CHAPTER 4

RESEARCH SETTING AND RESEARCH DESIGN

4.1 Introduction

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4.1 INTRODUCTION

Research is a systematic effort in the direction of solution of a problem having direct or indirect bearing on human welfare. It is 'systematic' because it involves certain steps to be taken in a definite order. A researcher guided by desire to gain knowledge or by an urgency to solve a problem scientifically works out a plan of study or a research design. Young states that a research design is the logical and systematic planning and directing of a piece of research. According to Kerlinger, it is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance. It includes an outline of everything the investigator will do from writing the hypotheses and their operational implications to the final analysis of data. It also includes the most appropriate methods or techniques to be used to collect and analyse the data. It is difficult to generalize about the research design because of the wide variety types research; in other words, the research design varies with the type of research. The present investigation falls into the research area called Educational Measurement and Evaluation. And the category called the Research and Development Cycle. The design should therefore include the description of the nature of the population, sampling, instrumentation, techniques of data collection, techniques of data reduction (i.e. methods of analysing the data) and statistical procedure employed to treat the data.

This chapter gives the overview on the planning of the work, which is to be done under the proposed study.

4.2 NATURE OF POPULATION INVOLVED

'By population we mean the aggregate or totality of objects or individuals regarding which inferences are to be made in a sampling study.'
Population can be defined in such a way that 'participation is restricted to those who are able to make a significant contribution to the success of the study.'

The population for the purpose of the present study comprised all students receiving seventh grade education in Gujarat.

Investigator was interested to administer the developed tests in the months of March/April, as the tests are developed from the whole syllabus of Class Seven Science. But due to Earthquake in January - 2001 and Riots in March - 2002, the administration of the tests in that particular time-period was not possible.

After the waiting period of two years for the normal situation, investigator decided to administer the tests on the students of Class Eight of Gujarat in consultation of her supervisor. As the interest of investigator was of the item analysis and not to measure the academic achievement; also the items were based on the concepts only, it was assumed that class eight students could give responses of the items asked. So the decision was to administer the tests on the class eight students in the beginning of the 1st semester of the academic year 2002-03 i.e. in the months of July/August 2002.

Hence the population for the purpose of the present inquiry comprised all students receiving class eight educations in Gujarat.

4.3 SAMPLE FOR ITEM ANALYSIS

The population for the present investigation, as stated earlier comprised all students for class eight of Gujarat. To study the whole population is rather impracticable; a statistical process called sampling makes it possible to draw useful inferences or generalizations on the basis of careful observations or manipulation of
variables, within a relatively small proportion of the population. The process of sampling generally refers to the method of selecting a small part or specimen of a large Universe of subjects, in order to study some quality or characteristic of the whole. So, sampling is one of the most fundamental aspects of the total methodology followed in particular research study. It is an act of determining how many elements in a population are to be sampled, and how they are to be selected. A single member of the population is referred to as a population unit or element.

The study was carried out in selected High schools of randomly selected districts of Gujarat. In the present study, the sample selected was for the purpose of item analysis. The sample of 400 is generally identical for the purpose of item-analysis and from the drawn result/responses, dv and fv are calculated for each item. Investigator was having four test papers for the four major units of the test papers in any four cities of Gujarat for the purpose of item-analysis. So, randomly four districts were selected; which were Ahmedabad, Bhavnagar, Gandhinagar and Rajkot. After this, keeping in view the feasibility and other conditions the investigator used cluster sampling. In cluster sampling the population is viewed as a collection of groups that are much the same. That is, strata are internally homogeneous and clusters are internally heterogeneous. In cluster sampling, it is the clusters themselves, which are selected at random. The investigator used this technique because schools provide the whole class for test administration. It is not possible to select a simple random sample in educational institutions.

The item-bank is consisted more than 1000 items. It is impractical to develop the test paper with all the items and to give it to the students. So, investigator has decided to develop the test papers according to the distribution of the chapters in the units. So, the twenty different topics of the class seven-science textbook were classified in the four major units and unit wise papers were developed.
The tests developed as a tool for collecting the data were not to be mailed but administered in person when the students would be attending the classes. Prior permission of the principals concerned was sought for the administering of the test papers in person. Accordingly, all the students present at the time of information collection, were administered the tests under proper instructions.

As it was decided to administer the unit wise papers, and four districts were selected, so in one-one districts, one-one test papers were conducted on the selected sample.

A sample of approximate 2000 students was drawn from different 20 schools located in the selected districts i.e. five schools from each district were purposively selected. Approximate 500 students from each district were selected by keeping the equal proportion of boys and girls. The composition of the sample and its proportional representativeness is as juxtaposed to the population would be manifest from Table 4.1.

**TABLE 4.1**

**COMPOSITION AND REPRESENTATIVENESS OF THE SAMPLE**

<table>
<thead>
<tr>
<th>District</th>
<th>Test Paper</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmedabad</td>
<td>Unit I - Set I &amp; II</td>
<td>260</td>
<td>242</td>
<td>502</td>
</tr>
<tr>
<td>Bhavnagar</td>
<td>Unit II - Set III &amp; IV</td>
<td>256</td>
<td>242</td>
<td>498</td>
</tr>
<tr>
<td>Gandhinagar</td>
<td>Unit III - Set V &amp; VI</td>
<td>267</td>
<td>241</td>
<td>508</td>
</tr>
<tr>
<td>Rajkot</td>
<td>Unit IV - Set VII &amp; VIII</td>
<td>262</td>
<td>245</td>
<td>507</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>1045</td>
<td>970</td>
<td>2015</td>
</tr>
</tbody>
</table>
It is evident from Table 4.1 that the
(1) Percentage composition of the population is, by and large, reflected in the sample in regard to the gender and districts;
(2) Percentage composition of the population is, by and large, reflected in the sample in regard to the test papers also.

However, it may be said that the sample is fairly representative of the population in regard to the proportion of the students in all the districts.

4.4 TECHNIQUES OF COLLECTING INFORMATION

Information pertinent to the field of an investigation could be had from primary, secondary and tertiary sources. There is no substitute for consulting primary source if they are available and postgraduate work is most subject areas demand it. Needless to say, tests fall under the category of primary source of information. Sources of the data relevant for the present study are enumerated in the preceding paragraph. Tool required for collecting necessary information in regard to item analysis of the item bank under study was to be devised and developed. Accordingly, test papers were devised.

**Development of Tools:** Criteria were first laid down on the basis of which the items of the question bank were to be developed. The first set of test paper comprised the three types of questions such as multiple choice type, true-false type, and match the following type while the second set of test paper was comprised of two types of questions like fill the gaps type and answer in one word type. Suitable items were framed in view of the aforesaid criteria. The items thus prepared were given to the subject expert to check the content aspect of the items as a particular and of the tests as a whole. Also the items were scrutinised by the language expert to remove any
vagueness in the language and item construction. The detail discussion fall under this point is given in the chapter of Item bank development.

**Data Collection:** Fortunately, the eight sets of test papers administered were not very technical as far as their administration is concerned. So, the investigator decided to visit the schools herself for data collection. The basic requirement of the study is that all tests must be administered to the same subjects. If a subject takes one of the tests, it is a must for him to give the responses of all the items to fulfill the need of the study. Before the administration of the tests, the students were acquaint with the purpose of the study, chapters included in the particular set of the test paper so as to prepare their selves for taking the test paper. The investigator visited and collected the data from different high schools personally and also took the help of her colleagues.

To seek cooperation of principals and teachers of these high schools, the investigator took the help of the lecturers of the various District Institute of Education & Training of the State. Consequently, the principals and the teachers of the schools visited for data collection cooperated fully in the process of test administration. The entire data collection business was completed during the period from July 2002 to August 2002. The students of the said high schools also cooperated satisfactorily.

**4.5 Method of Analysis**

The adjectives of this study indicate that the data analysis would be carried out fewer than two broad divisions, namely, (1) facility value and (2) discrimination index.

In regard to the item analysis, all the items were scored as 1. To find out the facility value and discrimination index for all the items, according to the test paper the data file of responses given by each sample was prepared in the Edit application
of MS-DOS. The computer programme, developed by Dr. Navneet Rathod, Reader, Department of Education, Bhavnagar University named as NRTVB was used to find out the facility value and discrimination index. As a convention a facility value between 0.20 and 0.80 and discrimination index above 0.30 was considered desirable for the selection of an item for the final form of the item-bank.

4.6 DEVELOPMENT OF COMPUTER PROGRAMME

This is the important step of the study. After item analysis, the selected items will be incorporated for the development of computer programme.

The computer programme will be developed for the application of item-bank. The programme will be developed in FoxPro and in Gujarati language for its easier use at the side of teacher and student.