CHAPTER IV

METHODOLOGY

- The design of the study
- Statement of the problem
- Major Variables of the study
- Tools used for collection of data
- Sample for the study
- Administration of the final test
- Methods used for classifying the sample
- Statistical techniques used for data analysis
This chapter describes the methodology adopted in this study. It provides a description of the research design, with details regarding the selection of variables, hypotheses and objectives of the study, description of sample, description of tools used, mode of data collection, statistical techniques used for analyzing the data and summary of the related operational procedure adopted for the study.

4.1 The design of the study

The research design stands for the detailed plan adopted for an investigation. The selection of the research design has to be obviously based upon the purpose of investigation, types of variables used in the study, methods used for manipulating the variables and practical constraints under which the research is to be conducted.

One of the most commonly used methods for studying educational problems of the kind used here is what is called the "Normative Survey". This method involves comparison, measurement, classification, evaluation and generalization—all directed towards a proper understanding and solution of significant educational problems. The investigator decided to use normative survey for the present
investigation, considering the special nature of the problem under investigation and the methodology intended to be used for the study.

4.2 **Statement of the problem**

The title of the study is “A Survey of Vocational Information of Higher Secondary Students of Kerala.”

4.3 **Major Variables of the study**

The variables of the study, categorized into independent and dependent variables, are given below:

(a) **Dependent Variables**

The study has been conceived with a single-dependent variable - vocational information of higher secondary students in relation to three major vocational areas, viz., medicine, agriculture and engineering.

(b) **Independent Variables**

The independent variables of the study are:

- Intelligence level of subjects
- Prior Achievement in School Science of subjects
- Gender of subjects (boy/girl)
- Socio-Economic Status of subjects
- Locale (Urban/Rural Residence) of subjects

4.4 **Tools used for collection of data**

The data needed for the present study were collected using the following tools:
4.4.1 Vocational Information Inventory

(tool standardized by the investigator)

4.4.2 The Kerala University Group Test of Intelligence For Adults

(tool standardized by Nair and Amma)

4.4.3 The Kerala Socio-Economic Status Scale

(tool developed by Nair)

4.4.4 General Data Sheet

(tool developed by Nair)

4.4.1 Vocational Information Inventory

The tool for measuring 'Vocational Information' was developed by the investigator. This tool, the Vocational Information Inventory (for higher secondary school students), was developed using the scientific construct of 'vocational information', as used in modern educational literature. The tool was developed and standardized by the investigator using accepted scientific principles.

The draft form of the inventory comprised 150 question statements finally reduced to 48 after item analysis. The respondents had to choose one of the four given alternatives as the correct answer to a statement. The questions related to the three vocational areas for which the inventory was developed, viz, medicine, agriculture and engineering. Equal representation has been given to vocational information relating to each of the three above vocational areas in the final scale; 16 items were included for each vocational area. Vocational information of subjects was assessed by summing the scores in each of the three vocational areas by giving equal weightage to each component. Specimen items used for measuring vocational information in each of the component areas, are given below:
Medicine
1. The specialist who diagnoses and treats children's diseases is called by the name
   (a) Ophthalmologist
   (b) Gastroenterologist
   (c) Pediatrician
   (e) Dermatologist
   Correct answer: (c)

Agriculture
2. The course in Farm Power and Machinery is offered in Kerala in
   (a) College of Agriculture, Vellayani
   (b) College of Horticulture, Vellanikkara
   (c) Kelappaji College of Agriculture Engineering and Technology, Thavannoor.
   d) College of Forestry, Vellanikkara
   Correct answer: (c)

Engineering
3. The branch of engineering, which deals with the design and development of machinery related to ships is called
   (a) Instrumentation Engineering
   (b) Marine Engineering
   (c) Industrial Engineering
   (d) Mechanical Engineering
   Correct answer: (b)
The test was developed and standardized using accepted psychometric procedures for test development.

The following steps were adopted in the construction and standardization of the tool.

4.4.1.1 Operationalizing the construct of ‘vocational information’

This is probably the most important step in test development. The investigator was required to define the meaning of ‘vocational information’ in terms of test items. This needed the investigator to define operationally the concept of vocational information, which would help the investigator to obtain behavioural evidence from an individual whether he is in possession of the construct called ‘vocational information.’

Vocational information in the present educational context was interpreted to stand for all the representative evidence (information) on which one can make his vocational choices. The selection has to be made with a full knowledge of all relevant information-example qualifications or eligibility to get entry into specified course and, other information relating to the profession, like the initial salary to be expected during entry, promotional possibilities once a person enters a job in the selected vocation, social prestige attached to a job, etc. It is difficult to get a dependable picture of all the background information unless a student makes a focused study of the vocational scenario all on his own or with specialized assistance to be possessed by a higher secondary student. The information should be such as would enable him to make a meaningful and practical choice of a vocation, prepare for it
through proper forms of earlier schooling, enter institutions which provide the selected vocational education and qualify for entry into a vocation, at a specified level, with a full understanding of his own mental potential and aptitudinal dispositions, for achieving success in that vocation. In other words, vocational information stands for all relevant information regarding jobs in the three select areas in this case, like an understanding of the educational qualifications to be acquired for entering such jobs, identifying institutions where such qualifications are offered, the types of courses offered by them, duration of such courses, financial requirements to complete the courses, procedures used for selection to such courses etc. One should make vocational choices with a full knowledge of the qualifications or eligibility to get entry into specified courses and other information like salary and promotional possibilities once a person enters a job, in a specified vocation. It is difficult to get a dependable picture of all the background information unless a student makes a focussed study of the vocational scenario all on his own or with specialized assistance.

The above definition in terms of the behaviour evidences, was used for developing the test of vocational information. All items were of the objective type.

4.4.1.2 Preparation of the draft test

A preliminary pool of test items was prepared to cover the diverse forms of information which a student is expected to possess relating to the three vocations selected for investigation--medicinje, agriculture and engineering. Within each profession, information relating to specialised aspects relating the vocations were converted into questions of the type given earlier.
aspects relating the vocations were converted into questions of the type given earlier.

The statements in the tool (Vocational Information Inventory) were selected by consulting a large number of experts professionals, guidance specialists, experts in research and psychometry, and administrators working in each of the three major professions selected for study. The statements were either prepared by the consultants or by the investigator on the basis of expert suggestions. The investigator frequently consulted experts working in the office of the Commissioner of Entrance Examinations and experts working in the Public Service Commission and the different University Departments of Psychology/Education in the state. From 250 items so designed, the investigator developed a preliminary test contained 150 multiple choice items relating to the three vocational areas (50 for each area) for the preliminary try-out. The items were re-edited and refined with expert help, a number of times before the preliminary tryout.

4.4.1.3 Preliminary administration of the test

For tryout, the test was administered to a representative group of higher secondary students belonging to the representative Higher Secondary Schools of Thrissur District of Kerala. Eight class divisions (standard XI and XII) were selected at random from the eight representative schools selected for preliminary testing. The final coverage was fixed around 400-480 since each division had a strength of around 50-60. Tests were confined to students who offered four science areas viz, mathematics, physics, chemistry and biology/computer science.
After rejecting incomplete entries, etc, 398 subjects were available for item selection. The draft test of vocational information comprising 150 multiple choice items (model given as Appendix I) was administered on the group and data relating to 398 students were used for the item selection.

Appropriate instructions were given prior to the administration of the test, to ensure that the objectives of test-taking were clear to all. The responses were marked by the students in the separate response sheets, as instructed. The test was administered under ideal conditions with enough time given for answering the whole test. The draft test was administered in three test sessions of 45 minutes duration. The average time used by the students to complete the test was noted. This was used for estimating the average time taken by students to complete one item which was used for assigning time limit for the final test.

4.4.1.4 Scoring

The investigator prepared a punched scoring key for the test. The scoring scheme of the test was one score for each correct answer and a zero score for every incorrect answer. Incomplete answer sheets, which evince careless modes of answering, score sheets containing many corrections, erasures etc, were rejected from final analysis. A further random rejection was again made to yield 370 response sheets for final analysis.

4.4.1.5 Item analysis

This process of establishing the suitability of an item for inclusion in the final test, was done using the performance of subjects in
the 370 answer sheets selected for item analysis. The number 370 was selected following the standard practice of selecting 27% from the top and bottom, for comparison. This procedure yielded 100 answer sheets from each of the two groups. Answer sheets of 100 high performers and 100 low performers were separated and used for comparison. The performance of the two groups for each item was examined and used as the method for selecting ideal items for the final test.

It is known that ideal levels of validity and reliability for each item will be available when the top and the bottom 27% are used as extreme groups for item selection. The present test being an ability test, the items have to be selected using two different indices—discriminating power and difficulty level. The quality of each item was ascertained by estimating both the indices and combining these indices for item selection. Difficulty Index and the Discriminating Index were calculated using conventional procedures.

A number of psychometric procedures are available for item analysis. The investigator selected a relatively simple technique for the purpose—the procedure suggested by Ebel and Frisbie (1991).

The two indices were calculated for each items separately as follows:

(i) The total score for each answer sheet (total scores in all the three components) was entered on the answer sheet.

(ii) The answer scripts (N=370) were arranged in the descending order of the total scores.

(iii) The top 27% (100 top answer sheets) were separated and
treated as the lower group or the U-group and the bottom 27% (bottom 100 answer sheets) were treated as the lower group or the L-group.

(iv) For each item, the number getting any item correct in the upper group was noted as U, and the number getting the same item correct in the lower group was noted as L.

(v) The values of U and L were identified separately for all the 150 items.

(vi) The Index of Discriminating power and the Index of Difficulty Level were separately calculated for each item, using standard formulae cited later. This was done for all the 150 items.

(vii) The two indices were calculated using the following formulae:

\[
\text{Index of Item Difficulty} = \frac{U + L}{2N}
\]

\[
\text{Index of Discriminating Power} = \frac{U - L}{N}
\]

\[L = \text{Number of right responses in the 'lower group'}\]
\[U = \text{Number of right responses in the 'upper group'}\]
\[N = \text{Number of subjects in each sub-group (100)}\]

**4.4.1.5.1 Selection of Items for the final test**

Items to be in the final test were selected on the basis of the Index of Item Difficulty and the Index of Discriminating power for each item. The following standard principle was used: from among items with the highest discriminating index, items with average difficulty level
would be selected. Average difficulty level was defined as those with difficulty level of around 50 percent (5 as index) or values close to this. Values slightly above or below this were also selected.

From among the items which have the highest Discriminating Index, items with average Difficulty Index were selected, with special attention given to yield sufficient number of items for each component of the test—viz, items for the three vocational areas Medicine, Agriculture and Engineering. Generally Difficulty Index of a good item is considered to lie between 0.4 and 0.6 and Discriminating Power as those with indices exceeding 0.4. This meant that an item satisfying both the above criteria got selected.

The investigator finally selected 16 items from each of the three vocational areas, viz, medical, agricultural and engineering. The selected questions (48 items) were printed in the form of a booklet. Special response sheets were also printed.

The details regarding the difficulty index and discriminating power of items, final format of the inventory, response sheet, scoring key etc of the Vocational Information Inventory are given as Appendix II, Appendix III, Appendix IV and Appendix V respectively.

The final test was given a trial on a sample of 42 higher secondary students of a new school for fixing the optimum time for administration. The time limit was fixed as 50 minutes for the whole test, (48 items) presented in three sections

4.4.1.6 Validity of the Vocational Information Inventory

Validity of an instrument for measuring a concept like
‘vocational information’ is to be mainly established in terms of its ‘construct validity’. This means the focused operation of the concept of face validity, since the ‘construct validity’ itself is a sophisticated use of the concept of ‘face validity’. The investigator decided to ensure ‘construct validity’ as the method of establishing the validity of the present tool. Internal validity was ensured by selecting items which cohere— ensured through item analysis, as explained earlier.

4.4.1.6.1 Face Validity

The face validity of the final tool was ensured using the procedures already described. The help of a panel of six experts was used for preparing the items. All the six experts consulted were senior experts in guidance/psychology attached to important colleges of the state or of the state employment bureaus. All of them were involved in the task of scrutinizing the items of the test, and selecting them for inclusion in the test, in terms of covering of all intended behaviours and also in terms of the formats used for testing, including the distractions used in each item. All agreed that the inclusion of the set of items would yield a test which measures what it is expected to measure, viz, “vocational information.”

4.4.1.6.2 Construct Validity

Construct validity refers to the degree to which the test actually measures, or it is specifically related to the traits for which it was designed. In other words, it represents the degree to which the construct of “vocational information” is represented by the items of the test. It shows, how adequately the test samples the universe of knowledge and skills which represent the construct of ‘vocational information,’ in three areas sampled by the test.
4.4.1.6.3 Internal Validity

The more important component of validity to be considered in the present context is the degree to which the items cohere or go together in measuring the construct which they are presumed to measure. This has been ensured by selecting items (48 items out of the 150 items used in the pre-test) with high discriminating power as also by selecting items with optimal difficulty level.

4.4.1.7 Reliability of the test

Reliability of the test refers to the degree of consistency and accuracy with which the test measures whatever it measures. Reliability of the test was estimated by the investigator using the Test-retest Method. The same test was repeated on a sample of 44 students (of standard XII), after an interval of four weeks. The scores obtained on the two occasions were correlated using Pearson’s Product-Moment ‘r’. The following formula was used for estimating ‘r’.

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

Where, \( r \) = Coefficient of correlation between \( X \) and \( Y \)
\( \Sigma X \) = Sum of \( X \) scores (Scores obtained during the first testing)
\( \Sigma Y \) = Sum of \( Y \) scores (Scores obtained during the second testing)
\( \Sigma XY \) = Sum of the product of the corresponding paired \( X \) and \( Y \) scores
\( \Sigma X^2 \) = Sum of the squared values of the \( X \) scores
\( \Sigma Y^2 \) = Sum of the squared values of the \( Y \) scores
\( N \) = Number of paired scores (\( N = 44 \) in this case)
The value of \( r \) is the reliability coefficient, calculated using the test-retest method. This coefficient was found to be 0.8612 in this case. This is a reasonably high value of \( r \) which indicates that the two sets of scores show a high degree of agreement. It may be safely assumed that the test provides reliable measures of 'vocational information'.

It may be presumed that the inventory is a reliable instrument for measuring the vocational information of subjects. The validity and reliability coefficients when used together help us to conclude that the inventory is a reasonably dependable tool for measuring the 'vocational information' of higher secondary students.

4.4.1.8 Objectivity and Practicability of the Inventory

Two of the other characteristics for which the inventory was assessed were 'objectivity' and 'practicability'. These characteristics were automatically covered in the procedures used for assessing the tool's validity and reliability.

Objectivity was ensured by using test items of the objective type, where it is possible to know whether the mode of responding to an item in the test indicates clearly the attainment of the information sought to be measured through the item. The scoring key was used for objective scoring.

Practicability of the test was ensured through the procedures adopted. Steps were taken to ensure the practicability of the test. This was done by adopting the particular format used for testing. The booklet form used, the response sheet used for testing, timing of the test, types of
items included (objective-type items), scoring key used, other procedures used for testing etc, all helped to ensure practicability for the inventory.

4.4.2 Kerala University Group Test of Intelligence For Adults

The Kerala University Group Test of Intelligence for Adults prepared by Nair³ (1978) was used to measure the general intelligence of the subjects covered by the study. It comprises four sub-tests, all measuring of the ‘g’ factor of intelligence using differing problem formats. A brief description of the test is given below:

Description of the test

The test consists of 80 items in all, comprising of four sub-tests of 20 items each, measuring intelligence using four item formats, namely, Analogy, Classification, Number Series and Letter Matrices. Proper instruction are given for each subtest in the beginning of each sub-test. Sample items of the different sub-tests are given below:

Verbal Analogy

This test consists of three words given with a fourth word missing. The first two words are related to each other in a particular way. The same relation is to be used between third word and a fourth word to be worked out, using the principle or relationship discovered for the first two words. Four alternatives are given as answers from which a respondent has to identify the word which represents the correct answer. Two examples of the items in this sub-test are given below:
1. Book: Library:: Medicine::
   (a) Doctor (b) Hospital (c) Treatment (d) Disease
   answer: (b)

2. Confusion: Order:: War::
   (a) Guns (b) Army (c) Peace (d) Thunder
   answer: (c)

**Verbal Classification**

Each item of this test contains five words of which four can be grouped together using a certain principle while one cannot be included in the group. The respondent has to find out the word which does not belong to the group.

**Examples:**

1. (a) Iron; (b) Nail; (c) Copper; (d) Brass; (e) Silver
   answer: (b)

2. (a) Hindi; (b) Malayalam; (c) Telugu; (d) Punjabi; (e) English
   answer: (e)

**Number Series**

In this test, a set of numbers are presented in a certain order. One number in the set is missing. The student has to choose the correct number from the given four alternatives.

Examples: \( \frac{1}{2}, \frac{1}{4}, \ldots, \frac{1}{16}, \frac{1}{32} \)

   (a). \( \frac{1}{8} \); (b) \( \frac{1}{6} \); (c) \( \frac{1}{12} \); (d) \( \frac{1}{10} \)

answer: (a)
2.  68,  66,  62,  54,  38,

   (a) 32;       (b) 16;       (c) 12;       (d) 6

   answer: (d)

Letter Matrices

In this test there are nine cells arranged in three rows/three columns. Eight of these cells are filled with letters of the English alphabet. The bottom right hand cell is empty. By examining the first two rows or columns, of this arrangement, the student has to discover the principle which connects the figures in the first two rows (or the first two columns) and then use this relationship to find out the missing letter in the third row (or the third column).

1. 

<table>
<thead>
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<th></th>
<th>G</th>
<th>F</th>
<th>E</th>
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<tbody>
<tr>
<td>J</td>
<td>I</td>
<td>H</td>
<td></td>
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<tr>
<td>M</td>
<td>L</td>
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</tr>
</tbody>
</table>

(a) G; (b) I; (c) N; (d) K

   answer: (d)

2. 

<table>
<thead>
<tr>
<th></th>
<th>AC</th>
<th>BD</th>
<th>CE</th>
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</thead>
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<tr>
<td>DF</td>
<td>EG</td>
<td>FH</td>
<td></td>
</tr>
<tr>
<td>GI</td>
<td>HJ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) 1J; (b) GH; (c) IK; (d) JL

   answer: (c)

Time

A total of 30 minutes was allotted for the completion of the
whole test. Time allotment for the sub-tests are: 6 minutes for sub-test - I, 5 minutes for sub-test - II, 9 minutes for sub-test - III, 10 minutes for sub-test - IV.

**Scoring**

Scoring was done with the help of the scoring key in the form of a stencil. The total score for each sub-test was obtained by counting the number of correct responses. Each correct response was given one score while wrong responses are given a zero score.

**Reliability**

Test-retest reliability (reported in the test manual) is 0.901 while the split-half reliability is 0.94. Both are high values.

**Validity**

Validity of the test (as reported in the manual) has been studied using different methods. In one method, test scores were correlated with the scores obtained for Raven's Progressive Matrices (standard series). The correlation between the scores was 0.76. In other method the correlation coefficient between the test scores and school achievement scores were correlated; The correlation coefficient in this case was found to be 0.65. Both the scores represent high external validity for the test.

Copies of the intelligence test, response sheet and scoring key are given as Appendix VI, VII, VIII.

**4.4.3 Prior Achievement in Science (Biology, Physics, Chemistry and Mathematics**

This presented certain practical problems. The investigator
had to decide whether she should construct separate tests of achievement for the four subjects or use other common scores already available. The investigator was left with two options:

(i) Revert back to student performance in the common state-conducted examination (common S.S.L.C Examination) at the end of 10 years of schooling: the 10th Standard Examination provided scores in all the four science areas-Mathematics, Physics, Chemistry and Biology.

(ii) Construct a common achievement test in science for the four areas. The investigator decided to choose the first course—collecting the science achievement scores of pupils in the 10th Standard Examination. The investigator went to the schools selected for study (for details please see details of the sample used for study reported later in this chapter) and collected from the school registers the scores of students in the four subjects selected for study viz, Mathematics, Biology, Physics and Chemistry, in the S.S.L.C Examination. The scores were reported in school records as letter grades. These were converted into score percentages following official conventions. For example, a grade A+ is treated as having obtained a percentage between 90-100. The interval was reduced to a single score by obtaining the mid-value of the interval, viz. 95%. Similarly grades A and, B+ were treated as 85% and 75% respectively. The same procedure was adopted for other letter grades.
4.4.4 The General Data Sheet

The investigator made use of a standard form of General Data Sheet (developed by Nair\(^4\)), used in the SES scale, to collect additional demographic/biographical information about respondents, for measuring the three component variables of SES, viz, Parental Education, Parental Occupation and Parental Income, to be used for estimating the Socio Economic Scores of subjects and other demographic variables relating to the respondents.

A copy of General Data Sheet used for the study is given as Appendix IX

The General Data Sheet comprises four sections. Section I collects information about of the school, details about place of residence etc. Section II is meant for collecting information regarding the level of education of the parents, siblings and other members in the family. Section III provides information regarding the occupation of the parents and other members of the family. Section IV collects details relating to the income of family members.

A General Data Sheet was given to the sample of students to be tested in the beginning of a test session in school and the relevant entries were completed by students. Data to be collected from school records were entered later. The details which were not properly available in the school records were collected through direct questioning of the respondents during the administration of the test. The General Data Sheet helped to classify subjects on the basis of their Parental Education, Parental Occupation and Parental Income and their
total Socio-Economic scores.

4.4.5 The Kerala Socio Economic Status Scale (Revised)

The investigator used the updated version of the socio-economic status scale prepared by Nair\(^5\) (1970). The scale used three parameters defined by Kuppuswamy\(^6\) (1962) for measuring the construct of socio-economic status. The investigator revised the scoring procedure in certain areas which needed updating in consultation with the author of the scale. The socio-economic status of a student as per the scale is determined in terms of three variables, viz, education, income and the occupational level of the head of the family. Each parameter is again classified into six sub-categories for purpose of scoring. Separate scores are assigned for the three dimensions. These are added to yield a composite score for every respondent.

Educational Classification

The first parameter, viz, education is classified into six sub-categories. Classification is according to the levels of education of the parents and other family members. The levels are given below:

1. Masters Degree/Professional Degree & above
2. Bachelors’ Degree (general subjects)/equivalent
3. +2/T.T.C/I.T.I /equivalent
4. Std VIII-X /equivalent
5. Std I-VII /equivalent
6. Illiterate
The weightage given to each level of education is presented in Table 1.

**Income Classification**

The second parameter, viz., family income (the total monthly income of the head of the family) was estimated on the basis of the monthly income of a family. The whole group was divided into six categories, as per their monthly income as indicated:

1. Above Rs.24000/-
2. Between Rs.14401/- and Rs.24000/-
3. Between Rs.9601/- and Rs.14400/-
4. Between Rs.4801/- and Rs.9600/-
5. Between Rs.2401/- and Rs.4800/-
6. Below Rs.2400/-

The details of the classification scheme are presented in Table 1, weightage given to each level of income is also presented in the same table.

**Occupational Classification**

The third parameter for estimating the SES is the occupation level of the head of the family. The procedure for quantifying ‘father’s occupation level’ (occupation level of the head of the family) is given below. Parent occupation is classified into six categories indicated on Table 1, also with scores to be assigned for each level.
The categorisation was done using the classification given below:

1. **High Professionals**

   Ministers, Judges, Bank Executives, Top Managers of Important Organizations, Specialist Doctors and Engineers, Eminent Lawyers, Senior Educational Administrators, University authorities/Officials/Teachers, Head of Big Commercial/Research Organizations, Head of Government Departments, Secretaries to Government, Top Police/Military Officials, Affluent Land Owners, District Collectors, M.Ps, and other equivalent categories.

2. **Semi Professionals**


3. **Skilled Workers**

   Mechanics, Fitters, Electricians, Drivers, Photographers, Laboratory and Hospital Assistants, Carpenters, Document Writers, Clerks of Advocates, Junior Police Personnel, Small-scale Business/Workshop Owners, Junior Rank in Defence Services, Village Officers, Surveyors, Health Assistants and Other Equivalent Categories.
4. Semi - Skilled Workers

Farmers, Mechanics, Drivers, Small-Scale Merchants/Roadship Shops, Office Attenders, class IV Employees in Governments/Equivalents in Private Business/in constructs, Skilled Masons/Carpenters or equivalent professions.

5. Unskilled Workers

Coolies, Day Labourers, Watchmen, Office Attenders/Peons and Employees belonging to similar categories.

6. Unemployed

Persons without a stable job, without any special qualifications or skills, unemployed most of the time.

Computation of Socio-Economic Status (SES) of the subjects

For each component, a score was assigned to the head of the family. Each subject in the sample was assigned a socio-economic score (SES-score) by summing the separate scores, in the coponent areas, viz, education, occupation and the income. The sum of the composite score obtained for the family was treated as the Socio-Economic Status score of the individual student.

The socio-economic status score has been calculated for each subject by quantifying the data using the weightage as described in the Table. 1.
TABLE 1

WEIGHTAGE GIVEN TO DIFFERENT LEVELS OF THE THREE SOCIO-ECONOMIC PARAMETRES

<table>
<thead>
<tr>
<th>Education</th>
<th>Score</th>
<th>Occupation</th>
<th>Score</th>
<th>Income</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masters Degree/Professional Degree &amp; Above</td>
<td>10</td>
<td>High Professional</td>
<td>10</td>
<td>Above Rs. 24,000</td>
<td>10</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>8</td>
<td>Semi Professional</td>
<td>8</td>
<td>Rs. 14,401-24000</td>
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</tr>
<tr>
<td>Pre degree/T.T.C/ I.T.I</td>
<td>6</td>
<td>Skilled Workers</td>
<td>6</td>
<td>Rs. 9601-14,400</td>
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<tr>
<td>Std VIII-X</td>
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<td>Semiskilled Workers</td>
<td>4</td>
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<td>Unskilled Workers</td>
<td>2</td>
<td>Rs. 2401-4800</td>
<td>2</td>
</tr>
<tr>
<td>Illiterate</td>
<td>1</td>
<td>Unemployed</td>
<td>1</td>
<td>Below Rs. 2400</td>
<td>1</td>
</tr>
</tbody>
</table>

4.5 Sample for the study

The population for the study is obviously students of the higher secondary classes of Kerala-students attending standard XI and XII of the Kerala State school systems-specializing in science-maths areas who are eligible to apply for admission to engineering-technology courses/medical and allied medical areas/ agriculture-related courses, including fisheries and forestry. All students aspiring to join these courses are expected to take the state-level entrance examinations and qualify for entrance to the different courses. The study is an attempt to assess the vocational information of this feeder-group to find out whether they are
choosing their future careers with proper basic information about their careers or whether they choose careers based on the social prestige associated with such courses. Higher Secondary students who have taken minimum of three science subjects (including mathematics) with minimum prescribed marks (different for different vocations) are eligible for admission to the above professional courses provided they show specified levels of performance in science subjects-Physics, Chemistry, Biology and Mathematics. These considerations confined the sample for the study to higher secondary students of Kerala State offering any three of the above science subjects, including mathematics. The investigator was constrained to draw a representative sample from this group by considering the following aspects:

a. Sample size
b. Sampling design
c. Factors to be represented in the sample

Details relating to the above are presented below:

4.5.1 Sample Size and Sampling Design

The size was tentatively fixed, considering the fact whether the selected sample in itself and the sub-samples treated as independent samples would yield reliable information in respect of the variables covered by the study. The size of the sample for the study was tentatively fixed to be around 800, considering the fact that:
(a) the size of the sample and the possible sub-samples to be considered would be sufficient for giving dependable results relating to the major variables under study; and

(b) whether the size would be optimal to be covered within the time available for conducting a study of the present kind

The investigator followed the common dictum used by social researchers who are investigating problems of the present kind. The criterion suggested by Best and Kahn\(^6\) (2002) was used as a guideline. A sample size of around 720 is known to be adequate for studies like the present, dealing with social data. A tentative proportionate representation was worked out for 800 students with equal representation given to boys and girls, rural and urban subjects and for government and private institutions in the sample, and the level of school performance. There are the basic factors which are known to affect students' educational performance. The tentative break-up for the different variables is given below:

a. Gender of the subject (boy, girl)
b. Locale of the school (rural, urban)
c. Institutional management types (government, private)
d. Instructional efficiency of the institution (high, average, low)

This gave the investigator a crude indication of the number of institutions to be covered, assuming that one full science class division will have to be taken as the unit for testing, irrespective of its student strength. Calculating at the rate of sixty students per each class,
it was decided to cover 12 class divisions to be covered from twelve schools. The twelve schools were to be selected to give the expected representation to the factors intended to be covered.

The investigator was careful in selecting the sample since she knew that the dependability of her study is determined to a great extent by the appropriateness of the sample used for her study. The sample selected should exhibit all properties of the population which it is expected to represent. The investigator decided to use stratified Random Sampling Technique as described earlier, with representation given to different strata like the following:

a. Gender of the subject (boy, girl)
b. Locale of the school (rural, urban)
c. Type of institutional management (government, private)
d. Instructional efficiency of the institution (high, average, low)

The rationale for selection of each of the above strata is as follows:

a. **Gender of the subject**

The gender of the student has an important role in the selection of a sample which deals with educational outcomes/other by-products of cognitive development. This is proved by many research studies. Gender difference is reported in a wide range of cognitive abilities like intelligence, science aptitude, spatial ability different forms of school achievement, general knowledge etc. The investigator therefore decided to give equal representation to boys and girls in the sample, since dependable statistics relating
to the actual number of enrolled boys and girls in higher secondary classes for the different sub categories was not available to give proportionate representation. Ever since the starting of many new institutions under the self-financing system was adopted as a state policy, the state has discontinued publishing the latest statistics relating to total enrolment on the basis of gender differences. A full explanation for gender differences is not available in literature except that such differences are either due to hereditary factors/differing levels of social motivation/social expectations placed on the two sex groups where boys are given a more favoured treatment both at home and in the social setting in all matters relating to education.

b. Locale of the school

A very significant outcome of research studies in the area of educational outcomes relate to rural-urban differences in cognitive abilities and the educational outcomes. Most of the studies on the theme indicate that urban students have a clear advantage over their rural counterparts. Such differences are attributed to differences in the learning facilities available/higher motivation acquired by urban children due to exposure to superior educational institutions and superior educational facilities like availability of better quality teachers in urban institutions, better labs, better libraries etc. Differences are noted in the examination performance of rural and urban students in all state conducted common examinations. In the absence of dependable data for calculating the proportion to be selected from each category, the investigator decided to give equal representation to schools from each category.
A school was treated as an urban institution if it is situated in a municipality/corporation area or is in the close proximity and access to regular urban institutions like nearby railway station/bus station, which will take students to urban educational institutions or urban facilities like libraries, communications etc. A school situated in areas other than municipalities/corporations is treated as belonging to a panchayat area and is labelled as a rural school. Identification of institutions according to locale was done with the above considerations in mind.

c. Type of institutional management

There is research evidence which shows that private institutions (state supported or independent) perform much better than the state-run institutions, although remarkable exceptions are there in the case of a few select institutions in both categories. There are very superior institutions under both the state supported and non-supported institutions. This necessitates the representation of both types of institutions in the sample. Among private schools, there are two types - aided private schools and unaided private schools. Academic environment of these three types of schools are also different. This creates differences in their educational performance. Special attention was paid to the selection of both government and private institutions and also the two categories of private institutions in the sample.

d. Instructional efficiency of schools

School performance varies depending upon the efficiency of instruction which institutions provide. This is reflected as
performance the efficiency of institutions which is in turn gets projected as percentage passes in common state examinations. Efficiency in performance depends also upon the school culture/institutional culture of certain institutions have ensured a high degree of instructional efficiency, whatever be the other determining factors. This is achieved through the development of a superior instructional culture—better instructional facilities and higher teacher effectiveness. It has also been noted that better pupils are attracted to schools where the above mentioned conditions are optimally available. Higher standards of performance of pupils in certain schools is to be attributed to this characteristic viz, instructional efficiency, which is projected as institutional efficiency. A crude index for measuring instructional efficiency is the pass percentage of an institution in the common S.S.L.C Examination. The percentage result for 2004 was obtained from official records for the schools of the selected region. The sample was decided to be selected from four revenue districts—Thiruvananthapuram, Ernakulam, Thrissur and Malappuram Districts of Kerala State, to represent different levels of school efficiency. Each category was worked out from the published official statistics. The schools were classified into three based on the percentage passes in the S.S.L.C Examination of 2004 March.

The following three levels were selected for the purpose:
A - Above Average Schools - Pass percentage 80% and above
B - Average Schools - Pass percentage 40% and above but below 80%
C - Below Average Schools - Pass percentage below 40%

Schools from these three categories were drawn from four districts with equal representation given to rural and urban schools.

Selection of schools for testing

With the above stipulations in mind, institutions were selected. The total number of schools to be selected was fixed as twelve assuming that around 900 subjects will be available for study (75 x 12). The educational attainment of the various districts of Kerala is more or less the same, when each district is taken as a whole. The investigator selected four districts from north to south of Kerala as indicated below:

- Thiruvananthapuram - South
- Ernakulam - Middle
- Thrissur - Middle
- Malappuram - North

Of the schools selected, six schools were from urban areas while six schools were from rural areas, with the additional condition that from each district, equal number of schools will be selected from both rural and urban areas. From each of the four districts, three schools will be selected so that one will be above average, one will be average, and one will be below average in instructional efficiency. This yielded twelve schools in all, with four above average schools, four average schools and four below average schools.

From each school, care was taken to ensure that almost an
equal number of boys and girls got selected. Also, in selecting schools, equal number of rural and urban schools were selected. Again in selecting schools, equal number of government and private schools were selected. School efficiency level (instructional efficiency level) was ensured as described earlier. When any category was in excess of what is required to make sizes equal, the excess was rejected by random selection.

Details of the school-wise distribution of the sample are given in table 2

4.6 Administration of the final test

The investigator personally visited the schools selected and obtained the prior consent of the concerned heads. The test was conducted in each school as per a pre-fixed schedule. The investigator conducted the testing (administration of the inventory, the tests, general data sheet etc) with the help of two assistants trained for the purpose by the investigator. The investigator herself administered the tools one after the other, with the help of a few assistants, on specified dates. The sessions required about 180 minutes of testing time for each school. The General Data Sheet was administered first. This was followed by Vocational Information Inventory, followed by Intelligence Test. Different timings were fixed with the school authorities for different sessions. Normally, each school was covered in three test sessions extending for 60 minutes each. The General Data Sheet was used for collecting the needed information for calculating SES. Each class was
## TABLE 2
DETAILS OF THE SCHOOL-WISE DISTRIBUTION OF THE FINAL SAMPLES

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of the School</th>
<th>Locale</th>
<th>Nature of School</th>
<th>Type of Management</th>
<th>Efficiency Level</th>
<th>Number of Students</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Thiruvananthapuram District</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>L.M.S.H.S.S. Amaravila</td>
<td>Urban</td>
<td>Co-Educational</td>
<td>Aided</td>
<td>Above Average</td>
<td>28</td>
<td>32</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>L.M.S.H.S. Vattapara</td>
<td>Rural</td>
<td>Co-Educational</td>
<td>Aided</td>
<td>Average</td>
<td>23</td>
<td>37</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>G.H.S.S. Ayiroorppara</td>
<td>Rural</td>
<td>Co-Educational</td>
<td>Government</td>
<td>Below Average</td>
<td>25</td>
<td>35</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>II</td>
<td>Ernakulam District</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>S.N.H.S. Okkal</td>
<td>Rural</td>
<td>Co-Educational</td>
<td>Aided</td>
<td>Above Average</td>
<td>24</td>
<td>36</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>S.R.V.H.S. Ernakulam</td>
<td>Urban</td>
<td>Co-Educational</td>
<td>Government</td>
<td>Average</td>
<td>32</td>
<td>8</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>6</td>
<td>G.H.S.S. Narakkal</td>
<td>Rural</td>
<td>Co-Educational</td>
<td>Government</td>
<td>Below Average</td>
<td>31</td>
<td>29</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>II</td>
<td>Thirissur District</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Vivekodayam Boy’s H.S.S.</td>
<td>Urban</td>
<td>Co-Educational</td>
<td>Aided</td>
<td>Above Average</td>
<td>33</td>
<td>27</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>8</td>
<td>G.H.S.S. Villadam</td>
<td>Urban</td>
<td>Co-Educational</td>
<td>Government</td>
<td>Average</td>
<td>22</td>
<td>38</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>9</td>
<td>T.M.V.H.S. Perumpilavu</td>
<td>Urban</td>
<td>Co-Educational</td>
<td>Aided</td>
<td>Below Average</td>
<td>33</td>
<td>27</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>III</td>
<td>Malappuram District</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>H.M.Y.H.S. Manjeri</td>
<td>Urban</td>
<td>Co-Educational</td>
<td>Aided</td>
<td>Above Average</td>
<td>26</td>
<td>34</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>11</td>
<td>G.H.S.S.C.U. Campus</td>
<td>Rural</td>
<td>Co-Educational</td>
<td>Government</td>
<td>Average</td>
<td>35</td>
<td>25</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>12</td>
<td>G.H.S.S. Chelari</td>
<td>Rural</td>
<td>Co-Educational</td>
<td>Government</td>
<td>Below Average</td>
<td>28</td>
<td>32</td>
<td></td>
<td>60</td>
</tr>
</tbody>
</table>
taken as a unit for testing. The examination marks of students in the SSLC Examination were collected by the assistants from the school records.

4.6.1 Mode of Data Collection

The different tests were administered under ideal conditions prescribed for psychometric testing. Each test was given in a different test session. Before starting each test, the subjects were asked to go through the instructions given in the front page of each test thoroughly. This was followed by questions by subjects and clarifications, for each using model items displayed on the black board. The investigator cleared the doubts and enough time was given to acquaint the subjects with the tasks expected of them in answering each test, and the manner of completing the performance on the response sheet distributed at the beginning of each session. Practice items gave adequate opportunities for developing proper ideas about the mode of responding. The total time for answering each test was made known at the beginning. All subjects were asked to start answering when the direction ‘start’ was given by the test administrator. They were to stop when the direction ‘stop’ was given by the test administrator. The total time for answering the 48 questions in the inventory (empirically determined) was 90 minutes. The timing for other standardised tests were also implicitly followed. The instructions, pauses etc for test preparation, took another 10-15 minutes on the average.

Seating of subjects was carefully done to make mutual consultation difficult with two students on each bench, seated at either
ends of the same bench. The different rows were separated considerably from each other. Following these procedures, the data from the total sample were collected. Data relating to 783 subjects were available for analysis. The responses of 783 subjects were available for analysis.

4.6.2 Scoring and consolidation of data

Scoring of the 783 answer sheets was done by the investigator with the help of the prescribed scoring key. All the information relating to each subject (test scores, demographic details etc) were consolidated in a data sheet. Entries pertaining to any one individual were entered in a single line on a consolidated data sheet against the name of the person. A serial number was assigned to each subject for identification. All entries pertaining to every student was made against their serial number on the consolidated sheet.

The serial number was entered in coloured ink at the top of each answer sheet to facilitate cross checking, if needed. Thus the scores of each student for the different variables were consolidated and coded for computer processing. Incomplete response sheets, ambiguous entries etc were not used for final analysis. This yielded a final sample of 720 subjects for analysis. Final analysis was made using the data relating to 720 subjects.

4.7 Methods used for classifying the sample

A major question which had to be tackled in analyzing the data was the need to classify the total sample into sub-samples for analysis, where the influence of each independent variable on the dependent variable (vocational information) had to be
assessed. This necessitated the classification of the total sample (720 subjects) in each of the three independent variables into high and low.

**Classification of the total sample into high and low groups**

For this, the total sample was classified into two groups based on the scores in each of the independent variables, viz, intelligence/achievement in science and socio-economic status. The mean for the total sample in each of the three variables was used for classifying the sample into high and low for that variable. For classification based on levels of intelligence, the mean intelligence score was used for cut off. Those getting mean intelligence score and above mean intelligence score was labelled as the high intelligence group others were labelled as the low intelligence group. This procedure was repeated for identifying ‘high’ and ‘low’ for the other two variables.

Using this method, the sample was divided into

a) ‘high intelligence’ (HI) and ‘low intelligence’ (LI) groups

b) ‘high prior science achievers’ (HSA) and ‘low prior science achievers’(LSA); and

c) ‘high socio-economic status’ (HSES) and ‘low socio-economic status’ (LSES) groups.

**4.8 Statistical techniques used for data analysis**

The scores of different variables were analyzed using any one or more of the following techniques:
(i) examining the score distribution of the dependent variable (vocational information) using graphical techniques and the measures of skewness of the score distribution (applied for the total sample and the relevant subsamples)

(ii) comparison of the mean vocational information scores of related sub-samples formed on the basis of differing levels of each of the independent variables based on intelligence, prior science achievement and socio-economic status (HI-LI groups, HSA-LSA groups and HSES-LSES groups) and groups based on the gender of subjects, (boys and girls) or their residence (rural-urban) using 't' test of significance for difference between means, of independent large samples for each of the independent variables, and

(iii) exploring the correlation between each independent variable with each of the selected dependent variables (product-moment 'r')

Correlation (Pearson’s product moment co-efficient of correlation- r) was calculated using the following standard formula:

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

Where X stands for the scores in the independent variables used in the study; and

Y stands for the corresponding scores in the dependent variable.
Test of significance for difference between means for large independent samples for computing the critical ratio for differences was calculated using the following formula:

$$\text{Critical Ratio (t)} = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where $M_1$, $\sigma_1$, and $N_1$ are the mean, standard deviation and size of the sample of the first group, and $M_2$, $\sigma_2$, and $N_2$ are the mean, standard deviation and size of the sample for the second group, respectively. The use of two-tailed tests led to the selection of critical values at 1.96 and 2.58 respectively for significance at 0.05 and 0.01 levels.
References:


References:


