CHAPTER IV

PLAN OF THE PRESENT INVESTIGATION

In experimental study, it is indispensable to have a good experimental plan, prior to data collection. An experimental plan consists of, nature of the sample, experimental material, and instruments, properly worded instructions, well defined experimental design, procedure of conducting the experiment with assignment of the subjects to various treatment combinations, recording techniques of the raw-data and appropriate statistical techniques.

Planning the Experiment

The investigator had gone through many research reviews in the field of programmed learning. The investigator could find out that very few studies were there in the field of branching style of programmed learning. The investigator had planned to study the field of branching style of programmed learning.

By studying the literature and by consulting the experts in the field of programmed learning the investigator had selected the problem for the detailed study, viz:

"Use of Branching Variety of Programmed Learning Materials in Mathematics as the Diagnostic and Remedial Tool".
After selecting the problem, the investigator had decided to study the problem with two groups. One of these two groups was taught through conventional method and other group through programmed learning techniques, particularly 'branching'. Then, these two groups were compared with respect to the performance at the post-test. For this, the planning and selection was made in four ways, viz:

(a) Formulation of the hypotheses.
(b) Selection of the research tools.
(c) Selection of the sample.
(d) Selection of the experimental design.

Formulation of the Hypotheses

From the review of the studies, a number of interpretative conclusions can be drawn. The researches done on programmed learning versus conventional methods of teaching are far from being unanimous. Some researches have shown the superiority of programmed learning. Some researchers are of the opinion that conventional method of teaching is significantly superior to programmed learning and some researchers have reported that there is no significant difference between these two methods. In this study, the investigator has tried to compare these two methods of teaching, particularly, branching style of programmed learning versus conventional method of teaching. Such comparison has been rarely reported.
Before starting an experiment, one must have some specific ideas and general background about it. Similarly, this investigation was started with some assumptions from which developed the later theoretical framework like tools and techniques and research design.

The hypotheses were as follows:

1. There is no significant difference between the mean scores of the groups which were taught through programmed learning method and the groups which were taught through conventional method.

2. There is no significant difference between the mean scores of boys and girls who were taught through programmed learning method and taught through conventional method.

Selection of the Research Tools

In order to test the above hypotheses the following tools were found appropriate and were selected after much consideration and consultation with experts in this field. The tools used in this investigation were:

(a) The pre-test.

(b) The intelligence test.

(c) The programmed learning material in branching style.

(d) The post-test.
(a) **The Pre-Test**

The investigator had adopted the first test of the school. It was the teacher-made test. It was decided to use the marks earned by the students for that test.

(b) **The Intelligence Test**

In order to measure the intelligence of the students which was assumed to be an intervening variable affecting the criterion performance of the students, the Champaben Bhatt Group Intelligence Test was used. The investigator tried to partial out the effect of intelligence by analysis of covariance. This test is for the students of standards V, VI and VII. Generally, the average age of these students range from 10 years to 14 years. This test is in Gujarati. It was standardized on a large population of Gujarat. The reliability of this test is 0.934 by Kuder-Richardson simplified formula and the validity was estimated 0.819 with Shukla's Adoption of Stanford - Binet.

(c) **The Programmed Learning Material in Branching Style**

The investigator had prepared branching programmed in arithmetic for standards V, VI and VII. It was in booklet form and it is called scrambled book. The selection of the topics for programming had been done in the following way.
The investigator had collected opinions from experienced mathematics teachers of different schools for the common mistakes done by the students in arithmetic of standards V, VI and VII.

To support these opinions, the investigator had checked the arithmetic answer books of the first test which was conducted in the school of the above classes.

Then the investigator had prepared programmes in branching style for these items. These programmes were validated according to the rules and regulations of the programmed learning.

(d) The Post-Test

The construction of the post-test was done with object to measure the performance of the students of both the groups, who were taught by programmed learning technique as well as by conventional methods of teaching. The test was teacher-made test. It was of objective type. There were twenty-four items in the test of standard V.

The post-test for standard VI consisted of fourteen items. There were multiple choice items, matching type and recall type items.

There were three questions for standard VII. One was of completion type and other two questions were for application.
Selection of the Sample

Keeping in view the nature of the problem under study, it was decided to subject them to investigation on V, VI and VII class students. The students were both boy and girl students of Sardar Patel Vinay Mandir, Vasad. Thus, the population or universe consisted of male and female students of V, VI and VII classes. It was necessary to draw an adequate representative sample from this universe for this experiment.

The selection of the subject was done by random sampling method from these three classes. Each standard had three divisions. In each division, there were sixty students. So each standard consisted of 180 boy and girl students. And out of these 180 students the investigator selected 80 students. There were 40 male students and 40 female students. Then these students had been divided randomly into two groups. In one group, there were 20 male students and 20 female students.

One group would act as a control group which would be taught by the conventional method of teaching and the other would be taught by the programmed learning technique; i.e., by branching programming. This group would act as an experimental group. This procedure was followed for all the three classes. Thus, there were six groups formed from three standards. In all, there were 240 boy-girl students from three standards. The
distribution scheme adopted was as follows:

<table>
<thead>
<tr>
<th>Class</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sections</td>
<td>A</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>Groups</td>
<td>E</td>
<td>C</td>
<td>E</td>
</tr>
<tr>
<td>No. of students</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

Section A of the classes formed the experimental (E) group of 40 boy-girl students and section B of the classes formed the control group (C) of 40 boy-girl students.

In an experimental study of this type many intervening variables can be considered, such as the grade level, the intelligence level, scholastic achievement, socio-economic status, etc.

In the present study, grade level was held constant by forming two groups from the same class.

The groups might be initially unlike with regard to mean IQs. The investigator calculated the mean IQs of all the six groups and found them to be obviously different. In the light of these obvious differences, it was decided to analyse the data using the special technique of analysis of co-variance.

Socio-economic status could not be known precisely because of students coming from different areas. There
were some students coming from fields and some were from the village, viz., Vasad.

So the students were randomly divided into two treatment groups with the assumption to randomize the socio-economic status.

There are some studies indicating that socio-economic status is not to that extent contributing to the achievement. The IEA study in which the comparisons among twelve countries were made, indicates that the curricular and methods of instructions may be a far more influential factor than socio-economic class.3

The same result is seen in a National Survey of Mathematics Achievement in India. The investigator of this survey did not find any appreciable relationship between the composite score on the socio-economic scale and mathematics achievement.4

The Selection of Research Design

Ostle stated that "designing an experimental simply means, planning an experiment so that information will be collected which is relevant to the problem under investigation..... The design of an experiment is then a complete sequence steps, taken ahead of time, to ensure that the appropriate data will be obtained in a way which permits an objective analysis leading to valid inferences with respect to the stated problem."6
Appropriateness of a design depends upon the nature of the problem and hypothesis that is to be tested. So, in this investigation, random group design was adopted. Two groups were formed by random sampling method from each class (i.e., from V, VI and VII). In each group, there were equal number of male and female students. One group (E) was treated as an experimental group and another as a control group (C). Group E had been given a treatment of programmed learning technique and group C had been taught through conventional method of teaching.

Any difference observed at the end of the experiment in the particular factor under study, between the experimental group and the control group was expected due to the introduction of the experimental factor, i.e., introduction of programmed learning technique of branching style. The investigator took sufficient time to complete this experiment. The experiment lasted for one week.

The above procedure was adopted to test the first hypothesis which states, there is no significant difference between the mean scores of the groups which were taught through programmed learning method and the groups which were taught through conventional method of teaching.

To test the second hypothesis, i.e., there is no significant difference between the mean scores of boys and girls who were taught through programmed learning method and taught through conventional method.
There were two groups for each class. Section A was to be treated as an experimental group and Section B was to be treated as a control group.

Then these two groups were further divided into two sub-groups. So, in all there would be four groups for each class. Group I consisted of boys who were taught through programmed learning technique \((N = 20)\), Group II consisted of boys who were taught through conventional method of teaching \((N = 20)\), Group III consisted of girls who were taught through programmed learning \((N = 20)\) and Group IV consisted of girls who were taught through conventional method of teaching \((N = 20)\).

A two-way analysis of variance procedure was used to compare the mean scores of post-test of students in the four cells or groups schematically. It is represented as follows:

<table>
<thead>
<tr>
<th>Sex</th>
<th>Methods</th>
<th>Conv.</th>
<th>P.L.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>a</td>
<td>b</td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>c</td>
<td>d</td>
<td></td>
</tr>
</tbody>
</table>
References


