CHAPTER V
RESEARCH DESIGN AND APPLICATION

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5.0 INTRODUCTION

Research design is a strategy on paper like an architect's plan. The purpose of a research design is to impose controlled restrictions on observations of natural phenomena. It suggests the investigator what to do and what not to do.

The product of research depends upon the quality of its design. A good research work can not be done without purposeful efforts. If the design has faults then the final result will have faults. Certain fundamental steps of research design must be given due importance when proposed to be used. The operation of the design, that is planning must be carried out with patience and accuracy.

The first phase of the study i.e. development and
execution of attitude scale of Sanskrit have been described in the foregoing chapter. This chapter deals with the research design for the second phase of the study, i.e. the study of the attitude of students in relation to their parents' caste, occupation and socio-economic status.

5.1 BASIC ELEMENTS OF RESEARCH METHOD

The basic elements of research method are variables, hypotheses, research tools and selection of the sample. Each one of the four elements has been described in detail hereunder:

5.1.1 Variables

In the literature of psychology, the term 'affect' and 'feeling' are used interchangeably. An individual who has associated positive affect or feeling with some psychological object is said to like that object or to have a favourable attitude towards the object. An individual who has associated negative affect or feeling with the same psychological object would be said to dislike that object or to have an unfavourable attitude towards that object. For the present study, Sanskrit is a psychological object and the purpose is to study the attitude of students.
towards Sanskrit in relation to their parents' caste, occupation and socio-economic status is favourable or unfavourable (positive or negative). But the attitude depends upon several factors in a particular situation. From the discussions with the experts in the field of education and psychology, it was concluded that the following factors may affect the attitude of students towards Sanskrit and therefore should be taken into consideration for verification.

(1) Area where the school is situated.
(2) Sex of the students.

The various variables and their levels at which they operate in this research study are given in table 5.1.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Variable</th>
<th>Nature of Variable</th>
<th>No. of levels</th>
<th>Name of levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Area</td>
<td>Independent</td>
<td>2</td>
<td>Urban, Rural</td>
</tr>
<tr>
<td>2</td>
<td>Sex</td>
<td>&quot;</td>
<td>2</td>
<td>Boys, Girls</td>
</tr>
<tr>
<td>3</td>
<td>Parents' caste</td>
<td>&quot;</td>
<td>2</td>
<td>Non B.C., B.C.</td>
</tr>
<tr>
<td>4</td>
<td>Parents' Occupation</td>
<td>&quot;</td>
<td>3</td>
<td>High, Middle, low</td>
</tr>
<tr>
<td>5</td>
<td>Parents' SES</td>
<td>&quot;</td>
<td>3</td>
<td>High, Middle, low</td>
</tr>
<tr>
<td>6</td>
<td>Attitude</td>
<td>Dependent</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
The above described variables led to the following hypotheses.

5.1.2 Hypotheses

The following null hypotheses were formulated for investigation. The null hypotheses are of general nature related to the effect of interaction between amounts in various independent variables.

$H_{01}$: There is no significant effect of Parents' caste on the attitude of students towards Sanskrit.

$H_{02}$: There is no significant effect of area on the attitude of students towards Sanskrit.

$H_{03}$: There is no significant effect of sex on the attitude of students towards Sanskrit.

$H_{04}$: There is no significant effect of interaction of area and sex on the attitude of students towards Sanskrit.

$H_{05}$: There is no significant effect of interaction of area and parents' caste on the attitude of students towards Sanskrit.

$H_{06}$: There is no significant effect of interaction of sex and parents' caste on the attitude of students towards Sanskrit.
There is no significant effect of the interaction of area, sex and parents' caste on the attitude of students towards Sanskrit.

There is no significant effect of area on the attitude of students towards Sanskrit.

There is no significant effect of sex on the attitude of students towards Sanskrit.

There is no significant effect of Parents' high and middle occupation on the attitude of students towards Sanskrit.

There is no significant effect of Parents' high-middle and low occupation on the attitude of students towards Sanskrit.

There is no significant effect of interaction of area and sex on the attitude of students towards Sanskrit.

There is no significant effect of interaction of area and parents' high and middle occupation on the attitude of students towards Sanskrit.

There is no significant effect of interaction of area and parents' high-middle and low occupation on the attitude of students towards Sanskrit.
There is no significant effect of interaction of sex and parents' high and middle occupation on the attitude of students towards Sanskrit.

There is no significant effect of interaction of sex and parents' high-middle and low occupation on the attitude of students towards Sanskrit.

There is no significant effect of interaction of area, sex and parents' high and middle occupation on the attitude of students towards Sanskrit.

There is no significant effect of interaction of area, sex and parents' high-middle and low occupation on the attitude of students towards Sanskrit.

There is no significant effect of area on the attitude of students towards Sanskrit.

There is no significant effect of sex on the attitude of students towards Sanskrit.

There is no significant effect of parents' high and middle SES on the attitude of students towards Sanskrit.

There is no significant effect of parents' high-middle and low SES on the attitude of students towards Sanskrit.
There is no significant effect of interaction of area and sex on the attitude of students towards Sanskrit.

There is no significant effect of interaction of area and parents' high and middle SES on the attitude of students towards Sanskrit.

There is no significant effect of interaction of area and parents' high-middle and low SES on the attitude of students towards Sanskrit.

There is no significant effect of interaction of sex and parents' high and middle SES on the attitude of students towards Sanskrit.

There is no significant effect of interaction of sex and parents' high-middle and low SES on the attitude of students towards Sanskrit.

There is no significant effect of interaction of area, sex and parents' high and middle SES on the attitude of students towards Sanskrit.

There is no significant effect of interaction of area, sex and parents' high-middle and low SES on the attitude of students towards Sanskrit.
5.1.3 **Tools Used**

The selection of an appropriate tool or instrument for measuring the variables is one of the most critical components of the research process. The following tools were used in this study.

(i) **Attitude Scale** : Developed by the investigator.

(ii) **Socio-Economic Status Scale** : Developed by K.G. Desai.

(i) **Attitude Scale**

This scale is developed by the investigator to measure attitude of students of secondary schools towards Sanskrit. It is in Gujarati. It has twenty-four statements showing favourable and unfavourable feeling equally. The preparation and administration of the scale has been described in detail in the previous chapter and is appended in Appendix C.

(ii) **Socio-Economic Status Scale**

This is developed by K.G. Desai of Ahmedabad. It is also in Gujarati. This scale is used to measure socio-economic status of the parents of the students of secondary schools. It is administered to all the students of the sample. It is also appended in Appendix E.
5.1.4 Sample Selection

Sampling means taking any portion of a population or universe.

A sample is said to be representative when it has approximately the characteristics of the population relevant to the research in equities. When a random sample was drawn from a population, it was assumed to be representative.

There are several methods of selecting samples. Some of the commonly used methods are:

1. Random Sampling,
2. Quota Sampling,
3. Purposive sampling.

Random sampling is that method of selecting a sample from a population so that all samples of fixed size have the same probability of being selected. Thus in a random sample every element of the population has an equal chance of being selected.

When a population could be divided into strata these strata are used for selecting a representative sample. In this method quotas are assigned to different strata. That is why it is called quota sampling.

Purposive sampling is a non-probability form of sampling. Under this method one selects the available
sample. This method has to be followed when it is not possible to indentify all the subjects of the universe or when it is not possible to disturb the subjects due to administrative reasons as in the case of a classroom experiment.

To have as big a sample as one can, is desirable for better norms. But the representative sample should not be too large. It should be carefully determined.

In the present study the stratified random sampling method had been adopted. According to this method of sampling, it was decided to administer scale in practically all the parts of Gujarat. The scale was administered to 1080 students of secondary schools in different parts of Gujarat. The table 4.7 shows the area-wise, sex-wise and grade-wise distribution of the sample selected for the study.

5.2 STATISTICAL TECHNIQUES

For testing the hypotheses an experimental design is needed. In an experimental design the investigator manipulates and controls one or more independent variables and observes the dependent variables for corresponding changes.

The designs are classified into two groups or
(i) Inadequate designs or quasi experiment designs, and
(ii) General Experimental designs.

5.2.1 Choice of the Design

In deciding an approach the investigator has to take into consideration several factors like available setting, nature of objectives and time.

Two separate and independent dimensions can help the investigator in the choice of approach. Fox¹ has suggested the following table.

---
<table>
<thead>
<tr>
<th>Dimension 2</th>
<th>Dimension 1</th>
<th>(Time in which Interest Lies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intent of Research</td>
<td>Past</td>
<td>Present</td>
</tr>
<tr>
<td>Description</td>
<td>Historical</td>
<td>Survey</td>
</tr>
<tr>
<td>Correlation</td>
<td>Simple</td>
<td>Simple survey,</td>
</tr>
<tr>
<td>Survey</td>
<td>Historical</td>
<td>Case study,</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Parallel</td>
<td>Multiple group</td>
</tr>
<tr>
<td>Historical</td>
<td>survey,</td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survey</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The use of the above table in the present case leads to the choice of multiple group experimental design.

There were five independent variables. Out of these, three independent variables i.e. Parents' caste, parents' occupation and Parents' SES were the main variables and area and sex are the common variables. Looking to the levels of variables factorial design was used to study the effect of each main variable.

5.2.2 ANOVA : Factorial Design

According to Kerlinger² "Factorial Design is the structure of research in which two or more independent variables are juxtaposed in order to study their independent and interactive effects on a dependent variable."

In this study three factorial designs were prepared.

(1) The First Factorial Design

This factorial design was prepared to study the effect of parents' caste on the attitude of students towards Sanskrit. The parents' caste is the main independent variable while area and sex are the common variables. All

the variables in this design are at two levels. Hence, 2x2x2 factorial design was prepared.

(2) The Second Factorial Design

This factorial design was prepared to study the effect of parents' occupation on the attitude of students towards Sanskrit. The parents' occupation is the main independent variable while area and sex are the common variables. Area and sex are at two levels, while parents' occupation is at three levels. Hence 2x2x3 factorial design was prepared.

(3) The Third Factorial Design

This factorial design was prepared to study the effect of parents' socio-economic status on the attitude of students towards Sanskrit. The parents' SES is the main independent variable while area and sex are the common variables. Area and sex are two levels, while parents' SES is at three levels. Hence, 2x2x3 factorial design was prepared.

In all the three designs the dependent variable consisted of attitude towards Sanskrit scores to be arrived at from the students performances on attitude scale. The raw scores have been used as the dependent or criterion score to be analysed.
Factorial Analysis of variance has several advantages. It enables the investigator to manipulate and control two or more variables. Secondly variables sex, parents' Caste, Parents' occupation, Parents' SES etc., that cannot be manipulated can also be controlled. A third advantage of factorial analysis which is more precise than the one-way analysis. Finally the interactive effects could be studied. This is important from a scientific point of view.

It is desirable that research designs together with all variables should be presented in the tabular form for all the ready recoder. The schematic representation of all the factorial designs are given in tables 5.3, 5.4 and 5.5.

TABLE 5.3
SCHEMATIC REPRESENTATION OF THE FACTORIAL DESIGN IN RELATION TO PARENTS' CASTE WITH CELL NOTATION

<table>
<thead>
<tr>
<th>Parents' Caste</th>
<th>Urban Area</th>
<th>Rural Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>NON B.C.</td>
<td>111</td>
<td>121</td>
</tr>
<tr>
<td>B.C.</td>
<td>211</td>
<td>221</td>
</tr>
</tbody>
</table>
TABLE 5.4
SCHEMATIC REPRESENTATION OF THE FACTORIAL DESIGN IN RELATION TO PARENTS' OCCUPATION WITH CELL NOTATION

<table>
<thead>
<tr>
<th>Parents' Occupation</th>
<th>Urban Area Boys</th>
<th>Girls</th>
<th>Rural Area Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>111</td>
<td>121</td>
<td>112</td>
<td>122</td>
</tr>
<tr>
<td>Middle</td>
<td>211</td>
<td>221</td>
<td>212</td>
<td>222</td>
</tr>
<tr>
<td>Low</td>
<td>311</td>
<td>321</td>
<td>312</td>
<td>322</td>
</tr>
</tbody>
</table>

TABLE 5.5
SCHEMATIC REPRESENTATION OF THE FACTORIAL DESIGN IN RELATION TO PARENTS' SES WITH CELL NOTATION

<table>
<thead>
<tr>
<th>Parents' SES</th>
<th>Urban Area Boys</th>
<th>Girls</th>
<th>Rural Area Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>111</td>
<td>121</td>
<td>112</td>
<td>122</td>
</tr>
<tr>
<td>Middle</td>
<td>211</td>
<td>221</td>
<td>212</td>
<td>222</td>
</tr>
<tr>
<td>Low</td>
<td>311</td>
<td>321</td>
<td>312</td>
<td>322</td>
</tr>
</tbody>
</table>

5.2.3 ANOVA Technique

The value of $F$ for all the three factorial designs was calculated. The $F$ test is based on the following assumptions.

(4) An equal unit scale is assumed for the measurement
of the dependent variable.

(ii) Homogeneity of variance.

The sum of squares (SS\textsubscript{T}), between sum of squares (SS\textsubscript{B}), within the sum of squares (SS\textsubscript{W}) were calculated for all the three factorial designs to test the significance of F. The 0.05 and 0.01 confidence levels were taken to test for significance.

The orthogonal contrasts matrices for all the factorial designs were made to test the main effects and interaction effects. The complete ANOVA is used to study the effect of parents' caste, parents' occupation and parents' SES on the attitude of students towards Sanskrit.

5.3 SUMMARY

This study was undertaken to measure the attitude of students towards Sanskrit in relation to their parents' caste, occupation and SES. The research design for this study is described in this chapter. The next chapter deals with the analysis and interpretation of the data.