CHAPTER IV

PLANNING AND PROCEDURE

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4.0 Introduction

The present investigation into academic achievement of girls studying in the secondary schools of Kheda district is a unique problem in itself because it is solely a study on the girls of secondary schools. Moreover, various factors which influence the academic interest have been isolated for the study.

This would be a survey research in which cross-sectional study research would be resorted to. In this study, the data are gathered on the sample at one point of time. Hence it is simple, easy to execute and, moreover, it is economical.

4.1 Phases of Research

The researcher intended to divide the whole research activity in two phases: Phase Two would deal with the following independent variables:

(1) Area operating at two levels of Urban and Rural.

(2) Caste operating at two levels of Non-BC and BC.
Now, Phase 2 would deal with the following four independent variables wherein the two variables of area and caste would be repeated with the two others. Thus, the independent variables of the Second Phase would be as under:

1. Area operating at two levels of Urban and Rural.
2. Caste operating at two levels of Non-BC and BC.
3. SES operating at two levels of High and Low.
4. Family size operating at two levels of Large and small.

While, School achievement would be acting as dependent variable.

A question would arise as to why the investigator instead of a single study divided the research activity into two phases. The reasons are as under:

1. For a single research design, there would be a factorial design of $2^6$ dimensions, involving various
two factors, three factors, four factors, five factors and six factors interactions.

The multiple factor interactions of a multi-variable design would be complex and they are difficult to interpret.

(2) Moreover, single factorial design would have 63 dfs, the mean square error which would be utilized for computing F-ratio would be small enough; this would result in showing many effects as significant which in practice may not be there. Such design would be very liberal in showing significance. In order to curb liberality of inflated F-ratio, the investigator decided to have two phases, thereby using a conservative standard of significance.

(3) The two phases would be easier for data analysis and very simple and economical when fed to computer.

4.2 Problem and Its Variables

The present research concerns itself with the social as well as psychological factors which influence academic achievement of the girls of Kheda district studying in secondary schools.

Looking to the various variables of the problem, the investigator has selected the following variables for study.
(1) **Reading Ability**:

In any academic achievement worth the name, the reading ability plays the major role as pupils have to comprehend the content area effectively before they appear for the examination. Here it is pertinent to note that intelligence also plays a dominant role in academic success. In most of the studies, reading ability and intelligence have been taken up as independent variables, intelligence is being measured by a verbal test. So in this case, intelligence and reading ability test scores correlate highly. The end result would be that when reading ability showed significant relationship with academic achievement, the intelligence would also follow suit.

If this be the case, the present researcher wants to select only one from these two variables and she selected reading ability of the girls for the following reasons:

(i) Reading ability has a direct relationship with the academic achievement.

(ii) Reading ability with good study (reading) habits yields excellence in achievement. It is possible to measure or assess study habits. It is difficult to measure intellectual habits of a person. So reading ability and study habits are the crucial variables for success in school education.
(2) **Socio-economic Status:**

Socio-economic status is an important factor because it decides the facilities a child would get from the home background. SES of a person depends on his/her earning and standing in the society. It is purely a social variable. A rich home background with highly literate parents motivate their children for high excellence in their studies while opposite is the case in the poverty stricken areas. Hence it is hypothesized that high SES may influence good academic achievement.

(3) **Family Size:**

Now social factors are many and varied. Looking to the present need of fresh information which would enhance the population control, the researcher purposely incorporated a variable of family size in this study. Though it is a demographic variable, in larger context, it may be regarded as a unit of the society. Hence family size as a variable would serve a unique purpose of studying its effect on achievement.

In nut-shell, the following independent variables are incorporated in the study:

(1) **Reading Ability**

(2) **Study habits**

Psychological factors
For the purpose of this investigation, academic achievement has been treated as dependent variable.

4.3 Variables and Their Measurement

In this research there are many variables which are classifactory in nature, such as area, caste, family size etc. The girls belonging to different categories of variable can be ascribed at once if one knows a specific response. A girl may be studying in school located either in rural or urban area. She cannot belong to both. Similarly her caste category can be ascertained from general register of the school.

In this way, certain of the variables can be ascertained by the information she gives in the answersheets used for reading ability test.

There are other variables which are required to be measured by using standardized tools. These tools required detailed description.
4.3.1 Trivedi and Patel's Reading Ability Test

[A] General Description of Trivedi and Patel's Reading Ability Test:

The present investigator studied many available tests for measuring reading ability. She selected one that has been constructed and standardized by R.S. Trivedi and B.V. Patel because it has been standardized on the sample drawn from Kheda district. The test is also meant for grades 8, 9, and 10 of secondary schools. The age range of the population was 12 to 16.

The test was standardized on 1300 students drawn as sample from schools situated in rural and urban areas. The sample included girls as well as boys from different schools like girls' schools, boys' schools, mixed schools and multi-purpose schools. The population was taken from different socio-economic strata of the society. Thus the sample was sufficiently large.

Moreover, the test measures different components of reading comprehension. There are ten sub-tests, each of which was selected after it was only subjected to statistical analysis. Moreover, it is a group test which enhances its usability. In short, the Reading
Ability Test constructed by R.S. Trivedi and B.V. Patel is the first test in Gujarati of its kind.

The Trivedi and Patel's Reading Ability Test is given in Appendix 1.

[B] Psychometric Properties of the Reading Ability Test:

(1) For the selection of the items in the test, the Kelley's well-known 27 percent method was adopted. The items had been selected in the context of the following points:
   (a) Discriminative Index
   (b) Difficulty Value
   (c) Behavioural changes pertaining to completion purposes

   The items having the difficulty index ranging from 20 to 80 percent and discrimination value more than 0.2 have found a place in the test. Thus, in the selection of the items, pupils' expected behavioural changes were also taken into consideration.

(2) For establishing the validity of the test no external criterion was used. The way in which the test makers selected the items suggests its validity.
The reliability of the test has been established by two different methods, namely, the split-half method and K.R. formula - 21. The reliability co-efficient found out by these methods are 0.89 and 0.91 respectively.

In addition to these, the standard scores and percentile norms are also given for each of the grades.

The test has all the psychometric properties desired. It is easy to administer, score and interpret.

Looking to the above characteristics of the test, it could be said that the test is quite suitable and valid for measuring the reading ability of the pupils of grades 8, 9 and 10.

Administration and scoring of the Trivedi and Patel's Reading Ability Test:

The administration and the scoring of the test were strictly according to the instructions given in the manual of the test. From the distribution of the scores of the girls of 8, 9 and 10 grades, the means, SD and Q₁ and Q₃ values had been found for each grade.
As usual, the $Q_1$ and $Q_3$ values had been treated as cut-off scores to categorize the girls into poor and good readers respectively. The poor readers scored equal or less than $Q_1$ value while good readers were those who scored equal or above the $Q_3$ value.

### 4.3.2 An Inventory of Study habits

The study habits of a pupil can be ascertained by administering the study habits inventory. Such inventory has been constructed and validated by B.V. Patel. Many researchers have used this inventory to assess the study habits of the pupils. The inventory has 45 items which are to be ticked by the pupils in the space provided. It is a five point scale. There are seven components of the study habit inventory which are as under:

<table>
<thead>
<tr>
<th>Statements pertaining to</th>
<th>Total number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Home Environment and Work Organisation</td>
<td>07</td>
</tr>
<tr>
<td>2. Reading and Note taking</td>
<td>09</td>
</tr>
<tr>
<td>3. Planning of subjects</td>
<td>05</td>
</tr>
<tr>
<td>4. Work concentration</td>
<td>04</td>
</tr>
<tr>
<td>5. Preparing for exam</td>
<td>06</td>
</tr>
<tr>
<td>6. Habits and attitudes</td>
<td>08</td>
</tr>
<tr>
<td>7. School environment</td>
<td>06</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>45</strong></td>
</tr>
</tbody>
</table>
Thus the maximum score would be 225 and the minimum would be 45, giving the range from 45 to 225.

The manual gives instructions for scoring and administration. The reliability found out by various researchers for the inventory is quite high. Therefore it is held to be reliable for the present research.

The manual has provided the different categories of study habits. Thus, there are five categories. The average category is at the middle. The investigator kept the category of average at constant level while those two categories at lower level were collapsed into one which was called 'poor' while those categories at higher level were collapsed into 'good' study habits group.

Thus, the bifurcation of the sample was made into good and poor study habits while the average category was discarded.

The reading ability test was given to the pupils of good and poor study habits groups.

4.3.3 Socio-Economic Status and Its Measurement

Human societies are divided into strata based on income, educational level, cultural background, and
a variety of related factors. Because these strata differ in the facilities and opportunities afforded to the children, a significant sampling problem arises.

Various proposals have been made for its solution. The most common involves selection either in terms of a single factor, such as parental occupation, or income level or in terms of a series of questions covering occupation, income, possessions etc. as in Jim's Scale\(^1\) or the very composite scale of Leahy\(^2\); or in terms of cultural level, as in the studies of Warner\(^3\) et al.

In Gujarat many scales are available e.g. A.S. Patel's Socio-Economic Scales, C.C. Pathak's Scale and K.G. Desai's Scale for assessing SES. The scales mentioned above have many factors in common and they have taken into consideration many criteria for determining the SES. Therefore the researcher has selected C.C. Pathak's scale. It contains many factors such as caste sub-castes, occupation, educational level, monthly income, type of house and type of vehicle and other luxurious items. The responses could be obtained without any confusion.
4.3.4 Family Size

Family size was another important variable of the study. The pupil's proforma was so prepared by the investigator that it may invite from the pupil essential particulars required as regards her family size.

Each pupil under the sample was asked to write in the sheet the following particulars in the space meant for:

(i) Total number of children parents have in the family.
(ii) Total number of sons
(iii) Total number of daughters

The criteria for determining the size of the family were that the family which comprised of the father, the mother and their two children was considered as an average family. Allied relatives or kinsman in the family were not to be taken into consideration while determining the family size. If the total number of the members of the family was less than 4, the family was considered as a small family. On the other hand, if the total number in the family was more than 4, the family was considered to be a large family.
4.4 Selection of the Sample

A random sample of girls had been taken from the talukas of Kheda district. The schools of each taluka are first listed under rural and urban areas. Afterwards from each list of rural and urban area four schools were randomly selected. Thus there were eight schools from each taluka - 4 of rural setting and another four of urban setting.

Now from each school, girls having average, above average and below average achievers were isolated and from each category of achievement only three girls were randomly selected. This procedure was followed for grades 8, 9 and 10.

Thus from each school, the following number of girls was selected.

<table>
<thead>
<tr>
<th>Category of Achievement</th>
<th>Grades</th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Under achiever</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>09</td>
</tr>
<tr>
<td>Average achiever</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>09</td>
</tr>
<tr>
<td>Above average achiever</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>09</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>09</td>
<td>09</td>
<td>09</td>
<td>27</td>
</tr>
</tbody>
</table>
From each taluka, four schools belong to rural and another four to urban. Thus, from each taluka

Rural sample consisted of $27 \times 4 = 108$

Urban sample consisted of $27 \times 4 = 108$

Total sample from each taluka 216

The data have been collected from 80 schools (out of which 40 belonged to rural area and 40 to urban area) of ten talukas of Kheda district and the total initial sample 2160 girls of standards VIII, IX and X of the Kheda district.

Stratified cluster sampling was resorted to, in order to have equal weightage of rural-urban population of each district.

Because the study concentrated on the correlates of academic achievement, the selection of girls were made equally from the three categories of school achievement of previous year.

The data had been gathered regarding their reading ability, study habits, SES and family size.

These data are presented in Table 4.1 below.
Table 4.1  
Sample Profile of Girls of Kheda District regarding Area, Caste, Family Size, SES, Study Habits and Reading Ability

<table>
<thead>
<tr>
<th>1. Area</th>
<th>Rural 1080</th>
<th>Urban 1080</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NBC 738</td>
<td>NBC 772</td>
</tr>
<tr>
<td></td>
<td>BC 342</td>
<td>BC 308</td>
</tr>
<tr>
<td></td>
<td>= 2160</td>
<td>= 2160</td>
</tr>
<tr>
<td>2. Caste</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NBC 58</td>
<td>NBC 68</td>
</tr>
<tr>
<td></td>
<td>BC 92</td>
<td>BC 93</td>
</tr>
<tr>
<td></td>
<td>= 116</td>
<td>= 114</td>
</tr>
<tr>
<td>3. Family Size</td>
<td>L 290</td>
<td>L 350</td>
</tr>
<tr>
<td></td>
<td>S 448</td>
<td>S 442</td>
</tr>
<tr>
<td></td>
<td>= 738</td>
<td>= 772</td>
</tr>
<tr>
<td></td>
<td>BC 132</td>
<td>BC 192</td>
</tr>
<tr>
<td></td>
<td>= 342</td>
<td>= 308</td>
</tr>
<tr>
<td>4. SES</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High 58</td>
<td>High 68</td>
</tr>
<tr>
<td></td>
<td>Low 232</td>
<td>Low 282</td>
</tr>
<tr>
<td></td>
<td>= 316</td>
<td>= 552</td>
</tr>
<tr>
<td>5. Study Habits</td>
<td>Good 80</td>
<td>Good 106</td>
</tr>
<tr>
<td></td>
<td>Poor 130</td>
<td>Poor 361</td>
</tr>
<tr>
<td></td>
<td>= 210</td>
<td>= 445</td>
</tr>
<tr>
<td>Discarded : Average</td>
<td>528</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>= 1156</td>
<td>= 1004</td>
</tr>
<tr>
<td>6. Reading Ability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test given to 1156 girls</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High 24</td>
<td>High 46</td>
</tr>
<tr>
<td></td>
<td>Low 36</td>
<td>Low 48</td>
</tr>
<tr>
<td></td>
<td>= 60</td>
<td>= 105</td>
</tr>
<tr>
<td></td>
<td>= 220</td>
<td>= 608</td>
</tr>
<tr>
<td></td>
<td>Average 20</td>
<td>Average 12</td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>= 328</td>
<td>= 1156</td>
</tr>
</tbody>
</table>
4.5 Research Design and the Statistical Technique

For the first phase which includes four independent variables of area, caste, SES and family size, all operating at two levels would be set into a factorial design of $2 \times 2 \times 2 \times 2$ dimensions.

For each cell 13 pupils would be randomly selected and their academic achievement scores of all subjects converted into the percentages would be tabulated.

While in the second phase, the four variables includes area, caste, study habits and reading ability, each operating at two levels. Here each cell would have ten pupils selected randomly and their percentages of achievement scores would be tabulated.

Before going for ANOVA, the homogeneity of variance test would be employed so as to confirm the homogeneous groups of the factorial design.

A fixed-effect model of ANOVA would be used for determining the F-ratios wherein within group MSV would act as a denominator.

For first phase, the independent variables would be:

(1) Area of the pupils operating at two levels of urban and rural.
(2) Caste operating at two levels of non BC and BC.

(3) SES of parents operating at two levels of High and low SES.

(4) Family size operating at two levels of large and small family size.

For second phase, the independent variables would be:

(1) Area of the pupils operating at two levels or urban and rural.

(2) Caste operating at two levels of non BC and BC.

(3) Reading ability of the pupils operating at two levels of high and low reading ability.

(4) Study habits operating at two levels of good and poor study habits.

The structural score of the design is postulated below:

\[ Y = U + A + B + C + D + AB + AC + AD + BC + BD + CD + ABC + ABD + ACD + BCD + ABCD + \text{Error} \]

\[ Y = \text{Mean achievement score} \]
\[ U = \text{Usual grand mean of factorial design} \]
\[ A = \text{Effects due to Area of the pupils} \]
\[ B = \text{Effects due to Caste of the pupils} \]
C = Effects due to SES of the pupils
D = Effects due to Family size of the pupils

For second phase,
A = Effects due to Area of the pupils
B = Effects due to Caste of the pupils
C = Effects due to Reading Ability of the pupils
D = Effects due to Study habits of the pupils

To facilitate easy computation, equal cell size in each factorial design would be kept. Moreover, this would also enhance the precision and accuracy of the interpretation. If cell size is kept constant, the homogeneity of variance test is not required.

4.6 Null Hypotheses

The following null hypotheses are generated for the first phase:

Ho 1: There is no significant difference between the academic achievement of girls of rural area and urban area.

Ho 2: There is no significant difference between the academic achievement of girls or NBC and BC.
Ho 3: There is no significant difference between the academic achievement of girls of high SES and low SES.

Ho 4: There is no significant difference between the academic achievement of girls from large family and small family.

Ho 5: There is no significant effect of the interaction of area and caste on the academic achievement of the girls.

Ho 6: There is no significant effect of the interaction of area and SES on the academic achievement of the girls.

Ho 7: There is no significant effect of the interaction of area and family size on the academic achievement of the girls.

Ho 8: There is no significant effect of the interaction of caste and SES on the academic achievement of the girls.

Ho 9: There is no significant effect of the interaction of caste and family size on the academic achievement of the girls.
Ho 10: There is no significant effect of the interaction of SES and family size on the academic achievement of the girls.

Ho 11: There is no significant effect of the interaction of area, sex and SES on the academic achievement of the girls.

Ho 12: There is no significant effect of the interaction of area, caste and family size on the academic achievement of the girls.

Ho 13: There is no significant effect of the interaction of area, SES and family size on the academic achievement of the girls.

Ho 14: There is no significant effect of the interaction of caste, SES and family size on the academic achievement of the girls.

Ho 15: There is no significant effect of the interaction of area, caste, SES and family size on the academic achievement of the girls.

For second phase,

Ho 16: There is no significant difference between the academic achievement of girls of rural area and urban area.
Ho 17: There is no significant difference between the academic achievement of girls of NBC and BC.

Ho 18: There is no significant difference between the academic achievement of girls having high reading ability and low reading ability.

Ho 19: There is no significant difference between the academic achievement of girls having good study habit and poor study habit.

Ho 20: There is no significant effect of the interaction of area and caste on the academic achievement of the girls.

Ho 21: There is no significant effect of the interaction of area and reading ability on the academic achievement of the girls.

Ho 22: There is no significant effect of the interaction of area and study habit on the academic achievement of the girls.

Ho 23: There is no significant effect of the interaction of caste and reading ability on the academic achievement of the girls.

Ho 24: There is no significant effect of the interaction of caste and study habit on the academic achievement of the girls.
Ho 25: There is no significant effect of the interaction of reading ability and study habit on the academic achievement of the girls.

Ho 26: There is no significant effect of the interaction of area, caste and reading ability on the academic achievement of the girls.

Ho 27: There is no significant effect of the interaction of area, caste and study habit on the academic achievement of the girls.

Ho 28: There is no significant effect of the interaction of area, reading ability and study habit on the academic achievement of the girls.

Ho 29: There is no significant effect of the interaction of caste, reading ability and study habit on the academic achievement of the girls.

Ho 30: There is no significant effect of the interaction of area, caste, reading ability and study habit on the academic achievement of the girls.

In nutshell, the hypotheses for both the phases would be as under given in Table 4.2 below:
Table 4.2: Hypotheses and Their Number and Levels Phasewise

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Number</th>
<th>Phase I</th>
<th>Phase II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Effects</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>First order interactions</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Second order interactions</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Third order interactions</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

4.7 Statistical Model

Because of the extreme levels incorporated in each of the variables, the investigator would follow the "Fixed-Effect" model of Analysis of Variance. The sum of squares due to effect would be examined against the error variance of each of the factorial design.

To locate the significance of means, a Newman Keuls' Sequential Range Test\textsuperscript{5} would be followed and a proper relationship would be established.

The fifth chapter would devote to data and statistical analyses of various factorial designs described earlier.


