CHAPTER 4

RESEARCH PLANNING AND PROCEDURE

4.0 Introduction
4.1 Method of Study
4.2 Population and Sample
4.3 Variables Involved
4.4 Data Gathering Instruments
4.5 Data Collection
4.6 Statistical Techniques
4.0 INTRODUCTION

Planning is the most essential step for any work to be done systematically. Without comprehensive planning for research work, no specific outcome would be generated. The planning helps researcher to make his work possibly faultless. For better and scientific planning of the work, the chief objectives of the research must be kept in view constantly. The main objective of the present investigation is to study scholastic achievement in the context of intellectual ability, creativity, personality factors, family background and other variables of talent search scholars of Gujarat and top students as rated high by their teachers of Gujarat.

4.1 METHOD OF THE STUDY

As already has been discussed in the earlier chapters that studies in the field of talented students have employed different research methods and strategies. Considering the nature and objectives of the present study as well as the resources of the investigator, normative survey method of research was used. The survey is now accepted as fundamental instrument of researchers in social sciences. In the present investigation all the steps and characteristics have been followed, which are essential for the normative survey method of research.

4.2 POPULATION AND SAMPLE

All the 339 students, who had been selected by the State Level examination for the National level examination during 1987 and 1988 constitute the population of the study. Out of which the students of other medium rather than Gujarati have not been included in the population, because the tools used in the study are in Gujarati language. Thus the result of the study will be
applicable to only those talented students of Gujarati medium and those who know well Gujarati language.

How to get the number of students, who have appeared for N.T.S. examination or who have been at least selected for the examination and how to contact them were the questions before the investigator. Gujarat State Examination Board is the agency, which is responsible for conducting the state level examination and keeping the official records of such students. The investigator tried to contact the office of State Examination Board and the persons in charge of the said work. First of all, the Director was contacted and made aware of the need of the problem and the significance and importance of the study. The objectives of the study were clarified during the interview. The research proposal was also discussed and when the authorized person was satisfied with the purpose of the study, a permission was given to procure the list of talented students of state level examination and the investigator got the list of talented students of 1987 and 1988, as detailed in the following Table 4.1.

Table 4.1

<table>
<thead>
<tr>
<th>Medium</th>
<th>1987</th>
<th>1988</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>88</td>
<td>63</td>
<td>151</td>
</tr>
<tr>
<td>Gujarati</td>
<td>91</td>
<td>97</td>
<td>188</td>
</tr>
<tr>
<td>Total</td>
<td>179</td>
<td>160</td>
<td>339</td>
</tr>
</tbody>
</table>

As described in the first chapter, the students were to be administered the various tests, the details of those students with their proper addresses were to be noted by the investigator. These details can be gathered from the official records and they were kept confidential. The investigator had to try and try for this difficult task. The investigator visited the office four or five times and noted all the necessary details of those students, who were recommended by the state

The list consisted of all those selected students. The tools to be administered were in Gujarati language and therefore, the Gujarati knowing students and the students of Gujarati medium were sorted out. Thus the population comprised of 188 talented students. But while collecting the data, only 111 students could be contacted, out of which eleven sets of answer sheets being incomplete have been excluded. The exact number of cases, of which the data processed, have been 100 named as Group A, shown below.*

Table 4.2
The Sample of the Study

<table>
<thead>
<tr>
<th>Name of the Place</th>
<th>Students of Group A</th>
<th>Students of Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ahmedabad</td>
<td>51</td>
<td>51</td>
</tr>
<tr>
<td>2 Anand</td>
<td>04</td>
<td>04</td>
</tr>
<tr>
<td>3 Dahod</td>
<td>03</td>
<td>03</td>
</tr>
<tr>
<td>4 Gandhinagar</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>5 Mahesana</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>6 Nadiad</td>
<td>03</td>
<td>03</td>
</tr>
<tr>
<td>7 Surat</td>
<td>04</td>
<td>04</td>
</tr>
<tr>
<td>8 Silvassa</td>
<td>09</td>
<td>09</td>
</tr>
<tr>
<td>9 Vadodara</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>10 Visnagar</td>
<td>04</td>
<td>04</td>
</tr>
<tr>
<td>11 Zagadia</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

* The investigator had in mind the other objective of the study as to inquire into the scholastic achievement of the top students as rated high by their teachers in context of the previously mentioned variables. The same number of students were taken as Group B.
4.3 VARIABLES INVOLVED

This study has involved 25 variables, out of which scholastic achievement has been treated as dependent variable and intellectual ability, originality, fluency, flexibility, creativity, personality factors (A, B, C, D, E, F, G, H, I, J, O, Q₂, Q₃, Q₄), S.E.S., study habits, birth order, father's education and mother's education have been the independent variables.

4.4 DATA GATHERING INSTRUMENTS

There are five tools that have been used to measure the variables involved in this study.

1. General Ability Tests (G.A.T.) for classes XI and XII developed by Dr. Pallavi P. Patel.

2. Creative Ability Test (C.A.T.) for classes X to BG developed by Lilaben Devda.

3. High School Personality Questionnaire-Form A (H.S.P.Q.) adapted by Dr. R.N.Thakur.

4. Socio-Economic Status Scale (S.E.S.) developed by Dr. Bhailalbhai Patel and Dr. Vora.

5. Study Habits Inventory (S.H.) developed by Dr. Bhailalbhai Patel.

I Intellectual Ability

For measuring Intellectual Ability, the investigator studied the available standardized tests meant for Gujarati knowing students, who have passed standard X. They were as follows.

1. Desai - Bhatt Group Intelligence Test prepared by Dr. K.G.Desai and Dr.C.L.Bhatt.

2. The Construction and Standardization of a Spiral Omnibus Type Group Non-verbal Test of Intelligence for Grade VIII to XII prepared by Miss Tarulata M. Shah.
3. General Ability Tests for classes XI and XII developed by Dr. Pallavi P. Patel.

Desai - Bhatt Group Intelligence Test had been developed by the author before few years and it is a verbal test. The investigator had no information about the revision of the test, if there be any. Hence it was not used for the study.

The investigator then inquired about the Construction and Standardization of a Spiral Omnibus Type Group Non-verbal Test of Intelligence for grade VIII to XII prepared by Tarulata M. Shah.

It is a non-verbal test developed for the same age group but the copies of it were not available at that time.

The non-verbal test of General Ability Tests for classes XI and XII of Dr. Pallavi P. Patel, was used for the study because it has been developed and standardized for the same age group and for the classes XI and XII recently and the investigator could get the required copies of the test, when they were needed. The test has been divided into two parts. It contains 87 items. Part I tests the familiarity of the students with the world around him. Part II presents geometrical drawings, designed to test the power of abstract reasoning of the students. The number of right answer for both the parts of the test added together to get raw score to obtain the I.Q.S. of the students. The reliability co-efficients of the test range from 0.71 to 0.96 established through various methods. The validity of the test determined by different techniques bears validity co-efficients from 0.52 to 0.79. This test for students of standards XI and XII is designed to be given to many pupils at a time. The time for the test is 45 minutes. The test is given in Appendix 1.

II. Creativity

For measuring creativity of the students under the study, the investigator tried to get the available tools. Creative Ability Test for class XII developed by Lilaben Devda is the only available tool for the use in this study.
Creative Ability Test (C.A.T.)

This test is classified in three sections, as shown below:

Section 1  Verbal Creativity Test.
Section 2  Figural Creativity Test.
Section 3  Numerical Creativity Test.

The question of each section is followed by the instructions given with illustrations.

Section 1

In Verbal Creativity Test, there are two sub parts.

Section 1.1  Instances.
Section 1.2  Uses.

Each sub part consists two questions.

Section 2

In Figural Creativity Test, there are two sub parts.

Section 2.1  Line Meaning.
Section 2.2  Pattern Meaning.

Each sub part consists of two figures.

Section 3

In Numerical Creativity Test, there are two sub parts.

Section 3.1  Numerical.
Section 3.2  Operations.

Each of these two sub parts consists two questions. Thus the whole test consists of twelve questions.

The C.A.T. is classified as above. Five minutes time limit is given for each question and thus sixty minutes time is required for the completion of the whole test. The reliability of the test was found by test-retest and split-half method. It is 0.85 and 0.91.
The concurrent validity of Creative Ability Test with different criteria measures varies from 0.66 to 0.77.

Scoring of Creative Ability Test

As there are no right or wrong responses for the test, much can be exercised at the time of scoring. The scorer has to acquaint himself fully with the method of scoring and the use of scoring sheet. Each test item is to be scored for originality, fluency and flexibility. The total of these component scores become creativity score for each item. Then the total of all the item scores become the total creativity score of the testee.

The Creative Ability Test provides for testing three major factors related to creativity viz. 1) originality, 2) fluency, 3) flexibility.

The scheme of scoring, regarding the above mentioned three factors, is explained in details as under:

1. Originality

1) An irrelevant response gets a zero score.

2) If the response reoccurs in the same item, it does not get any score.

3) Each category consists of an alphabetic signal. This signal is demonstrated with the arithmetic figure.

To find out the originality of the response, this arithmetic figure is taken into consideration as a score of originality.

The above procedure is to be done in case of all the responses. The grand total of the scores of all responses is the originality score.

2. Fluency

1) An irrelevant response gets a zero score.
2) If the response reoccurs in the same item, it does not get any score.

3) The remaining each response gets one mark each.

4) The total score so arrived at is taken as fluency score of that test item only.

5) The grand total of all the 12 items of fluency score is called the 'Fluency Score'.

3. Flexibility

1) An irrelevant response gets a zero score.

2) The category of response is to be found out from the scoring scheme.

3) The re-occurrence of the same category does not hold any mark i.e. the total number of the various alphabets is the score of flexibility of the responses.

4) The grand total of all the 12 items of flexibility is called 'Flexibility Score'.

4. Total Creativity Score

The sum total of the 1) Originality Score, 2) Fluency Score and 3) Flexibility Score becomes the 'Creativity Score'. The test is given in Appendix 2.

III. Personality Traits

For measuring the personality traits of the students under the study, the investigator could get High School Personality Questionnaire (H.S.P.Q.) for Gujarati children of ages 12 through 18 adapted by R.N.Thakur(1988). It is the only available test in Gujarati to measure the personality traits enlisted by Cattell. There were other tests available in Gujarati prepared by Dr.A.S.Patel in M.S.University and Dr.K.G.Desai in Gujarat University. But the abovementioned test is the
recent one and measuring the various factors of personality as desired by the investigator. Moreover, this test has separate answer sheet, therefore it is economical also. The adaptation has been made in two forms, Form A and Form B. But after discussion with the experts, the investigator decided to use only Form A. The H.S.P.Q. can be administered without any specific time limit. The test contains 142 items, out of which the first and the last are the buffer items. It measures 14 factors of personality and thus 10 questions measure one factor. The items have been arranged at random.

The co-efficients of stability obtained by the different method establishing reliability are sufficiently high. The validity as estimated for the test is quite moderate. It ranges from 0.16 to 0.58. The stern norms have been established with the help of the scoring key and card. The scores can be calculated, for each factor, with the help of the tables given for the different samples. The raw scores can be converted into standard scores. Table 4.3 gives the details of fourteen personality traits. A copy of H.S.P.Q. is attached as Appendix 3.
### Table 4.3

**Personality Traits**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Personality Traits</th>
<th>Sr. No.</th>
<th>Personality Traits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A Reserved</td>
<td>8</td>
<td>H Shy</td>
</tr>
<tr>
<td></td>
<td>B Less Intelligent</td>
<td>9</td>
<td>I Tough minded</td>
</tr>
<tr>
<td></td>
<td>More Intelligent</td>
<td></td>
<td>Tender minded</td>
</tr>
<tr>
<td>3</td>
<td>C Affected by Feelings</td>
<td>10</td>
<td>J Zestful</td>
</tr>
<tr>
<td></td>
<td>Emotionally Stable</td>
<td></td>
<td>Restrained</td>
</tr>
<tr>
<td>4</td>
<td>D Undemonstrative</td>
<td>11</td>
<td>O Self Assured</td>
</tr>
<tr>
<td></td>
<td>Excitable</td>
<td></td>
<td>Self Responding</td>
</tr>
<tr>
<td>5</td>
<td>E Obedient</td>
<td>12</td>
<td>Q₂ Group Dependent</td>
</tr>
<tr>
<td></td>
<td>Assertive</td>
<td></td>
<td>Self Sufficient</td>
</tr>
<tr>
<td>6</td>
<td>F Sober</td>
<td>13</td>
<td>Q₃ Uncontrolled</td>
</tr>
<tr>
<td></td>
<td>Enthusiastic</td>
<td></td>
<td>Controlled</td>
</tr>
<tr>
<td>7</td>
<td>G Weaker Super Ego</td>
<td>14</td>
<td>Q₄ Relaxed</td>
</tr>
<tr>
<td></td>
<td>Stronger Super Ego</td>
<td></td>
<td>Tense</td>
</tr>
</tbody>
</table>
IV. Socio-Economic Status (S.E.S.)

It is generally believed that the students of good S.E.S. would get better chances to be exposed to a wider range of social experience. Such social situations offer wider chances to enter into social interaction, which provide more chances to multiply all kinds of useful experiences in the life. The socio-economic status (S.E.S.) is one of the factors, which has been taken into consideration, with a view to observing whether scholastic achievement has any relationship with S.E.S.

In this study, the investigator used the S.E.S. Scale prepared and standardized by Patel B.V. and Vora I.A., because it is recent and widely used.

A copy of the scale is attached as Appendix 4. The subjects have to choose as many items as fit to describe their conditions. The scale is divided into following areas.

1) Details of family
2) Educational Qualification
3) Total income of family
4) Numbers and types of vehicles
5) Housing accommodation and
6) Household conveniences.

According to the manual, the scale value of each item is to be pooled and finally the total scores of all the divisions are combined into one.

V. Study Habits

In order to study the study habits of the students under the study, the test is consisted of 45 statements, in which 27 statements are indicating proper study habits and 18 statements are indicating improper study habits. All the statements are based on five point scale.
It consists of the following seven sections (Appendix 5).

§ Statements 1 to 7 For home atmosphere, planning of work
§ Statements 8 to 16 For reading and note
§ Statements 17 to 21 For planning of subjects
§ Statements 22 to 25 For attention
§ Statements 26 to 31 For preparation for examination
§ Statements 32 to 39 For habits and attitudes
§ Statements 40 to 45 For atmosphere of the school

Scoring key and letter grade key are given in the manual.

4.5 DATA COLLECTION

Data collection for the study has been based on normative survey method. The investigator administered a set of five tests. Each one has been administered separately with the help of duly framed instructions. It was a huge task for the investigator. The investigator, after getting the list and the details of the students, planned the work of the study according to the names of the city. In the beginning, it was decided to call the students at one place and to administer the test to them. Moreover, it was time consuming so it was also decided to pay them for travelling expenses and some sufficient snacks. The draft letter explaining the purpose of the study was prepared and the post-cards were printed as shown in Appendix 6.

At first, the call letters were issued to such students, who were residing in Ahmedabad and they were called for the purpose at S.M.N.Dalal Education College for Women, Ahmedabad according to the dates mentioned in their letters. They were also asked to bring with them the co-students, who have equal scholastic achievement. This planning did not succeed as the co-operation achieved was not enough as planned out. There might be various reasons for it. The students were studying in standards XI or XII and most of them were in Science Stream and, therefore,
they might be busy in their study in the school and tuition classes. As a result, ten students in each category participated in that planning and they were treated as mentioned previously.

Then the investigator asked the experts in the field for guidance and discussed the matter as to how to contact the students and to get the co-operation of the students. It was felt, as a result of discussion, that if the place of study of the candidate could be identified, then it would be easy to work with him according to his convenience. He might not find time at home or any leisure time but the investigator could contact him in the school in free hours or during the practical work and administer the test by taking previous permission of the Principal.

These talented students in Gujarat were scattered at different places studying in standards XI, XII of Science Stream or Commerce Stream or some of them might be found in Diploma Technical Courses. The investigator felt it appropriate to know the places, where they might be studying and, therefore, in order to collect the correct information from them, the individual letters were posted along with the stamped and self-addressed envelope. The data asked for was about the school, timing of the school, class etc. After that almost all the students recommended by the state level examination in 1987 and 1988 were contacted by the investigator through the reply cards. But some of the posts were returned due to the change in their addresses or some of them were reluctant to co-operate as they had no time and some of them were out of station for their technical courses as stated by their parents and a few of them stated that it is not convenient for them. A good co-operation was achieved by the plan and the work was smoothened by their replies. The students' ratio was found more in the wellknown schools of urban area. The investigator then could make out the centres, where more number of candidates could be gathered. Accordingly, 22 letters were written to the said Principals asking the permission for the test administration. Most of the School Principals co-operated well and gave the permission for test administration. Not only that but they
provided the full facilities for such a noteworthy task and evinced interest in the same. Thus the investigator commenced the work of administering the tests, with two assistants trained in the said task at various places according to the schedule. Among all the tests, much care was exercised for the administration of the I.Q. test and creativity test. The others were not time bound and, therefore, the students filled in the details themselves according to their convenience.

The investigator organised the field work as mentioned above at the schools of Ahmedabad, Baroda, Surat, Mehsana, Gandhinagar, Silvassa, Anand, Nadiad, Visnagar and Dahod, where the talented students were studying.

The work continued from September 1989 to February 1990. After a careful planning and a lot of trials, 111 students could be contacted out of the total 188 students as mentioned previously. While checking and marking their answer sheets, a few of them were not duly filled in and, therefore, they were cancelled. At last, 100 cases of the each group were taken for data analysis. The scholastic achievement is one of the important factor, which has been taken into consideration, with a view to observing whether various abilities have any relationship with scholastic achievement.

For obtaining scholastic achievement score, students result of Secondary School Certificate (S.S.C.) Examination Board was taken into consideration. The percentage of the aggregate marks obtained at the S.S.C. examination is taken as scholastic achievement score and the investigator got the scores from the students as well as from the school records.

The achievement scores obtained at state level examination were kept confidential by Gujarat State Examination Board and hence the investigator decided to take their achievement scores at S.S.C.E. level as it is also a public examination and the scores are equally valid.
Totally five different types of tests were to be administered to these students. The task was completed according to the planning of test administration. The schematic view of the plan is given as under in Table 4.4.

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of the Tool</th>
<th>Total time taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General Ability Test (G.A.T.)</td>
<td>45 minutes</td>
</tr>
<tr>
<td>2</td>
<td>Creative Ability Test (C.A.T.)</td>
<td>70 minutes</td>
</tr>
<tr>
<td>3</td>
<td>High School Personality Questionnaire (H.S.P.Q.)</td>
<td>45 minutes</td>
</tr>
<tr>
<td>4</td>
<td>Socio-Economic Status Scale (S.E.S.Scale)</td>
<td>15 minutes</td>
</tr>
<tr>
<td>5</td>
<td>Study Habits Inventory (S.H.)</td>
<td>35 minutes</td>
</tr>
</tbody>
</table>

Thus obtained data have been scored with the help of the scoring keys developed by the test constructors. The mass data collected through the use of various tools, however, reliable, valid and adequate, have been found meaningless to use. Therefore, the data have been organized in a systematic way to achieve the purpose of the study. This data have also been checked to see the accuracy, utility and completeness and then tabulation has been performed.

4.6 STATISTICAL TECHNIQUES

The objectives to be achieved through this study have been to find out the relationship among intelligence, originality, fluency, flexibility, creativity, S.E.S., personality traits, study habits and scholastic achievement of students, and to study the individual as well as joint contribution of intelligence, originality, fluency, flexibility, creativity, personality traits, S.E.S. and study habits in predicting scholastic achievement of students.
Hence multiple regression and multiple co-efficient of correlation have been used for describing the relationship between dependent and independent variables, whereas ANOVA and 't' test are used for the differential studies.

**Multiple Regression Analysis**

Multiple regression is a method of analysing the collective and separate contributions of two or more independent variables to the variation of dependent variable. Handled with knowledge, understanding and care, it is indeed a general and potent tool of behavioural scientists.\(^4\)

By this method, it is possible to compute the equation, which gives the best possible linear combination of a number of independent variables for the purpose of predicting another dependent variables. This equation is known as multiple regression equation.

The regression equation, which expresses the relationship between a single variable \(X_1\) and any number of independent variables, \(X_2, X_3 \ldots X_n\) may be written in deviation form as follows:\(^5\):

\[
\bar{X}_1 = b_{12.34\ldots n}X_2 + b_{13.24\ldots n}X_3 + \ldots + b_{1n.23\ldots (n-1)}X_n
\]

and in score form, it will be as follows:

\[
\bar{X}_1 = b_{12.34\ldots n}X_2 + b_{13.24\ldots n}X_3 + \ldots + b_{1n.23\ldots (n-1)}X_n + K
\]

Where \(b\) co-efficient are called the partial regression co-efficients and give the weights to be attached to the scores in each of the independent variables, when \(X_1\) is to be estimated from all these in combination.

Furthermore, these regression co-efficients give the weights, which each variable exerts in determining \(X_1\), when the influence of other variables is partialled out. Thus, the regression equation tells just what role each of the several variables plays in determining the score in \(X_1\), the criterion.
Multiple Correlation

The multiple correlation analysis provides an analysis of the relations among a single criterion measure and two or more predictor measures. One result of the analysis is an equation for predicting the unknown criterion score of a new subject from his known set of predictors' scores. The obtained equation for predicting the criterion is called multiple regression equation. The another result of the analysis is a co-efficient of multiple correlation. The multiple correlation co-efficient between observed value of the dependent variable and those values estimated from the multiple regression equation. Multiple R shows how accurately the scores from a given combination of variables represent the actual value of the criterion, when independent variables are combined in the best linear equations. The multiple correlation can be interpreted by squaring it.

The co-efficient $R^2$ provides an estimate of the proportion of the total variance in the criterion that can be predicted from the known variance in the predictors, and is a measure of the overall effectiveness of the multiple regression. The quantity of $100R^2$, which gives the percentage of the variation of the dependent variable, which is due to regression, is known as the co-efficient of determination.

ANCOVA

ANCOVA (Analysis of Co-variance) technique requires one to assume that there is some sort of relationship between the dependent variable and the uncontrolled variables. This form of the relationship is the same in the various treatment groups. As some are,

1) Various treatment groups are selected at random from the population.

2) The groups are homogeneous in variability.

3) The regression is linear and is same from group to group.
Computations Done

The multiple correlation and regression analysis is so tedious that they cannot be used unless the assistance of computer is taken. The computer has made these techniques accessible and practical. Therefore, in the present study, all the computations have been made with the help of the computer. After making all the necessary computations, the results were summarised and interpreted. These have been set forth in the tables appearing in the text.
References


