CHAPTER 3

METHODOLOGY

3.1. Variables
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3.4.1. Tools used for the study
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3.4.6. Statistical techniques used
The success of a research study depends on the methodology adopted and the tools and techniques used. Research methods describe the various steps of the plan of action to be adopted in solving the research problem. The details of the methods adopted, variables selected, tools used, samples selected, procedures adopted and statistical techniques used for the analysis of data are described in this chapter.

The present study was intended to test the effect and relation of each of the correlates of achievement motivation with academic achievement in social science. It also tries to identify the best predictors of achievement in social science. The testing of these hypotheses requires the selection of appropriate procedures, suitable tools for the collection of data. The details of the tools used, sample selected for the study, scoring procedures and statistical techniques used for analysis are described in detailed in this chapter. There are given in under various heads as given below.

3.1. VARIABLES

The study is an attempt to find out the extent of effect and relation of correlates of achievement motivation with achievements in social science. The study being a prediction one two types of variables are involved, viz., criterion or dependent and predictor or independent variables. The dependent and independent variables of the study are presented below with the criteria for the selection of the independent variable.
**Dependent (Criterion) Variable**

Achievement in Social Science is taken as the dependent (criterion) variable.

**Independent (Predictor) Variables**

Correlates of achievement motivation is taken as the independent (predictor) variable. For the present study the following variables were selected as the correlates of achievement motivation.

1. Achievement Motivation
2. Intelligence
3. Level of Aspiration
4. Study Habits
5. Self Concept
6. Examination anxiety
7. Family income level
8. Family occupation level
9. Family education level
10. Socio Economic Status
11. Home Learning Facility
12. Family Acceptance of Education
13. Family Cultural Level
14. Family Environment
15. Socio Familial Adjustment
Rationale for the selection of the independent variables

First of all, the investigator reviewed various studies conducted in India and abroad in the area of ‘correlates of achievement’ motivation and ‘correlates of academic achievement’. From the review the investigator could identify a number of correlates of achievement motivation (variables having correlation with achievement motivation) and correlates of academic achievement (variables having relation with academic achievement). The review of related literature indicated that academic achievement of a student is influenced not only by a number of socio economic and familial variables but also by variables belonging to cognitive and affective domains. Among the identified correlates of achievement motivation the investigator selected the aforesaid variables which also show high correlation with achievement. The selection of independent variable was based on the assumption that the variables might be related to scholastic achievement. Since one of the objectives of the study is identify the significant predictors with relative efficiency of each in predicting achievement in social science. The variables selected were those which have high relation with academic achievement.

Criteria used for the selection of independent variables

Independent (predictor) variables were selected for the study keeping the following.

1. The variables selected show high relation with achievement motivation and academic achievement.
2. The variables selected can be measured objectively.

3. Standardised group tests were readily available or can be developed to measure the variables.

3.2. OBJECTIVES

1. To find out the effect of each of the correlates of achievement motivation on achievement in social science.

2. To test whether significant difference exists in the mean scores of achievement motivation variables between high and average and high and low, average and low achievers in social science.

3. To find out the extent of relationship between each of the correlates of achievement motivation and achievement in social science for the whole sample and the relevant sub samples.

4. To predict achievement in social science by using a set of select correlates of achievement motivation.

3.3. HYPOTHESES

1. There will be significant effect of each of the correlates of achievement motivation on achievement in social science.

2. There will be significant difference in the mean scores of achievement motivation variables between high and average, high and low, average and low achievers in social science.
3. There will be significant relationship between each of the correlates of achievement motivation and achievement in social science for the whole sample and the relevant sub-samples.

4. Criterion variable – Achievement in Social Science can be predicted significant from a set of select correlates the Achievement motivation.

3.4. METHODOLOGY

3.4.1. TOOLS USED FOR THE COLLECTION OF DATA

The main tools used for the present study were:

a. Kerala Scale of Achievement Motivation (Nair, 1980)
b. Kerala University Group Test of Intelligence (Nair and Amma, 1978)
c. Kerala Self Concept Scale (Nair, 1980)
d. Study Habits Inventory (Patel, 1975)
e. Kerala Examination Anxiety Scale (Nair, 1976)
f. Kerala Socio Familial Adjustment Inventory (Nair and Amma, 1982)
g. Kerala Socio-Economic Status Scale (Nair, 1980)
h. Level of Aspiration Measure (Mahesh and Shah, 1983)
i. Achievement test in social science for Standard IX (Investigator, 2003).
3.4.2. DESCRIPTION OF THE TOOLS

A) KERALA SCALE OF ACHIEVEMENT MOTIVATION

The scale has been developed by Nair (1980). It is used for measuring the Achievement Motivation. It is a self reporting inventory standardised for the secondary school and college students in Kerala. The scale measures the subjects power to initiate direct and sustain achievement oriented behaviour. The scale consists of 60 statements. The different items measures the level of achievement motivation by presenting statements related to the subjects’ own view about achievement, the different ways adopted for achieving the goal opportunities for doing extra ordinary things as a leader etc. Some statements are meant for finding out the subjects’ views about the achievement of others. Some other items are for getting the opinion of the subject about the attitudes of friends, parents and others towards his or her achievement. For each statement the subject is required to respond by selecting and marking anyone of the three responses Y (Yes) U (Undecided) and N (No) in the response sheet. A sample item of the scale is given below:

1. Many people consider that I am one who can not do anything useful or worthwhile.  

   Y  U  N
Scoring

There are both positive and negative items in the test. Positive items show high degree of achievement motivation and negative items show the least degree of achievement motivation. A mark under Y will be given a unit score for a positive item while a mark under N will be given a unit score for a negative item. All other responses receive zero score. The total score on the test is the sum of the scores obtained by a subject in all the items of the test. There is no time limit for the test.

Reliability and Validity of Achievement Motivation Scale

The test is reported to have a test-retest reliability of 0.73 (N = 56). Ayishabi (1985) had reestablished the reliability and validity of the test. She obtained reliability co-efficient of 0.83 for the scale on 50 second year degree students. The scale was revalidated on a sample of 40 adult college students against the sentence completion test of B.N. Mukerjee. The validity coefficient of the scale against achievement is 0.58 (N = 40) and that against the Sentence Completion test is 0.83 (N = 40).

The investigator had reestablished the reliability and validity of the scale (N = 50) on a sample of 50 secondary school students (Split Half Method) and obtained a reliability co-efficient 0.698 (N = 50). The validity co-efficient of the scale against school marks is 0.613 (N = 50). These psychometric properties of the scale show that it is a valid and reliable test for measuring the achievement motivation of school students.
B) THE KERALA UNIVERSITY VERBAL GROUP TEST OF INTELLIGENCE

It is a standardized instrument in Malayalam developed for measuring the general intelligence ‘g’ of pupils in secondary schools of Kerala. It consists of five sub tests. Total time for the test is 35 minutes. Table 3.1 gives the details of the test.

<table>
<thead>
<tr>
<th>Sub-tests Number</th>
<th>Name of sub-tests</th>
<th>Number of items</th>
<th>Time in minutes</th>
<th>Maximum scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analogy</td>
<td>20</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Classification</td>
<td>20</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Proverbs</td>
<td>20</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Number Series</td>
<td>20</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Verbal Reasoning</td>
<td>20</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

Test Components and Description

The test battery consists of five sub-tests. The details of each sub tests are given below:
1. Analogy

In this sub-test, three words are given. The first two words are related to each other in some way. The same relation is to be observed between the third word and the fourth word. The fourth word is to be found out from the four words given in the brackets. There are twenty items in this sub-test and the time allowed is six minutes. The maximum scores for the sub-test is twenty.

An example of an item in this sub-test is:

(i) Crow: Bird :: Tiger : ...................................

(a) Animal (b) Forest (c) Cave (d) Cage.

2. Classification

In this sub-test each item consists of five words of which four can be grouped together according to some principle or law and the fifth one is different. Subjects have to choose the word which does not fit into this group. There are twenty items in this sub-test and the time limit is five minutes.

(i) An example of an item is given below:

(a) Addition     (b) Subtraction (c) Division

(d) Arithmetic  (e) Multiplication
3. **Proverbs**

Each item in this sub tests consists of a proverb followed by four statements explaining the meaning of the proverb. Pupils have to choose the statement which comes very close to the idea contained in the proverb. There are twenty items in this sub test and the time allowed is 8 minutes. To illustrate an example is given below:

(i) All that glitters is not gold

(a) External and internal characters are not the same.

(b) All showing things are not gold.

(c) Gold need not glitter always

(d) Don’t be assessed by seeing the outward appearance.

4. **Number Series**

In each item, a series of numbers according to a particular pattern or law is given with one number missing. Pupils have to find out the missing number from those given in brackets. There are twenty items in this sub-test and the time limit is six minutes. An example of an item is given below:

1. 50, 46, 42, 38, ...... , 30.

   (a) 26  (b) 34  (c) 56.
5. Verbal Reasoning

In each item, a problem requiring a perception of some sort of relationship and its identification is given. Pupils have to select the correct answer to the problem from the alternatives given. This sub test consists of twenty items. The time limit ten minutes. To illustrate an example is given below:

(i) Rani is older than Ruby. Leena is older than Rani. Who is the oldest among the three?

(a) Rani (b) Ruby (c) Leena.

Validity and Reliability

The test components have been adopted from popular standardised test with high ‘g’ loadings. Inter correlation of the sub-tests also have been worked out on a selected representative sample (N = 120). The inter-correlation matrix presented in Table 3.2 shows that there is considerable overlapping between the sub-tests.
### TABLE 3.2

**Inter test correlation matrix of the sub tests of the Verbal Group Test of Intelligence**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Sub tests</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analogy</td>
<td>-</td>
<td>0.75</td>
<td>0.66</td>
<td>0.45</td>
<td>0.56</td>
</tr>
<tr>
<td>2</td>
<td>Classification</td>
<td>0.75</td>
<td>-</td>
<td>0.63</td>
<td>0.47</td>
<td>0.41</td>
</tr>
<tr>
<td>3</td>
<td>Proverbs</td>
<td>0.75</td>
<td>0.63</td>
<td>-</td>
<td>0.47</td>
<td>0.41</td>
</tr>
<tr>
<td>4</td>
<td>Number series</td>
<td>0.45</td>
<td>0.47</td>
<td>0.47</td>
<td>-</td>
<td>0.32</td>
</tr>
<tr>
<td>5</td>
<td>Verbal reasoning</td>
<td>0.56</td>
<td>0.41</td>
<td>0.41</td>
<td>0.32</td>
<td>-</td>
</tr>
</tbody>
</table>

The split half reliabilities of the five sub tests and the whole test (N =120) are given in table (N = 120).

### TABLE 3.3

**Split half reliability of Verbal Group Test of Intelligence**

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Sub Tests</th>
<th>Reliability (Corrected values)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analogy</td>
<td>0.88</td>
</tr>
<tr>
<td>2</td>
<td>Classification</td>
<td>0.86</td>
</tr>
<tr>
<td>3</td>
<td>Proverbs</td>
<td>0.86</td>
</tr>
<tr>
<td>4</td>
<td>Number Series</td>
<td>0.86</td>
</tr>
<tr>
<td>5</td>
<td>Verbal Reasoning</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>Whole Test</td>
<td>0.94</td>
</tr>
</tbody>
</table>
External validity was calculated against school marks. The validity coefficients of sub-tests 1-5 with school marks as external criterion are 0.61, 0.53, 0.65, 0.67 and 0.45 respectively.

The values above shows that the test is valid and reliable.

C) KERALA SELF CONCEPT SCALE

The Kerala Self Concept Scale (Nair, 1980) is a self report inventory. It is a standardised scale for use with Kerala subjects and from subjects from equivalent South Indian Culture. The test contains 60 items grouped in pairs and divided into two sections A and B. For each item in Section A there is an equivalent item in Section B. All the items are presented both in Malayalam and in English. The subjects are asked to enter their responses by marking ‘A’ ‘B’ ‘C’ ‘D’ or ‘E’ in the response sheet. ‘A’ stands for ‘Strongly Agree’, ‘B’ for Agree, ‘C’ for ‘No Opinion’, ‘D’ for ‘Disagree’ and ‘E’ for ‘Strongly Disagree’. The score for each item in Section A is compared with the score in Section B. The difference is calculated using appropriate procedure. Each item in Section A represents the subjects’ perception of ‘ideal self’. Each item in Section B represents his corresponding ‘real self’. An example from Section A and its matching item in Section B is given below as 1 and 2 respectively.

1. I wish my parents are the most influential persons in our locality.  

   A B C D E
2. My parents are the most influential person in our locality.

Item in Section A represents the ideal concept of the individual with respect to the influence that his parents can wield in the locality. Item in Section B represents the actual concept of the individual about the influence that his parents can wield in the locality. The individual by marking any one of the 5 responses (A, B, C, D and E) gets a score for his perception of the ‘ideal self’ and the ‘real self’.

**Scoring**

The scoring procedure of the scale is given below:

<table>
<thead>
<tr>
<th>Rating</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scores</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Theoretically the score for the ‘ideal self’ cannot exceed the score for the ‘real self’. When the difference is large it indicates a lower self concept as compared with a smaller difference. The maximum possible difference is 4. This represents the lowest self concept. The minimum difference is zero and it represents the highest self concept. Each difference is subtracted from 5 (to get at least a minimum score of one) to obtain the self concept score for each item. A higher score represents a higher self concept and vice-versa. The scores of all the items are summed up to obtain the total score for the whole test. There is no time limit for the scale.
Reliability and Validity

The test manual provides evidence of the reliability and validity. The reliability of the scale has been established by test-retest method and split half method. The test retest reliability coefficient of the scale is 0.83 (N = 56). The split half reliability coefficient of the scale is 0.83 (N = 56). The split half reliability coefficient for the scale is 0.74 (N = 100).

The investigator had reestablished the reliability of the test for the present study by using split half method and obtained a reliability coefficient 0.721 (N = 100).

The validity of the tool has been established against the Semantic Differential Scale of Self Concept (translated version of the Osgood model developed for another research study) as external criterion. The obtained correlation coefficient was 0.48 (N = 56). The above psychometric properties of the scale shows that the scale is reasonably valid and reliable to measure self concept.

**D) STUDY HABITS INVENTORY**

The study habits inventory constructed and standardised by Patel (1975) is a five point scale for measuring the study habits of secondary school pupils. The test consists of 45 statements. The statements fall into the following seven arrears.

1. Home environment and planning of work.
2. Reading and note taking
3. Planning of subject
4. Habits of concentration
5. Preparation for examination
6. General habits and attitudes
7. School environment.

Out of these 45 statements some of them depict good study habits while some others depict poor habits of study. These statements are to be rated on a 5 point scale and the 5 points are described as (1) Always (2) Often (3) Sometimes (4) Seldom and (5) Never. An example of an item of the test is given below.

1. I spend my leisure time at school in reading – Always / Often / Sometimes / Seldom / Never

**Scoring**

In case of the item depicting good study habits the student is to give 5 marks if he puts a tick in the column of 'Always'. 4, 3, 2 and 1 marks are to be given if he puts the tick mark in the column of ‘Often’ ‘Sometimes’ Hardly and Never respectively. In case of the statement depicting bad study habits the score is to be assigned in reverse order. That is, 1, 2, 3, 4 and 5 for Always, Often Sometimes Hardly and Never. Thus the high score on the inventory will indicate good study habits and vice versa. The maximum possible score on the inventory would be 225 and the least possible score would be 45. Students getting a score of 199 and above shows very good study habits. Score between 180 and 198,
score between 160 and 179, and score between 140 and 159 depicts good study habits, normal study habits and poor study habits respectively. Score of 139 and below indicates very poor study habits. There is no time limit.

**Reliability and Validity**

The reliability and the validity of the test are provided in the test manual. The reliability established by test-retest method and split-half method were found to be 0.79 and 0.82 respectively. The validity of the test was established by using external criteria viz. Examination marks and teachers’ opinion. The coefficient of correlation with the examination marks was 0.50 (N = 430) which is sufficiently high. With teachers’ opinion, the coefficient of correlation was 0.40.

For the present study, the validity and reliability of the test was reestablished by the investigator by the split half method on a sample of 100 students of IX standard. The obtained reliability coefficient is 0.64. The scores of the test were validated against the external criteria viz. the marks obtained on the achievement test in Social Science constructed by the investigator himself. The obtained coefficient of correlation was 0.58 (N = 100) which is sufficiently high. These psychometric properties show that this test is valid and reliable for measuring study habits.

**E) KERALA EXAMINATION ANXIETY SCALE (1976)**

The scale has been standardised for the use of Kerala Secondary School Students. The scale contains empirically selected components
which indicate examination anxious behaviour under Kerala conditions. The test consists of 30 simple statements to be answered in any of the three following ways ‘Yes’, ‘Undecided’ and ‘No’. The items of the scale have been presented both in English and Malayalam. It is a popular measure of test anxiety used by several social and educational researchers in Kerala. Specimen items of the test are given below:

1. When I enter an examination hall, very often I feel that I have forgotten every thing.  
   ![Y U N](image)

2. I experience some vague discomfort while taking a test.  
   ![Y U N](image)

The test consists of both positive and negative statements. For each positive statement an ‘Yes’ answer is given a score of one and ‘No’ answer is given a score of one for each negative statements. Increase in scores indicates a corresponding increase in examination anxiety. The total scores obtained is considered as examination anxiety

**Reliability and Validity of Examination Anxiety Scale**

The scale correlated -.203 with achievement while it correlated -.89 with intelligence for a sample of 727 secondary school students. The same study also reveals that this test has high positive correlation with general anxiety (r = .605).
The reliability of the test has been worked out in another study by Babu (1977) using the test retest method. The study shows that the test has a test retest reliability of 0.79. The available evidence shows that this is a valid and reliable measure of examination anxiety as applied to secondary school subjects of Kerala. A specimen score sheet used for this test is presented as Appendix. The details of reliability and validity noted above indicates that the examination anxiety scale is very much reliability and valid for the purpose of the present investigation.

F) SOCIO FAMILIAL ADJUSTMENT INVENTORY

The Socio Familial Adjustment Inventory was developed by Nair and Devi (1982) to measure the Socio-Familial background of the secondary school students. This inventory is used to measure 4 selected familial variables. They are home learning facility, family acceptance of education, family cultural level index, and family environment index.

(a) Home Learning Facility

This section consists of 23 items of which 21 are positive and the remaining two are negative. This part measures the various facilities that parents arranged for the learning of their children. The student is required to put a tick mark in the bracket that he chooses from the two alternative responses ‘Yes’ and ‘No’ given in the response sheet. Some sample items of the inventory are presented below:
Methodology

1. Are you interrupted by anyone at your study

2. Do your parents help you in doing home works

For a positive statement one score is given for ‘Yes’ response and for negative statements the scoring procedure is reversed. The maximum possible scores is 23.

(b) Family Acceptance of Education

This is a three point scale intended to know the extent to which the parents accept the educational work of their children. It consists of 16 statements. The student has to read the statements carefully and put a tick mark in the appropriate brackets he chooses from the responses ‘Always’, ‘Sometimes’ and ‘Never’. A sample item in the inventory is given below:

1. Your parents check your school notes

A score of 3 is assigned for a response of ‘Always’, a score of 2 for a response of ‘Sometimes’ and a score of 1 for the response of ‘never’. The scores on all the items are added together and the total is considered as a measure of family acceptance of education. The maximum score is 45.
(c) Family Cultural Level Index

This section helps to assess the cultural background of the pupils family. It consists 13 items. for the first seven items, the possible responses are ‘many’, ‘few’ and ‘none’ and for the remaining six items, the possible answers are ‘Always’ ‘sometimes’ and ‘never’. Two examples of item are given below:

<table>
<thead>
<tr>
<th>Many</th>
<th>Few</th>
<th>None</th>
</tr>
</thead>
</table>

1. Number of Newspapers subscribed by your family
2. Your parents ask you to read newspapers

For each statement a score of 3, 2 or 1 is given for the responses ‘Many’ ‘Few’ or ‘None’ respectively. The scores on all the 13 items are added together and the sum of the scores is considered as the measure of the cultural level of the family. The maximum score is 39.

(d) Family Environment Index

This part helps to collect information regarding the cultural level of one’s family neighbourhood. This is also a three point scale consisting of 14 statements. There are 13 positive items and one negative statement. For each statement the student is required to mark a tick in the bracket he selects from the responses ‘Many’, ‘Few’ and ‘Nil’. Two examples of item are presented below:
1. Number of cultural and social organisation in the locality

2. Number of people holding high job in your locality

For each positive statement a score of 3, 2 or 1 is given for the response ‘Many’, ‘Few’ and ‘Nil’ respectively. For the negative item scoring is reversed. The maximum score is 42. The sum of the scores on all the items is the measure of the total level of family environment index.

The sum of the scores on all the 4 sub tests gives an index of socio-familial variables.

**Validity and Reliability**

External validity was calculated by the investigator against the scores obtained on the achievement test in social science constructed by the investigator himself. The validity coefficients of sub test A-D are 0.63, 0.58, 0.65 and 0.54 respectively.

The investigator had re-established the reliabilities of the 4 sub tests and the whole test (N = 100) for the present sample by split-half method. The split-half reliabilities of the 4 sub tests and the whole test are 0.87, 0.88, 0.86, 0.87 and 0.89 respectively.
G) THE KERALA SOCIO-ECONOMIC STATUS SCALE

The investigator made use of the Kerala Socio-Economic Scale developed and standardised by Nair (1976) with necessary modification in scoring. The data for the scale was obtained from the general data sheet administered on the pupils.

Description of the Scale

The general data sheet is divided into five sections. Section one elicits the general information about the subject regarding the name of the pupil, age, sex, caste religion locality of the school etc. The second part calls for information regarding the level of education of parents, siblings and other occupants of the family. Part three is used to elicit information regarding the type of occupations of the members of the family. The details about the income of the family members are collected through the fourth part. The last section of the data sheet shows information regarding the school marks. The school records were used to fill in this part. This was done by the investigator. Other informations were collected from the pupils during the administration of the test.

The revision in the scoring scheme was necessary since the income level were based on the salary pattern existed nearly 25 years back. The revision was done on the basis of the opinions of experts, present salary patterns and cost of living index. The details regarding the categories and the respective weightages are presented in Table 3.4.
TABLE 3.4

Income Level of Father and Respective Weightage

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Below Rs. 1500/-</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Rs.1501/- to Rs.2500/-</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Rs.2501/- to Rs.4500/-</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>Rs.4501/- to Rs.6000/-</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Rs.6001/- to Rs.7500/-</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>Rs.7501/- to Rs.10000/-</td>
<td>30</td>
</tr>
<tr>
<td>7</td>
<td>Rs.10000/- and above</td>
<td>35</td>
</tr>
</tbody>
</table>

TABLE 3.5

Education Level of Father and Respective Weightage

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Illiterate</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Standard I to IV</td>
<td>10</td>
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<tr>
<td>3</td>
<td>Standard V to VII</td>
<td>15</td>
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<tr>
<td>4</td>
<td>Standard VIII to X</td>
<td>20</td>
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<tr>
<td>5</td>
<td>Pre-degree/Higher secondary/TTC/ITI/etc</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>B.A/B.Sc./B.Com/B.L.I.Sc./Engineering Diploma/B.Ed., etc.</td>
<td>30</td>
</tr>
<tr>
<td>7</td>
<td>M.A./M.Sc./M.Com./M.Ed./B.Sc. Engineering/M.B.B.S./LL.B./M.Lib.Sc./etc</td>
<td>35</td>
</tr>
</tbody>
</table>
TABLE 3.6

Occupational Level of Father and Respective Weightage

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unemployed</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
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<tr>
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</tr>
<tr>
<td>5</td>
<td>Semi professional</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>High Professional</td>
<td>30</td>
</tr>
</tbody>
</table>

The Classification of Occupations

The different occupations have been classified into six categories. They are the unemployed, unskilled, semi skilled, skilled, semi professional and high professionals.

1. Unemployed

Those who are having no work at all will come under this category.

2. Unskilled

Coolies, ordinary labourers, watchmen, peons etc. will form the unskilled labourers.
3. Semi-skilled

This category includes farmers, small scale merchants, library attenders, police constables, etc.

4. Skilled

Mechanics, fitters, electricians, drivers, photographers, laboratory assistants, carpenters, masons, document writers, vakil clerks, head constables, village officers, typists and the like will fall under this category.

5. Semi Professionals

Chemists, druggists, qualified nurses, teachers, managers, superintendents of offices, minor-businessmen, contractors, small landlords, sub inspectors of police, excise inspectors, sub registers, assistant educational officers, block development officers, officers of the sub-district level, health workers etc will come under this category.

6. High Professionals

Under this category the ministers, judges, bank executives, doctors, engineers, lawyers, university level teachers, heads of Government departments, heads of research organisations, secretaries of the government, big landlords, business executives, etc are included.
Method adopted for weighing the various categories

1. Education

The level of education has been divided into 7 categories which begins from the illiterate to post graduate level. The illiterate has been awarded 5 points, 10 points has been assigned to those who have education from standard I to Standard IV, 15 points from standard V to VII, 20 points from standard VIII to X, 25 points for pre-degree, higher secondary, T.T.C. etc. 30 points to graduates and diploma holders and 35 points to all post graduate including medical and engineering degree holders.

3. Occupation

5 points was given for the unemployed. From this group 5 points were added to the ascending groups like, Unskilled, semi-skilled, skilled, semi-professional and high professionals.

4. Income

This also has been categorised into six. The lowest fixed income was Rs.1500/- and the highest was Rs.10000/-. The group below Rs.1500/- was considered to be the lowest and the group above Rs.10000/- the highest. There are seven groups. For each group 5 scores were given in ascending order. Total weightage is 35.
The scale measures the socio economic status of the pupils in terms of his parents or guardians educational, occupational and income level. The weightage of the three levels are added to yield weightage of the three levels are added to yield composite socio economic status for each subject. A specimen copy of the General Data Sheet is provided as appendix.

H) LEVEL OF ASPIRATION TEST

This test is developed and standardised by Mahesh and Shaw (1983). It is a simple performance test. The test sheet has 50 circles which are arranged in 5 rows. Each row has 10 circles. The students have to draw four lines in these circles so that they may appear like a human face. Lines must be drawn in a sequence – right eye, left eye, nose and mouth. Draw lines from left to right across the rows and then proceed to the next line.

Above and below the rows, there are two boxes on the right side. The upper box is meant for entering the number of expected score number of triangles (which is expected to complete) excepts practice trial whereas the lower box is for writing the number of actual score (number of completed human face) 10 trials are needed for each subject except the practice trial. For each trial 30 seconds are allotted.

Students have to draw the lines and count the number of completed face and enter it in the lower box. The first trial will be treated as practice
Methodology

In the following trial subjects have to do the same thing and write the number of faces which they intend to complete in the upper box.

Scoring

The procedure of scoring is simple. Scoring is done in terms of goal discrepancy score (GDS). In order to find out GDS, actual score on the previous trial is subtracted from the expected score on the next trial. For example if the actual score on the previous trial is 25 and the expected score on the next trial is 32, GDS is \(32 - 25 = 7\). If there are 10 trials find out GDS of each trials and find out the average to obtain the level of aspiration. For example if the GDS of the 10 trials are 13, 11, 10, 7, 5, 12, 3, 7, 8 then the level of aspiration is 7.6 ( \(76 \div 10\)). A positive, GDS suggests that one’s goal is higher than one’s previous performance and a negative GDS indicates that one’s goal is lower than one’s previous performance. The size of the GDS shows how high or low one sets the goal relative to one’s performance. If the GDS is always positive then the subject is having high level of aspiration and if the GDS are always negative then the subject is having low level of aspiration.

Validity and Reliability

According to Muthayya (1959) level of aspiration behaviour remains constant regardless of the means used to measure. Question of validity arises only when a behaviour is inferred indirectly from another behaviour indirectly. Here the subject is involved in actual task and the situation is realistic for him. So the question of validity is not relevant to
the study of level of aspiration. Still the investigator tried to find out the validity co-efficient with the available test of aspiration. The validity co-efficient of this test against the Level of Aspiration measure (by Bhargava and Shah) is .78.

The reliability of the test is calculated by the test retest method and the split half method. The Pearson’s Product Moment Co-efficient of Correlation between the scores of first test and the retest (after 3 months) was found to be 0.86. In split half method the investigator correlated the scores of first half with the second half and the 'r' was found to be .83. These psychometric properties of the test show that it is a valid and reliable tool for measuring the level of aspiration.

I) ACHIEVEMENT TEST IN SOCIAL SCIENCE FOR STANDARD IX

This is a test constructed and standardised by the investigator. It is intended to measure Social Science Achievement of Pupils Studying in IXth Standard. The Social Science Curriculum includes History, Geography, Economics and Civics. The test was prepared in accordance with the scientific procedures for preparing an achievement test as suggested by Ebel (1972). The construction and standardisation of the test is described under the following heads:

- Planning of the test
- Preparation of the test
- Try-out of the test
- Finalisation of the test
Planning the test

The test is meant for the students of IX\textsuperscript{th} standard in the schools of Kerala. It is prepared for measuring achievement based on the taxonomy of educational objectives of the cognitive domain. The objectives included in the test were knowledge comprehension and application of the cognitive domain. A careful analysis of the objectives and content was done by the investigator. The content area covered by the test is the new syllabus of social studies text books of IX standards of Kerala.

Preparation of the Test Items

Blooms Taxonomy of Educational Objectives (Bloom, 1979) is followed for the test item construction. The construction of test items involves content outline, objective outline, difficulty level of questions and preparation of blue-prints.

Weightage to objectives

The investigator decided to follow Bloom’s Taxonomy of Educational Objectives for the item construction in the achievement test in social studies. The objectives included in the test were knowledge, comprehension and application of cognitive domain. The weightage assigned to the objectives is given in Table 3.7.
TABLE 3.7

Weightage to Instructional Objectives

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<tr>
<th>Sl. No.</th>
<th>Objectives</th>
<th>Marks</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Knowledge</td>
<td>10</td>
<td>20</td>
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<td>2</td>
<td>Understanding</td>
<td>20</td>
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</tr>
<tr>
<td>3</td>
<td>Application</td>
<td>7</td>
<td>14</td>
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<td>4</td>
<td>Analysis</td>
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<td>12</td>
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<td>5</td>
<td>Synthesis</td>
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<td>10</td>
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<td>6</td>
<td>Evaluation</td>
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<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Weightage to Content areas

The investigator consulted his supervising teacher and subject experts to make a content outline and prepared an outline of content area that should be covered for the test. The weightage was given to the topics in History, Geography, Economics and Civics. The sources used for the item construction are the social studies text books of standard IX of Kerala. Weightage to content was decided in consultation with experts in the field, teachers who deal with social studies in IXth standards. The weightage assigned to content is given in table 3.8.
Methodology

TABLE 3.8

Weightage to Content

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Content Area</th>
<th>Marks</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>1</td>
<td>History</td>
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<td>32</td>
</tr>
<tr>
<td>2</td>
<td>Civics</td>
<td>13</td>
<td>26</td>
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<tr>
<td>3</td>
<td>Geography</td>
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<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Economics</td>
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<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Weightage to difficulty level

Each question must have a capacity to differentiate bright pupils from below and average pupils. So it was decided that the test should include easy items, moderate difficult items and difficult items. The weightage to difficulty level is presented in the table 3.9.

TABLE 3.9

Weightage to Difficulty level

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Level of difficulty</th>
<th>Marks</th>
<th>Percentage</th>
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<tbody>
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<td>Easy</td>
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<td>Average</td>
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<td>Difficult</td>
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<tr>
<td></td>
<td>Total</td>
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<td>100</td>
</tr>
</tbody>
</table>
Weightage to form of questions

Considering the merits of the multiple choice questions over other forms of questions the investigator decided to include multiple choice questions only in the test.

Blue Print Preparation

Blue print for a test is a three-dimensional chart indicating the distribution of questions objective-wise, content-wise and form-wise. A blue print of the test was prepared in accordance with the above design and is presented in the table 3.10.
<table>
<thead>
<tr>
<th>Content</th>
<th>Knowledge</th>
<th>Understanding</th>
<th>Application</th>
<th>Analysis</th>
<th>Synthesis</th>
<th>Evaluation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>Form of questions</td>
<td>Objective type</td>
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<td>Objective type</td>
<td>Objective type</td>
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<td>1 (1)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>1 (1)</td>
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</tr>
<tr>
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<td>6 (6)</td>
<td>2 (2)</td>
<td>2 (2)</td>
<td>2 (2)</td>
<td>1 (1)</td>
<td>16</td>
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<tr>
<td>Geography</td>
<td>2 (2)</td>
<td>6 (6)</td>
<td>2 (2)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td></td>
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</tr>
<tr>
<td>Economics</td>
<td>2 (2)</td>
<td>3 (3)</td>
<td>2 (2)</td>
<td>2 (2)</td>
<td>1 (1)</td>
<td>1 (1)</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>10 (10)</td>
<td>20 (20)</td>
<td>7 (7)</td>
<td>6 (6)</td>
<td>5 (5)</td>
<td>2 (2)</td>
<td>50</td>
</tr>
</tbody>
</table>

The number inside the brackets shows the number of questions
Item writing

The items are so written that they are consistent with the educational objectives as laid down by Bloom. The source used for item writing were:

1. Social Science text books of Standard IX of Kerala 2000
2. A sample unit test in History (NCERT 1978)

According to the blueprint the investigator initially prepared 70 multiple choice items with four distracters in order to get reliable and valid items for the final test. After expert criticism and discussion with the teachers of secondary schools and college of teacher education 50 items were selected.

Try out of the test

The draft test was tried out on a sample of 400 students studying in standard IX selected randomly and covering adequate sub samples. The investigator contacted the heads and students of the school and informed the need of the study in advance. Each student was given the test booklet and the response sheet and necessary instructions. After the prescribed time limit the answer sheets and test booklets were collected and scored with the help of the previously prepared scoring key.
**Item analysis**

It is possible to find out through item analysis whether an item was too easy or too difficult, to what extent it was able to discriminate between high and low achievers and the effectiveness with which the different distracters functioned. Item analysis was done by the procedure suggested by Ebel and Frisbie (1991). The scored answer sheets which are complete and perfect were arranged from the highest score to the lowest score to get two extreme groups. Two extreme groups were separated from the sample of 370. From this, upper 100 (27% of the total sample) answer sheets having the highest scores and lower 100 answer sheets having the lowest scores were selected. The middle 170 papers were discarded from the analysis.

**Difficulty index or facility index**

The difficulty level of a test item is indicated by the percentage of students who answer the item correctly. The following formula can be used to estimate the difficulty index of an item.

\[
D.I. = \frac{U + L}{2N}
\]

(Ebel and Frisbie, 1991)

Where

- \(U\) = Number of right responses in the upper group.
- \(L\) = Number of right responses in the lower group
- \(N\) = Number of students in any of the groups.
It is clear that if more students answer an item correctly, the quotient showing the difficulty level will be larger, but the item is then easy. In other words, larger the index, easier the item and smaller the index more difficult the item.

**Discriminating Power**

The discriminating power of a test item refers to its ability to discriminate between the high and the low achievers. The discriminating power was found by using the formula:

\[
D.P. = \frac{U - L}{N} \tag{Ebel and Frisbie, 1991}
\]

Where

\(U\) = number of right responses in the upper group.

\(L\) = number of right responses in the lower group

\(N\) = Number of students in any of the groups.

The difference between the correct responses in the two groups will be an indication of how far it can discriminate the two groups. Larger the difference, more is the power to discriminate. The details of the item analysis is given in Table 3.11.
TABLE 3.11

Date and Results of Item Analysis of the Achievement Test in Social Science for Standard IX

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>U</th>
<th>L</th>
<th>DI</th>
<th>DP</th>
<th>Item selected</th>
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</thead>
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### Methodology

<table>
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<td>44</td>
<td>50</td>
<td>Selected</td>
</tr>
<tr>
<td>51</td>
<td>40</td>
<td>20</td>
<td>.360</td>
<td>.20</td>
<td>Not selected</td>
</tr>
<tr>
<td>52</td>
<td>36</td>
<td>14</td>
<td>.25</td>
<td>.22</td>
<td>Not selected</td>
</tr>
<tr>
<td>53</td>
<td>69</td>
<td>13</td>
<td>41</td>
<td>56</td>
<td>Selected</td>
</tr>
<tr>
<td>54</td>
<td>68</td>
<td>20</td>
<td>44</td>
<td>48</td>
<td>Selected</td>
</tr>
<tr>
<td>55</td>
<td>70</td>
<td>14</td>
<td>42</td>
<td>56</td>
<td>Selected</td>
</tr>
<tr>
<td>56</td>
<td>30</td>
<td>16</td>
<td>.23</td>
<td>14</td>
<td>Not selected</td>
</tr>
<tr>
<td>57</td>
<td>71</td>
<td>15</td>
<td>43</td>
<td>56</td>
<td>Selected</td>
</tr>
<tr>
<td>58</td>
<td>67</td>
<td>15</td>
<td>41</td>
<td>52</td>
<td>Selected</td>
</tr>
<tr>
<td>59</td>
<td>42</td>
<td>18</td>
<td>30</td>
<td>24</td>
<td>Selected</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>20</td>
<td>43</td>
<td>46</td>
<td>Not selected</td>
</tr>
</tbody>
</table>

Selection of items for the final test

On the basis of difficulty index and discriminating power, the items were selected for the final test. The items with difficulty index between
0.4 and 0.6 and discriminating power 0.4 and above is considered to be ideal. In the present study the investigator selected those items coming within the range between 0.4 and 0.51 difficulty level and those items having a discriminating power of 0.4 and above.

After rating the items applying the principle of item analysis the best ones that satisfy the blueprint of the final test are to be selected. The items were arranged in the order of difficulty and added necessary instructions.

**Validity**

The investigator made a thorough analysis of the syllabus for standard IX with the help of text books and subject experts. By the critical analysis of the content and objectives and by the preparation of blueprint, content validity was ensured. By item analysis each item in a test also is got validated. The criterion related validity of the test was established by correlating the test scores with the marks of the quarterly examination as an external criterion. The validity coefficients was calculated by Pearson's Product Moment Method and has got a high validity ($r = 0.88$, $N = 100$) when calculated on a sample of 100 students.

**Reliability**

The reliability of the test was determined by using the test-retest method and split-half method. Test-retest reliability was found out by the correlation between the scores obtained by 100 pupils in the final test and
retest after fifteen days. The Pearson’s product moment coefficient of correlation between these two set of scores was found to be 0.86.

In split half method the test scores was divided into two halves by the odd even method and the correlation was found for these half tests. The product moment correlation was found to be 0.84. The reliability of the whole test was estimated by using the Spearman-Brown Prophecy formula.

\[ r_{11} = \frac{2r_{11}^1}{1 + r_{11}^1} \]

Where

\( r_{11}^1 = \) correlation of the half test

\( r_{11} = \) correlation coefficient of the whole test

The reliability of the whole test was found to be 0.91

\[ r_{11} = \frac{2 \times 0.84}{1 + 0.84} = \frac{1.68}{1.84} = 0.91 \]

The validity and reliability values show that the test is highly valid and reliable for measuring the achievement in social science. The final test, its response sheet and the scoring key are given in Appendix.
3.4.3. SAMPLE

The sample for the present investigation has been selected using stratified random sampling method (Kothari, 1994) by giving due representation to Sex (Boys/Girls), Locale (Rural and Urban). Good (1973) defines a sample as finite number of observations or cases, selected from all cases in a particular universe, often assumed to be representative of the total group or universe of which it is a part.

Sampling technique

Stratified random sampling technique was used to select the sample for the study. According to Guilford and Frechter (1973) stratification is a step in the direction of experimental control. This is applicable when the population is composed of different strata. The widely accepted and popular procedure for stratification recommended for use by Indian Social Science Researchers was adopted for this purpose. Here the selection of the samples was made in such a way that each stratum will be duly represented. The investigator selected students of IX for the study since this level can be taken as representative of the secondary school students by giving due consideration to the following factors.

Factors considered in selecting the samples

a. Sex

The number of boys and girls was determined on the basis of the proportion of the two categories in the total sample selected. The number
of boys and girls in secondary schools in Kerala is almost equal (5th all India Educational Survey 1992). So the investigator decided to give equal importance to both boys and girls and selected 400 boys and 400 girls.

b. Locale

It is a matter of common knowledge that urban schools attain greater instructional efficiency as compared with rural schools. Performance in Common Examination very often points to this trend. It was decided to draw sample from rural schools and urban schools. Those schools located in the jurisdiction of Panchayat are considered as rural schools and those under municipal or Corporation jurisdiction are urban. The number of rural and urban schools was selected in the ratio of 3:2. For the present study 6 rural and 4 urban schools were selected. The investigator decided to select 480 rural subjects and 320 urban subjects as samples.

c. Management of Schools

The existing schools in Kerala fall in two broad categories according to the agency which runs the schools. Certain schools are run by the Government directly through the State Department of Education while others are run by private agencies. The number of Government and private schools was selected in the ratio of 2:3 so it was decided to select 4 Govt. and 6 private schools.

Size of the Sample
The size of the sample is an important factor to be considered. Regarding the size of the sample, sample should be large enough to reduce to the magnitude of sampling error within admissible limits (Best & Kahn, 1992). So the investigator fixed 900 as the sample size in order to get sufficient number of cases for the sub groups for the different types of analysis.

The investigator initially selected 900 samples. The details of the initial break-up of samples are given in table 3.12

**TABLE 3.12**

**Break up of the Initial sample (N=900)**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Locale</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural</td>
<td>Urban</td>
</tr>
<tr>
<td>Boys</td>
<td>270</td>
<td>180</td>
</tr>
<tr>
<td>Girls</td>
<td>270</td>
<td>180</td>
</tr>
<tr>
<td>Total</td>
<td>540</td>
<td>360</td>
</tr>
</tbody>
</table>

The details regarding the schools and the number of sample selected from each school and the break up of the final sample are given in table 3.13 and 3.14 respectively.
### TABLE 3.13

The details of the schools and number of students selected for the sample

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of school</th>
<th>Locale</th>
<th>Type Girls/Boys/Co/edn.</th>
<th>Type of management (Govt./private)</th>
<th>Number of Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Govt. Ganapath Girls Higher Secondary School, Calicut</td>
<td>Urban</td>
<td>Boys</td>
<td>Govt.</td>
<td>78</td>
<td>-</td>
<td>78</td>
</tr>
<tr>
<td>3</td>
<td>St. Joseph’s Boys Higher Secondary School, Calicut</td>
<td>Urban</td>
<td>Boys</td>
<td>Private</td>
<td>82</td>
<td>-</td>
<td>82</td>
</tr>
<tr>
<td>4</td>
<td>Govt. Model Higher Secondary School for Boys, Calicut</td>
<td>Urban</td>
<td>Boys</td>
<td>Govt.</td>
<td>-</td>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td>5</td>
<td>N.N.M. Higher Secondary School, Chelembra</td>
<td>Rural</td>
<td>co-edn.</td>
<td>Private</td>
<td>40</td>
<td>25</td>
<td>65</td>
</tr>
<tr>
<td>6</td>
<td>Govt. Model Higher Secondary School, Calicut University Campus</td>
<td>Rural</td>
<td>Co-edn.</td>
<td>Govt.</td>
<td>34</td>
<td>47</td>
<td>81</td>
</tr>
<tr>
<td>7</td>
<td>M.V. Higher Secondary School, Ariyalloor</td>
<td>Rural</td>
<td>co-edn.</td>
<td>Private</td>
<td>24</td>
<td>52</td>
<td>76</td>
</tr>
<tr>
<td>8</td>
<td>C.M. Higher Secondary School, Mannoor</td>
<td>Rural</td>
<td>Co.edn.</td>
<td>Private</td>
<td>47</td>
<td>40</td>
<td>87</td>
</tr>
<tr>
<td>9</td>
<td>C.B.H.S. Vallikkunnu</td>
<td>Rural</td>
<td>Co-edn.</td>
<td>Private</td>
<td>40</td>
<td>36</td>
<td>76</td>
</tr>
<tr>
<td>10</td>
<td>G.G.V.H.S.S. Feroke</td>
<td>Rural</td>
<td>Co-edn.</td>
<td>Govt.</td>
<td>55</td>
<td>40</td>
<td>95</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>400</td>
<td>400</td>
<td>800</td>
</tr>
</tbody>
</table>
### TABLE 3.14

**Break up of the final sample (N=800)**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Locale</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural</td>
<td>Urban</td>
</tr>
<tr>
<td>Boys</td>
<td>240</td>
<td>160</td>
</tr>
<tr>
<td>Girls</td>
<td>240</td>
<td>160</td>
</tr>
<tr>
<td>Total</td>
<td>480</td>
<td>320</td>
</tr>
</tbody>
</table>

### 3.4.4. ADMINISTRATION OF THE TESTS

The investigator made necessary arrangements for the administration of the various tests after obtaining the permission of the heads of the schools. In administering the tests uniform procedures were followed throughout the selected schools. Test tools with separate score sheets were supplied to the subjects. The investigator demonstrated the method of answering each question. Nine tests were administered on the students in group situation. The subjects were given assurance about the secrecy of the response.

### 3.4.5. SCORING AND CONSOLIDATION OF DATA

After the data collection response sheets were scrutinized and ensure the completeness of the data. In complete response sheets were rejected and response sheets which were complete in all respects were retained. The separate scoring keys were used. Scoring of the test was
done as described earlier in this chapter. All the relevant data were consolidated and classified for the purpose of data. Rejection of the incomplete response sheet resulted in a reduction of the size of the sample from 900 to 800.

3.4.6. STATISTICAL TECHNIQUES USED

The statistical techniques used for the present study cover both descriptive and inferential statistics. All the statistical computations were done with the help of a computer.

A) Preliminary statistical analysis

Descriptive statistics are those which can be used to describe the numerical properties of population. The descriptive statistics computed for the study are mean, median, mode, standard deviation, skewness and kurtosis.

B) Major statistical techniques

1. One-way analysis of variance (Best and Kahn 1992)

Analysis of variance is an effective way to determine whether the means of more than two samples are too different to attribute to sampling error. The computation of analysis of variance theoretically warrants that some basic assumptions underlying the use and interpretation of analysis of variance according to Wiersma (1986) are:

1. Measurement of dependent variable is on at least an interval scale.
Methodology

2. The scores on the dependent or criterion variable are selected from a population that is normally distributed.

3. When two or more populations are being studied they have homogeneous variance.

4. The observations or scores are independent which means that the scores of one individual is not influenced by the score of any other.

The analysis of variance consists of the following steps.

1. To find out the total sum of squares by using the formula

   \[ SS_t = \frac{\sum X^2}{n_1} - \frac{\left(\sum X\right)^2}{n_2} \]

2. To find out between group sum of squares (SS_b) by using the formula

   \[ SS_b = \frac{\left(\sum X_1\right)^2}{n_1} + \frac{\left(\sum X_2\right)^2}{n_2} + \ldots + \frac{(\sum X)^2}{N} \]

3. To find out within group of squares (SS_w) by using the formula

   \[ SS_w = SS_t - SS_b \]

4. To find out the mean squares within (MS_b) by using the formula

   \[ MS_b = \frac{SS_b}{df_{(b)}} \]

5. To find out mean squares within (MS_w) by using the formula

   \[ MS_w = \frac{MS_w}{df_w} \]
6. To find out F-ratio by using the formula

\[ F = \frac{MS_b}{MS_w} \]

If the obtained value of \( F \) is higher than the tabled value of \( F \), the difference in the group means is said to be significant for a particular level of significance and for \((K - 1, N - K)\) degrees of freedom.

2. Scheffe’s Test of multiple Comparison (Ferguson 1976)

Scheffe test is used as a post hoc comparisons between the pairs of different levels of independent variables if the main effect of an independent variable on a dependent variable is significant. The procedure of Scheffe test is as follows.

Step 1. Calculate F-ratio between the pairs of means by using the within group variance estimate

Step 2. Consult a table of \( F \) and obtain the value of \( F \) required for significance at 0.05 level for \( df_1 = K - 1 \) and \( df_2 = N - K \).

Step 3. Calculate \( F' \) where \( F' = (K - 1) F \)

Step 4. Compare the value of \( F \) and \( F' \)

For any difference to be significant at the required level, \( F \) must be greater than or equal to \( F' \)

Co-efficient of correlation between the scores of the different variables is found out by using the Pearson’s Product Moment Coefficient of Correlation. The Co-efficient of correlation is the index indicting the extent of the relation between two variables of which one may be the dependent and the other independent. The formula for computation of coefficient of correlation is

\[ r = \frac{N \Sigma XY - \Sigma X \cdot \Sigma Y}{\sqrt{[N \Sigma X^2 - (\Sigma X)^2][N \Sigma Y^2 - (\Sigma Y)^2]}} \]

Where

\( \Sigma X \) = Sum of the X scores
\( \Sigma Y \) = Sum of the Y scores
\( \Sigma X^2 \) = sum of the squared X scores
\( \Sigma Y^2 \) = sum of the squared Y scores
\( \Sigma XY \) = sum of the products of paired X and Y scores and
\( X \) = Number of paired scores.

Assumptions underlying the uses of ‘r’

1. The distribution of the scores on the dependent variable should be normal or at least not badly skewed. This can be determined by
studying the distribution graphically or by calculating measures of skewness and kurtosis.

2. The relationship between the two variables is to be rectilinear. As a rule this can be determined by inspecting the scatter diagram.

3. The condition of equal scattering (Homoscedasticity) should be satisfied. Homoscedasticity means that the dispersion should be the same for each row and column in correlation table. Guilford (1956) asserts that this condition will prevail generally when the two distributions are fairly symmetrically within themselves.

4. Test of Significance of the Correlation (Best and Kahn 1992)

   The significance of ‘r’ was tested by making use of the ‘t’ distribution developed by R.A. Fisher. When the population \( r = 0 \), a parameter ‘t’ can be estimated by the formula:

   \[
   t = \frac{r \sqrt{N - 2}}{\sqrt{1 - r^2}}
   \]

   Where

   \( t \) = critical ratio

   \( r \) = coefficient of correlation

   \( N \) = sample size

   \( N - 2 \) = Degrees of freedom
If the critical ratio obtained equals or exceeds the tabled value of ‘t’ for \((N - 2)\) degree of freedom for a particular level of significance, the computed value of ‘r’ is significant.

5. Confidence Interval of ‘r’

The confidence interval of ‘r’ 0.05 level and 0.01 level is calculated using the formula \(r \pm 1.96 \text{SE}_r\) and \(r \pm 2.58 \text{SE}_r\) respectively.

\[
\text{Where } \text{SE}_r = \frac{1 - r^2}{\sqrt{N - 1}}
\]

When we have a large sample (N is 30 or greater) and the value of ‘r’ is too high or too low, the ‘r’ value is converted into Z function for testing the significance of a given value of ‘r’ (Garrett 1979). After conversion of r’s into Z’s, the standard error of Z is calculated using the formula:

\[
\text{SE}_r = \frac{1 - r^2}{\sqrt{N - 1}}
\]

Where N = size of the sample.

Subsequently confidence interval at 5 per cent and 1 per cent level of confidence are found out by using the formula \(Z \pm 1.96 \text{SE}_z\) and \(Z \pm 2.58 \text{SE}_z\) respectively. The values are again converted into ‘r’ function
with the help of the conversion table in order to obtain the true limit of population ‘r’.

6. Verbal interpretation of ‘r’ (Garrett 1981)

Co-efficients of correlation were interpreted verbally by using the following classification suggested by Garrett.

‘r’ from 0.00 ± 0.20 denotes indifferent or negligible relationship

‘r’ from 0.20 ± 0.40 denotes low correlation present but slight

‘r’ from 0.40 ± 0.70 denotes substantial or marked relationship

‘r’ from 0.70 ± 1.20 denotes high to very high relationship

‘r’ from 0.00 ± 0.20 denotes indifferent or negligible relationship

‘r’ from 0.00 ± 0.20 denotes indifferent or negligible relationship

7. Shared variance

A correlation coefficient really implies the presence of a common factor that causes a common variance. The common factor variance is the variance shared by two or more variables. If coefficient of correlation has been calculated, then the common factor variance is the coefficient of correlation squared ($r^2$). It may also be expressed as percentage overlap ($r^2 \times 100$). The percentage overlap was worked out for the different ‘r’ values using the formula $r^2 \times 100$ where $r = \text{coefficient of correlation}$. A high percentage overlap indicates a high relationship between the
variables and conversely a low percentage indicates low relationship between variables.

8. Step wise Regression Analysis

This is a statistical technique to select the set of variables that best predicts the criterion variable and that eliminates superfluous predictor variables. This is a statistical device used for analysing the collective and separate contributions of two or more independent variables (Xi) to the variation of a dependent variable (Y). It helps to predict a criterion or dependent variable from a set of predictor or a independent variables (Tacq 1997).

In regression analysis the predictor variables are entered one by one on the basis of the size of the zero order correlation to find out the influence of each variable in predicting the criterion variable. First the predictor variable having the highest correlation. With the criterion variable is entered and then calculate the measures like F, R, R² adjusted R² Beta weight, partial regression coefficient β and significance of ‘t’ etc. Then the variable having the next highest partial correlation is entered second and so on. Proceeding like this a stage may come that further entering of predictor variables wont make significant change either in the percentage variance or in R. It is an indication that the variable entered last and the remaining variables are not significant predictors of the criterion variable.
Using the F value obtained it is possible to check whether the regression (predictor variable entered) is significant or not. If the F value exceeds the tabled value of F for a particular level of significance for appropriate degree of freedom, the regressor is significant. It is possible to prepare the equation to the regression line using these quantities.

In step II the predictor variable having the next largest correlation is entered. If the percentage variance contributed by the two variables is considerably higher than the percentage variance contributed by the first variable, then it can be assumed that the second variable entered is also a significant predictor. Then the equation to the regression line and R can be calculated from the regression weights computed. If the R also has increased considerably from the previous R, this is an evidence that the predictor variable second entered is also significant in predicting the criterion variable.

**Model of step-wise regression analysis**

<table>
<thead>
<tr>
<th>Variable entered</th>
<th>SE&lt;sub&gt;R&lt;/sub&gt; = B = SE&lt;sub&gt;B&lt;/sub&gt; =</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple R</td>
<td></td>
</tr>
<tr>
<td>Percentage variance</td>
<td>Beta =</td>
</tr>
<tr>
<td>Source</td>
<td>DF</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td></td>
</tr>
</tbody>
</table>
9. **The Co-efficient of determination $R^2$ (Garrett, 1981)**

The co-efficient of determination $R^2$ in terms of $\beta$ and $r$ which gives the efficacy of each predictor variable in predicting the criterion variable is calculated using the formula.

$$R^2_1 (2, 3, \ldots, n) = \beta 12.34 \ldots n r_{12} + $$
$$= \beta 13.24 \ldots n r_{13} + $$
$$= \beta 14.23 \ldots n r_{14} + $$
$$\ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots $$
$$+ \beta l_{n,23} \ldots (n - 1) n r_{1n}$$

Where 1 stands for the criterion variable and 2, 3, ..., for the significant predictor variables as found by regression analysis. The product of $\beta$ and $r$ is used the index of the predictive efficiency.

**Summary of methodology**

The methodology adopted in the present study is summarised in the following Flow Chart for clarity and easy understanding.
SUMMARY OF METHODOLOGY

VARIABLES

Independent

1. Achievement Motivation
2. Intelligence
3. Self Concept
4. Study habits
5. Examination Anxiety
6. Family Income Level
7. Family Occupation Level
8. Family Education Level

Dependent

9. Socio Economic Status
10. Family Acceptance of Education
11. Family Cultural Level
12. Family Environmental Index
13. Socio familial Adjustment
14. Level of Aspiration
15. Achievement in Social Science

TOOLS

Adminstration of Test and Data Collection

Scoring and Consolidation

Data Analysis

One way ANOVA
Schaffe' Test
Correlation Analysis
Stepwise regression Analysis
Co-efficient of Determination

Results and Interpretation