CHAPTER V

RESEARCH DESIGN AND APPLICATION

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CHAPTER V

RESEARCH DESIGN AND APPLICATION

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. Therefore, a proper design is needed for valid analysis. Certain fundamental steps of research design must be given due importance when it proposed to be used. The operation of the design, that is planning must be carried out with patience and accurately.

The first phase of the study i.e. construction and standardization of creative behaviour scale have been described in the foregoing chapter. This chapter deals with the selection of proper research design for the study.
The investigator used the experimental design for the validity of the study. The research tools, variables and their levels and sampling procedure are also described in this chapter.

Research tools, sampling procedure and design were followed to achieve the goals of the study.

The guiding words of Wierama are very significant:

"The basic reason for planning and organising is to facilitate the research. Any research project is made of specific hypotheses referring to the variables, conditions, factors or subjects or project are required. These specifies will vary with the nature and complexity of the research study, but it is attention to the details of the specific that brings a research project to a successful conclusion."

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 here under.
5.1.1. Variables

There are many scales and tests available for measuring creativity, creative thinking, creative writing and creative behaviour of the students.

In current educational environment high schools are not implementing project of creative behaviour of students. A rare effort or hardly a project has been done based on the academic subject.

Robert² presents, "Creation around which we have always placed an area of mystery consists in forming the mind forward, few of us have ever learned the art of thinking forward, because education and experience have always emphasized thinking backward. Strange to say, in most of our educational processes, we deal rather consistently with past, but without much definite understanding to how it fits in future...."

From the studies done on creativity and creative thinking and the discussions with the experts in the field of education and psychology, it was concluded that the various variables may affect the creative behaviour of the students, therefore investigator should take the
following variables for his study.

(1) Area

(2) Sex

(3) Intelligence

(4) Achievement

(5) Caste and

(6) Socio-Economic status

Many studies have shown that the area affects the psychological factors like creativity, creative thinking, attitude and behaviour of the students. Hence, the area was taken as one of the independent variable. This variable has two levels urban and rural.

Several study have shown that the sex is an important biological factor that influences other variable like achievement, behaviour, attitude etc., Hence, the sex was also taken as an independent variable. This variable has also two levels Boys and Girls.

Intelligence is an effective variable in nurturing and audiencing the behaviour and thinking ability
of the students. So I.Q. was taken as another independent variable. This variable has also two levels - High I.Q. and Low I.Q. A score of 105 or less the 105 on the Group test of intelligence developed and standardized by K.G. Desai and C.L. Bhatt was considered as Low I.Q. and a score greater than 105 was considered as High I.Q.

Achievement is considered as one of the variables that affects the psychological phenomena like creating thinking, creative writing, creative behaviour etc. So achievement of the student was taken as another independent variable. This variable has also two levels - High Achievement and Low Achievement. A score of 55% of the high school result or more was considered as High Achievement and less than that was considered as Low Achievement.

Caste is another factor that some time affects the psychological phenomena. And hence, it was considered as one of the independent variables. This variable has also two levels - Backward Class Caste (BC) and Non Backward Class Caste (NBC).

Socio-Economic status is taken as one of the independent variables in this study. SES of the student
was found out with the help of Socio-Economic status scale developed by K.G. Desai. This variable has three levels — High SES, Middle SES and Low SES. A score of 23 on the SES Scale of K.G. Desai was considered as High SES, score of less than 23 and more than 13 was considered as Middle SES and a score of 13 and less than that was taken as Low SES.

The creative Behaviour of the student is taken as dependent variable in this study.

All the variables and their levels at which they operate in this study are given in the table 5.1.
#### TABLE 5.1

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the variable</th>
<th>Nature of variable</th>
<th>No. of Level</th>
<th>Name of Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Area</td>
<td>In-dependent</td>
<td>2</td>
<td>1 Urban</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Rural</td>
</tr>
<tr>
<td>2.</td>
<td>Sex</td>
<td>In-dependent</td>
<td>2</td>
<td>1 Boys</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Girls</td>
</tr>
<tr>
<td>3.</td>
<td>Intelligence</td>
<td>In-dependent</td>
<td>2</td>
<td>1 High I.Q.</td>
</tr>
<tr>
<td></td>
<td>dependent</td>
<td></td>
<td></td>
<td>2 Low I.Q.</td>
</tr>
<tr>
<td>4.</td>
<td>Achievement</td>
<td>In-dependent</td>
<td>2</td>
<td>1 High</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Achievement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Achievement</td>
</tr>
<tr>
<td>5.</td>
<td>Caste</td>
<td>In-dependent</td>
<td>2</td>
<td>1 N.B.C.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 B.C.</td>
</tr>
<tr>
<td>6.</td>
<td>SES</td>
<td>In-dependent</td>
<td>3</td>
<td>1 High SES</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Middle SES</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 Low SES</td>
</tr>
<tr>
<td>7.</td>
<td>Creative Behaviour</td>
<td>Dependent</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The above mentioned 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.

**H01**: There is no significant effect of area on the creative behaviour of high school students.

**H02**: There is no significant effect of sex on the creative behaviour of high school students.

**H03**: There is no significant effect of I.Q. of students on the creative behaviour of high school students.

**H04**: There is no significant effect of Achievement of students on creative behaviour of high school students.

**H05**: There is no significant effect of interaction of area and sex on the creative behaviour of high school students.

**H06**: There is no significant effect of interaction of area and I.Q. on the creative behaviour of high
H07: There is no significant effect of interaction of area and achievement on the creative behaviour of high school students.

H08: There is no significant effect of interaction of sex and I.Q. on the creative behaviour of high school students.

H09: There is no significant effect of interaction of sex and achievement on the creative behaviour of high school students.

H010: There is no significant effect of interaction of I.Q. and achievement on the creative behaviour of high school students.

H011: There is no significant effect of interaction of area, sex and I.Q. on the creative behaviour of high school students.

H012: There is no significant effect of interaction of area, sex and achievement on the creative behaviour of high school students.
HO13: There is no significant effect of interaction of area, I.Q. and achievement on the creative behaviour of high school students.

HO14: There is no significant effect of interaction of sex, I.Q. and achievement on the creative behaviour of high school students.

HO15: There is no significant effect of interaction of area, sex, I.Q. and achievement on the creative behaviour of high school students.

HO16: There is no significant effect of caste on the creative behaviour of high school students.

HO17: There is no significant effect of SES on the creative behaviour of high school students.

5.1.3 Tools Used:

The selection of the appropriate tools for measuring the value of variables is one of the most critical components of the research process. The investigator had used for the following tools in the present study.

(1) Creative behaviour Scale:

Developed by the Investigator.
(2) **Group Test of Intelligence**

Developed and standardized by K.G. Desai & C.L. Bhatt.

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

Developed by K.G. Desai of Ahmedabad

(1) **Creative Behaviour Scale**

This scale is developed by the investigator to measure creative behaviour of high school students. It is in Gujarati. It has twenty five statements describing the nature of creative behaviour of the students. The process of development and standardization of the scale has been described in detail in the previous chapter with its reliability and validity. The scale is appended in Appendix C.

(2) **Group Test of Intelligence**

This test was developed and standardized by K.G. Desai and C.L. Bhatt of Ahmedabad. It is in Gujarati and meant for the age group of 12 to 18 years. This test contains 110 questions, out of these just ten questions are for practice.
The time for remaining 100 questions is meant forty minutes.

The separate answer sheet was provided to the testees and they were asked not to write anything on any place or not to make any sign in the test booklet. They were also asked to read and to make circle around the letter showing serial number of correct answer from the given answers of each question in the answer sheet.

The reliability of the test has been established by various methods.

(i) Test-Retest method - 0.84
(ii) Split-half method - 0.93
(iii) Kuder Richardson Formula Boys - 0.87
     Girls - 0.90

The validity of the test has been established with various tests. The validity criterion with each test is shown below.

(i) With Desai Group test (Verbal) - 0.88
(ii) With Bhatt Group test - 0.72
(iii) With Bhavsar Group Test (Non Verbal) - 0.77
(iv) With Tarulala Shah Group test (Non Verbal) - 0.62
The test is highly reliable and valid. It is appended in Appendix D with answer sheet and manual of the test.

(3) **Socio-Economic Status Scale** :

This scale was developed and standardized by K.G. Desai of Ahmedabad. It is in Gujarati. This scale is used to measure socio-economic status of the students of high schools. It is appended in Appendix E with some modification.

5.1.4 **Sample Selection** :

Sampling means making any portion of a population as universe.

A sample is said to be representative when it has approximately the characteristics of the population relevant to the research in equities. A sample is a subject of the population. But it is not necessary that the representative sample should be too large. The real worth at the sample lies not in its size but in accuracy and representativeness. The sample should be the representative of a population.
There are several methods of selecting samples. Some of the commonly used methods for sample selection are:

(1) Random Sampling
(2) Quota Sampling
(3) Purpositive 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 random sampling every element of the population has an equal chance of being selected. When a random sample was drawn from a population, it was assumed to be representative.

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.

Purpositive 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 identify 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 1600 students of high schools in Anand and Kheda district. The table 4 shows the area-wise and sex-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 categories:
Inadequate designs or equal experimental designs, and

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. Fox\(^3\) has suggested the following table 5.2.

**TABLE 5.2**

**INTERACTION OF TIME AND INTENT DIMENSIONS**

<table>
<thead>
<tr>
<th>Dimension 2</th>
<th>Dimension 1 (Time in which interest lies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intent of Research</td>
<td>Past Historical</td>
</tr>
<tr>
<td>Description</td>
<td>Historical</td>
</tr>
<tr>
<td>Comparison</td>
<td>Sample Historical</td>
</tr>
<tr>
<td></td>
<td>Parallel Historical</td>
</tr>
<tr>
<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 six independent variables. Out of these four independent variables i.e. area, sex, intelligence and achievement were tested through F test. For this purpose the investigator used a factorial design to study the effect of each variables. Looking to the levels of variables factorial design was used to study the effect of each variable.

5.2.2 ANOVA : Factorian Design :

According to Kerlinger⁴ "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 the factorial design was prepared
to study the effect of area, sex, intelligence and achievement on the creative behaviour of the high school students. All the variables in this design are at two levels. Hence, $2 \times 2 \times 2 \times 2 (2^4)$ factorial design was prepared.

In this design the dependent variable consisted of creative behaviour scores to be arrived at from the students performances on creative behaviour 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 like area, sex, intelligence and achievement can not 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 also important from a scientific point of view.

It is desirable that the research design together with all variables should be presented in the tabular form for all the ready recorder. The schematic representation of the factorial design is given in the table 5.3.
TABLE 5.3

SCHEMATIC REPRESENTATION OF THE FACTORIAL DESIGN WITH CELL NOTATION

<table>
<thead>
<tr>
<th>A1</th>
<th>B1</th>
<th>B2</th>
<th>A2</th>
<th>B1</th>
<th>B2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C1</td>
<td>C2</td>
<td></td>
<td>C1</td>
<td>C2</td>
</tr>
<tr>
<td>D1</td>
<td>D2</td>
<td>D1</td>
<td>D2</td>
<td>D1</td>
<td>D2</td>
</tr>
<tr>
<td>1111</td>
<td>1112</td>
<td>1121</td>
<td>1122</td>
<td>1211</td>
<td>1212</td>
</tr>
</tbody>
</table>

A - Area  
B - Sex  
C - Intelligence  
D - Achievement
5.2.3 ANOVA Technique:

The value of F for the factorial design was calculated. The F test is based on the following assumptions.

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

(ii) Homogeneity of variance.

The sum of squares (SS_T), between sum of squares (SS_B), within the sum of squares (SS_W) were calculated for the factorial design to test the significance of F. The 0.05 and 0.01 confidence levels were taken to test for significance.

The orthogonal contrasts matrix for the factorial design was made to test the main effect and interaction effects. The complete ANOVA is used to study the effect of area, sex, intelligence and achievement on the creative behaviour of high school students.

5.2.4 T Technique:

There are six independent variables out of these four are independent variables i.e. area, sex,
intelligence and achievement were tested through F test. For this purpose the investigator used a factorial design. For testing the effect of another two variables like caste and socio-Economic status of the student on the creative behaviour of high school students, the investigator used T technique. For this purpose investigator found out mean, S D and T from the raw scores obtained by the high school students on creative behaviour scale. The 0.05 and 0.01 level of confidence were taken to test for significance.

5.3 SUMMARY

This study was undertaken to measure creative behaviour of high school students in relation to their area, sex, intelligence, achievement, caste and socio-economic status. The research design for this study is described in this chapter. The next chapter deals with the analysis and interpretation of the data.
REFERENCES :


