was manipulated in three-ways. Other three variables, that is, intelligence, personality type and thinking level, were used as classifying variables. The classification variable of
intelligence at two-levels, namely high ability and low ability; personality at two levels, extroverts and introverts and comprehension also at two levels, high content comprehension and low content comprehension. The criterion variable was the scores on achievement test in mathematics.

3.2 SAMPLING DESIGN:

For this study all ninth class students enrolled in the year 1984-85 in different schools situated within the municipal limits of Jammu City formed the population. Seven schools were randomly selected from 63 schools. Out of these seven schools sections were selected through draw of lots. The sample thus raised consisted of 180 ninth class students. The institution-wise break-up of the sample is given in the Table 3.1 below:

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Name of the School</th>
<th>Total no. of students</th>
<th>No. of students included in the sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kendhriya Vidyalaya No.II, Jammu Cantt.</td>
<td>65</td>
<td>60 (Gr.I)</td>
</tr>
<tr>
<td>2.</td>
<td>Govt. Girls High School, Satwari (Jammu)</td>
<td>22</td>
<td>20 (Gr.II)</td>
</tr>
<tr>
<td>3.</td>
<td>Govt. High School, Jammu Cantt.</td>
<td>25</td>
<td>20 (Gr.II)</td>
</tr>
<tr>
<td>4.</td>
<td>Luthra Academy, Jammu</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>5.</td>
<td>Govt. Higher Secondary School, Gandhi Nagar, Jammu</td>
<td>25</td>
<td>20 (Gr.III)</td>
</tr>
<tr>
<td>6.</td>
<td>Bal Vishav Jyoti Academy, Jammu</td>
<td>27</td>
<td>20 (Gr.III)</td>
</tr>
<tr>
<td>7.</td>
<td>Govt. High School, Bhour Camp, Jammu</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total 211</strong></td>
<td><strong>180</strong></td>
</tr>
</tbody>
</table>
The above sample of 180 students was further divided into three groups namely Group I, Group II and Group III. Each Group was assigned to a mode of instructions randomly. Group I was assigned a learning package as mode of instructions. Group II was assigned a lecture method and Group III was assigned instructions through branching programme.

3.3 DESCRIPTION OF TOOLS:

In this study, the following tools were used:

- Standardized Tools; and

- Locally developed tools specifically for the use in the present study.

The following standardized tools were used in the present study:

3.3.1 Mental Ability Test:

Jalota (1972) Revised Group Test of General Mental Ability was used to measure the intelligence of the sample. The test consists of 100 items pertaining to discrimination, numerical reasoning, verbal reasoning etc. The test is of twenty minutes duration. Separate answer-sheets were provided to the students to answer so as to reuse the text-booklets. The coefficient of correlation of odd even items is 0.932. Hence the test is highly reliable. A Kurtosis of 0.647 and Skewness of -0.271 establishes the validity of the test. The test was administered and scored
strictly in accordance with the instructions given in the manual. A hand-made scoring key was prepared. The raw scores obtained were used as such in classifying the sample into high ability and low ability groups.

3.3.2 Personality Inventory:

Hindi Version of Eysenck's Maudsley Personality Inventory (M.P.I.) by Jalota and Kapoor was used to find personality types. It is a brief, standard, easily administered and scored inventory which is designed for assessing neuroticism-stability and introversion-extroversion dimensions of personality. Although no time limit is enforced in this test but it takes 15 to 20 minutes to complete the long scale and 3 to 5 minutes for short scale. Each of the question is to be answered with Yes, ?, No. This test can be used on a group or individual having age 15 years and above. The short scale has 12 items and long scale has 48 items in it. The long scale of the test has been used in the present study. The reliability co-efficient, the mean combined score and standard deviations of long scale for extraversion were 0.42, 27.3 and 6.20 respectively. The test was conducted according to the instructions given in the manual of the test. A hand-made scoring key (given in Appendix-II) was prepared to score the test items. The raw scores itself were used to classify the sample into extraverts and intraverts.

3.3.3 Content Comprehension Test:

The content comprehension test developed and standardized
by Dr. G. S. Sodhi and Tejinder Mohini (1982) of Panjab University, Chandigarh (India) was used to find the comprehension levels of the students. The test consists of 21 test items. The mean, SD, Sk, Ku of scores of the comprehension test were 12.85, 5.96, 0.4739 and 0.1473 respectively. The raw scores as such are used to classify the sample into high comprehension level and low comprehension level.

3.3.4 Achievement Test:

The achievement test developed and standardized by Dr. G. S. Sodhi and Madhu Chitkara (1985) of Education Department, Panjab University, Chandigarh (India) was used in the present study. The test comprises of two units of ninth class mathematics namely Unit I - Sets and Mappings and Unit II - Trigonometry. It has 50 test items to be answered. The Validity Correlation Coefficient and coefficient of reliability of the test are 0.68 and 0.81 respectively. Item difficulty of the items ranged between 0.26 to 0.75. The test was used as pretest and postest in the present study.

Locally Developed Tools:

The investigator developed the following tools to be used in the present study:

- Intrinsic Program (Scrambled Test); and
- Learning Package.
3.3.5 Intrinsic Program:

A branching program was developed on the two units namely Unit I - Sets and Mappings and Unit II - Trigonometry. These two units form a syllabus of ninth class in the subject of mathematics prescribed by National Council of Educational Research and Training, New Delhi. The program was validated and revised at three levels, individual testing, small group testing and field testing. It was evaluated on the basis of performance on the criterion test on 80/80 criterion. After validation, the Unit I was having nineteen sections and Unit II was having seven sections in it. The details have been given in the Chapter IV.

A criterion test to validate the branched program was developed for local use. The final draft of the criterion test was having 28 items in it. The item difficulty and discriminating powers of items ranged from .33 to .74 and .26 to .72 respectively. The details of the criterion test are shown in Chapter IV.

3.3.6 Learning Package:

In the present experimental study one of the teaching strategies used is personalized system of instructions. The learning package for this strategy was consisting of a computer program, summaries of Unit I and Unit II and exercises on these units. The details of these learning packages are given in Chapter IV.
3.4 DESIGN OF THE EXPERIMENT:

Stage I:

All the three groups were administered: (i) Jalota General Mental Ability Test to measure their intelligence; (ii) Eysenck's Personality Inventory to measure introversion and extroversion; (iii) Sodhi and Mohini Content Comprehension Test to measure the level of operative comprehension; and (iv) Mathematics Achievement Test developed by Sodhi and Madhu to measure the achievement in Mathematics before administering the treatment.

Stage II:

This stage was concerned with the actual conduct of the experiment. Group I was taught through learning packages ($M_1$); Group II was taught the same content through traditional lecture method ($M_2$) and Group III was exposed to the same content through scrambled book ($M_3$). The experiment lasted for one month. At the end of the experiment, again the same mathematics achievement test was administered to three groups as posttest.

The layout of the experimental procedure is given below:

<table>
<thead>
<tr>
<th>GROUP I</th>
<th>GROUP II</th>
<th>GROUP III</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Jalota Mental Ability Test (1972)</td>
<td>(a) Jalota Mental Ability Test (1972)</td>
<td>(a) Jalota Mental Ability Test (1972)</td>
</tr>
<tr>
<td>(b) Eysenck's Maudsley Personality Test</td>
<td>(b) Eysenck's Maudsley Personality Test</td>
<td>(b) Eysenck's Maudsley Personality Test</td>
</tr>
<tr>
<td>(c) Content Comprehension Test</td>
<td>(c) Content Comprehension Test</td>
<td>(c) Content Comprehension Test</td>
</tr>
<tr>
<td>(d) Mathematics Achievement Test as Pretest</td>
<td>(d) Mathematics Achievement Test as Pretest</td>
<td>(d) Mathematics Achievement Test as Pretest</td>
</tr>
</tbody>
</table>
3.5 DATA COLLECTION:

The collection of data followed the scheme as presented above. The data yielded scores on the following variables for further analysis:

- Intelligence Scores.
- Personality Scores.
- Content Comprehension Scores
- Achievement Scores.

3.6 OPERATIVE DEFINITIONS:

3.6.1 Intelligence:

The mean of the scores of intelligence for all the three groups was 33.8. Thus 33.8 was taken as a cut score to determine levels of intelligence. The score of 33 and below was taken as low ability group (I₂) and the score of 34 and above was taken as high ability group (I₃).

3.6.2 Personality:

The mean personality scores E for all the three groups was found to be 24.71. Therefore, a score of 24 and less was put in introvert type (P₂) whereas a score of 25 and above was put in extrovert type (P₁).
3.6.3 Content Comprehension:

The mean score for all the three groups was found to be 10.47. Hence 10 and less score was put in the category of low content comprehension level (C₂) whereas 11 and more scores were put in the high comprehension level (C₄).

3.6.4 Achievement:

Gain scores have been found by subtracting pretest scores from the post-test scores. Gain scores and gain mean scores have been used in the present study.

3.6.5 Learning Package:

It is programme on individualized instructions on the units of set and mappings and trigonometry of ninth standard. The computer programme, summaries of the above-said units and exercises on the above-said units form learning package in this study.

3.7 Analysis:

In this present study, three modes of instructions, two levels of intelligence, two personality traits and two levels of content comprehension act as independent variables. The effect of these four variables was studied on the criterion variable of total achievement. Four-way analysis of variance and t-ratios were included in this factorial design 3 x 2 x 2 x 2.
Analysis of variance was used to obtain the significant differences in total achievement of different groups, having learnt the same material through different modes of instructions. It was applied to ascertain the main effects of personalized system of instructions, branching programmed material and lecture method along with their interactions.

In view of the significant F-ratios, the t-test was employed to find out the significance of differences between means related to different groups and different variables.