

**A SURVEY OF VOCATIONAL INFORMATION
OF HIGHER SECONDARY STUDENTS
OF KERALA**

**THESIS SUBMITTED FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN EDUCATION**

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CERTIFICATE

I, Dr. K. Sivarajan, do hereby certify that this report “**A SURVEY OF VOCATIONAL INFORMATION OF HIGHER SECONDARY STUDENTS OF KERALA**” is a record of bonofide study and research carried out by Smt. Gangadevi. K under my supervision and guidance and that it has not been previously formed the basis for the award of a degree, diploma, title or recognition.


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GANGA DEVI, K

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CHAPTER I

INTRODUCTION

- **Need and significance of the study**
- **Statement of the problem**
- **Definition of key terms**
- **Variables of the study**
- **Hypotheses set for the study**
- **Objectives of the study**
- **Methodology**
- **Scope and limitations**
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INTRODUCTION

1.0 The present study is an attempt to make an in-depth assessment of the vocational information acquired by higher secondary students of the state of Kerala and explore to what extent this variable affected by certain other independent variables which are liable to influence this variable. The study was undertaken considering the critical nature of vocational information for students of higher secondary classes, especially since most of these students are required to take a very important decision which will affect their future life -- the choice of a vocation -- at the end of this course. It is widely known that a vast majority of students who enter the higher professions in the country, in professions like engineering, technology, medicine, allied health sciences, agriculture, veterinary sciences, forestry, fisheries etc, select their future vocations on the basis of inadequate or incomplete information about vocations, and using their subjective assessment of the nature of the vocations and their own abilities and aptitudes. It is important that students who enter the highly competitive global vocational scenario do so with full and dependable information about the wide range of vocational choice open to them and relate these to their own abilities and dispositions and make proper selection of their future vocations.

Informed decision - making by students

To what extent students are taking informed decisions relating to vocational selection will determine the future quality of life of the student as well as the quality of social returns which can be expected from them while functioning as a professional. The Indian system of education and its functioning styles do not take into account the ground-level realities relating to vocational choices. In many cases, wrong choices based on the degree of social prestige are selected. Such students end up in inferior vocational performance and therefore are unable to provide proper social returns through their professional performance. There are a vast number of western studies which show that the quantity and quality of vocational information possessed by a student at the time of choosing a vocation has very much to do with their later success in the chosen vocation. There are very few Indian studies of this kind on which to base our school guidance programmes.

The quality and quantity of the vocational information which students acquire on their own is certainly an index of their determination to make a correct choice of their future vocations. If one is to go by the available literature on vocational choices, by Indian students, there is very little evidence to show that the vocational decisions taken by students at this stage are realistic and psychologically valid. In the educational set up of this country, we have maximum concentration of the cognitive capital of the country and those entering many of the higher professions are confined to groups who have made unrealistic vocational choices.

This being so, we have to adopt proper social policies for helping these students to make meaningful selection of their future professions. The decision taken by this group of students is likely to have long-term impact on the economic development of the country and also on the socio-personal adjustment of individuals. Hence the decision to conduct the present study which is expected to throw light on the acquisition of 'vocational information' of higher secondary students, with a view to providing more adequate educational strategies for developing the much - needed 'vocational information' and help them to use much information in their vocational choice.

The available evidence shows that a vast majority of students land up in some of the major professions without a proper understanding of the nature of the vocations which they take up, or their suitability for effective functioning in the chosen areas of work. The recent changes that have overtaken the social, political and economic scenario of the world have altered drastically the structure and functioning of the educational systems all over the world. New operational strategies are adopted by most systems to optimise their performance. A basic requirement for optimising student performance is the selection of the 'right persons for the right job'.

Many lasting and continuing changes have come over society in the recent past following the adoption of ICT modes of living and the emergence of a globalized social order which is homogenizing the operation of educational systems all over the world. Common pattern of

actions are getting accepted, where even rural communities in countries like India are getting increasingly urbanized. All world communities are adopting a new work culture and a new philosophy of life, pointing to the need for scientific decision-making in all walks of life, especially in education. The practices which the world has been following for ages have changed and continue to change in the new world scenario where nations are competing with each other to produce professionals who can perform optimally. The nature of the professions have also changed during the recent past. They continue to change at a fast pace, creating new sub-specializations and demanding new work skills and different degrees of performance. This amounts to the acceptance of a new work culture and a social dictum that only the right person entering a profession can meet the stringent new demands on quality. All societies are introducing more focused man-power planning to identify human abilities and achieve the optimal utilization of available human resources for achieving better results.

One of the first essentials in the system of man-power planning for the new world order, as pointed out earlier, is the need to identify the “right person” for the “right job”. An important concomitant of these changes is the need to identify the right people for a vocational calling and train them in all the workskills so that they can contribute optimally to the demands of the new social order.

The new developments pose a very pertinent challenge to the educational establishment. The system has the duty to identify persons

who can practise a vocation with maximum efficiency, before admitting them for training for the different vocations. In a new world order where specialized vocations are on the increase and the demand on each vocation is becoming more stringent, we have to pay special attention to the problem of selecting the best students for the limited facilities available for training in any specified vocation. The modes of selecting students for the higher professions--especially the group of higher professions, which are critical for the functioning of a developed society--will have to be made more specialized to admit the very best available for selection. The situation presents a number of difficulties which have to be overcome once we decide to make a scientific selection. At one end, there are skills which are not properly identified in selection to a job, and hence are not utilized. At the other end, critical vocational areas (which set an upper limit to a country's economic development) are run by personnel who are totally unsuited for the tasks.

There are several jobs, old and new, for which properly skilled personnel are not available. The high degree of unemployment which exists in many parts of the country have very much to do with the lopsided educational training given to the youngsters. We can reduce the incidence of unemployment if we are able to develop the right type and right number of trained professionals for different vocations. This has to be done on the basis of man power planning and the identification of the right type of people for the different vocations. Selection of people most appropriate for a professional course, in itself, will help to improve the quality of the training programmes. The quality of the personnel who are

channelised into the programmes will decide the upper limit of the efficacy of the programme.

All the above considerations point to the need for a more scientific approach to the identification, development and the utilization of human potential for training in the critical vocations, where only those with a real understanding of the demands of a profession get inducted into the training for professional preparation. Vocational guidance, the branch of psychology which helps to identify “the right type of people for the right job, equip them for the job, and place them in the correct job”, is based on the assumption that there are scientific methods for vocational selection and allocation of people for the kinds of jobs for which they are most suited.

Psychological tests--intelligence tests, aptitude tests, personality tests etc--help us to identify the inherent dispositions of pupils which can be used for predicting one's success in a specific job. Once this information is available to our educational planners, students can be channelized into the right type of training programmes and into the right type of jobs. The scientific decision-making used in this approach will help an individual to know himself and assist him in making an informed selection of his future vocation.

Student guidance and scientific course choices

If we adopt focused scientific methods for vocational placement, we have to prepare the system for this task. The system of general education we practice is inadequate to develop all the needed

skills for a full understanding of the steps implied in vocational choice. Vocational choice needs to be made on the basis of essential background information. As pointed out by Hoyt and High¹, proper career choice involves the understanding of the employability skills, basic supporting academic skills, developing proper work habits, developing meaningful values relating to work, skills of self-understanding, understanding career interests and aptitudes, realistic understanding of career opportunities, skills for career decision-making, skills for overcoming biases, etc. What we need is a sound system of guidance which has to begin from the beginning of the secondary schools and strengthen from the first year of the secondary stage. A good guidance system will help learners to make realistic choices of a vocation. Realistic choice of a vocation means optimal utilization of the human potential available and evolving social policies which will lead to proper allocation of humans for different jobs, especially man-power planning. Guidance activities are to be designed for providing scientific information about vocations early enough in the school career of children.

All students should be helped to develop a proper concept of vocations before they can decide on their suitability for entering such vocations. Informed decisions will help to make proper choices and proper placements. This in turn will certainly help to accelerate the developmental process of the country. Besides, proper vocational placements will also help students to derive maximum psychological satisfaction from what they are doing to earn their living. The opposite will be the effect when

students make unscientific vocational selections or enter vocations for which they are not temperamentally or intellectually suited.

Diversification of curriculum and courses

All educational systems have a duty and an obligation to provide a wide array of course combinations at the higher levels of school education to cater to the differing needs and abilities of pupils and prepare them for different vocations. On successful completion of ten years of school education, large scale diversification of courses for entry into the needed subject combinations (which help learners to enter different higher professions) will have to be made. The higher secondary levels provide a wide range of subject combinations needed for entry into all major vocations. The basic preparation has to begin at the higher secondary stage. Students are expected to select proper courses, which will land them in careers for which they are most desired. But we cannot be sure that students are capable of making a realistic selection of courses, for different reasons. A most distressing situation which occurs at this stage when students often make blind choice of specialized courses without a full knowledge of the implications of such choices. At one end, students are not aware of their own aptitudes and dispositions for making a correct choice of course combinations. They are also totally ignorant of the roles in which they can contribute most to society. What is more distressing is that most students are unaware of the specialized educational requirements to enter such vocations. Most of the

students, often under the influence of their parents or other extraneous considerations, like respectability attributed to courses, availability of courses in the vicinity, continuing the vocations of the parents etc, choose wrong courses and careers. It is not unusual for parents to impose their judgements on their children on wrong considerations like social status and economic benefits attached to vocations, rather than for their appropriateness to the student. In many cases, parents are trying to fulfill their unsatisfied desires, by forcing their children to make wrong vocational choices.

Use of scientific procedures for making vocational choices

School guidance programmes, if properly conceived and operated, can contribute significantly to the needs for making students choose the right vocations. The 'individual' aim of education can be achieved only when the individual student receives the right type of education which will help him/her to understand oneself and make the right choice of a vocation. The right choice of a vocation by individuals will help society to conserve human resources and energy available to it. Helping the individuals to choose the right courses needed for the right vocations--the concept of "fitting the round peg in a round hole" as against the "round peg in the square hole"-- is an important responsibility of democratic education .

The critical role of vocational information

The first step in the realistic choice of a vocation by a student

is adequate information about the vocations themselves. The wide range of vocations from which one is required to select a vocation for oneself is a difficult task which all students face in their educational career. Occupation is not merely a means of earning a livelihood, it is a way of life itself. Income, status, social relationship and family relationship, all depend on one's vocational life. Modern education puts greater premium on vocational efficiency which is the crux of the progress of the individual and of the nation. This leads us to the question of making a meaningful choice of a profession, on the basis of a full understanding of the profession itself. This is basic to the operation of one aspect of modern school guidance programmes--vocational guidance. The following observation by Donald Super² about vocational guidance is significant: "Vocational guidance is the process of helping a person to develop and accept an integrated and adequate picture of himself and his role in the world of work, to test this concept against reality, and to convert it into a reality, with satisfaction to himself and benefit to society."

Vocational guidance is concerned with the problems and techniques involved in choosing an occupation and becoming adjusted to it. According to Roberts³, "for all individuals, whatever their qualifications, the social structure determines their eventual occupations." The Indian scenario of education does not make any attempt to assess the 'vocational information' acquired by school students. This is because of the obvious reason that this is not part of the the formal curriculum. To what extent the students have acquired some of the basic items of information for making the right vocational choice, has not been properly studied by

assess themselves to ascertain whether they have the mental potential and temperamental preparedness for undertaking such courses. It is this short-coming in the existing approach for vocational selection which prompted the investigator to undertake the present study. It intended basically to assess one important dimension of vocational choice--vocational information--*vis a vis* some of its determinants.

The investigator believes that a vast majority of higher secondary students of the state (and elsewhere in the country) choose vocations without a full understanding of the nature of vocations they choose and without a clear perception of the aptitudes and abilities needed for success in the course and also with a proper perception of the level of performance expected of them, once they enter a defined vocation. Most of the students are also unaware of the educational facilities that are available in the vocational institutions they choose, and also about the type of performance expected of them once they join such vocational courses. The investigator is convinced that the findings of this survey (where higher secondary students stand in respect of their vocational information and also the major variables which determine the level of this variable) will help the guidance personnel and educational systems to get dependable empirical evidence about the quantum of relevant vocational information available to them, before they make their vocational choices.

1.1 Need and significance of the study

Globalization has created a new educational and vocational culture all over the world. The fast-advancing scientific and technological

knowledge, which affect, the nature of jobs and the demands for a job in the market, dictate the need for a new vocational culture. The needed change is yet to happen in the Indian system of education. The young generation should be highly alert if they have to succeed in getting proper training and placement in the emerging competitive world job market. Education has to take up the responsibility to develop learners who can effectively face the challenges implied in the emerging job market, especially jobs in some of the critical vocational areas. Among the many aims of education, the vocational aim (preparing individuals for a suitable vocation) is listed as an important one. This means, education also has the responsibility to develop the right abilities, skills and attitudes needed for making a sound vocational choice. Education has the responsibility to perform this task in a most satisfactory manner, if it has to perform the role expected of it as an agency for vocational skill development.

In the rapidly changing world of work, young students are confused and often make random choice of courses after their high/higher secondary schools. Higher secondary stage of education in India is looked upon as the “delta stage” from which students branch off to all important higher professions. There are different entry points for different courses in the country -- completion of high school, completion of higher secondary school, graduation, post graduation, etc. A vast bulk of students who want to branch off to important professions (science-based professions like engineering, technology, medicine, agriculture etc) enter

vocational streams after the “+2” stage. When they complete higher secondary or “+2” stage, students have to decide which professional college/business school to attend and once this is identified, how to get admitted to such institutions. This raises several new basic questions like the following: what are the pre-requisite qualities expected of a learner?; what subjects of specialization are required for admission to such courses?; what kinds of new subject areas are he supposed to study for the course?; what kinds of jobs could he get after he completes his education?; what are the service benefits and promotional possibilities which will be open to him once he qualifies for entry into a higher profession? etc.

Selecting a career is often a long, difficult and unsettling experience for most children. Meaningful selection of a vocation/profession can be done only when students have all the basic information needed for making a meaningful selection. This seldom happens in our country. In advanced industrial systems, children are provided with adequate knowledge of different jobs and professional areas, different types of vocational courses to be completed for entering such jobs, the types of institutions where the courses are offered, entry qualifications prescribed for such jobs, duration of each such course, financial requirements for completing such courses, personal qualities expected for successful performance in the profession, specialization subject areas to be learned for each course, employment opportunities available in a vocational area, opportunities for professional advancement, possible

emoluments to be expected, etc. The present study has been conceived on the assumption that most of the students who enter different types of vocational education programmes do so with inadequate knowledge of the professions they enter.

The survey of literature in this area by the investigator also showed that research in India relating to vocational information is totally inadequate. All these further motivated the investigator to make a comprehensive study of this area. The role of career guidance as a support to general education is accepted in all enlightened educational systems. Educational systems are getting re-shaped to accommodate career guidance within this sphere of activity. The new movement is characterized by the following activities:

- (i) growing linkages between education and work;
- (ii) concern for the rising rates of youth unemployment;
- (iii) the need to create labour forces that are functionally literate, capable of engaging in the growing complexity of technological applications to work tasks, and emotionally committed to productive effort;
- (iv) shifts in proportions of women leaving the home and entering the work force;
- (v) alarm that large number of students are not mastering the school -to- work transitions because they lack the attitudes, skills, or personal goals that constitute employability; and

(vi) awareness that the major questions concerning the implementation of technology are not technical, but human questions.

The need for developing adequate knowledge for proper career choice and for entering a proper career education is acquiring greater significance in a world which is fast changing in respect of career demands. In a world where new occupations are created every moment, and where conventional vocations are fast disappearing, it is difficult for any young learner to be abreast in basic knowledge relating to vocations. The new age which presents unusual needs like supersonic space travel, electronic automation, space exploration, cryogenics, solar energy utilization, bio-engineering and DNA mapping, and nano technology, it is virtually difficult or impossible to get oneself updated about the entire range of new vocational demands, all the time.

The observations in the classical work of Hoppock⁵ on "Occupational Information: Where To Get It and How to Use it in Counselling and Teaching", is valid even after the expiry of 50 years. All important committees and commissions on education appointed by the Government of India since independence, recommended the introduction of guidance services in schools and colleges of the country. An important component of this recommendation is the need for creating a correct awareness among students about different vocations and about the educational avenues leading to vocational qualifications.

The Secondary Education Commission (1952-53) made certain significant recommendations about the need to start guidance

services (especially educational guidance) in schools to enlarge students' perspective of vocations. The commission⁶ observed as follows:

“In order to broaden the peoples' understanding of the scope, nature and significance of various occupations or industries, films should be prepared to show the nature of the work in various industries and this should be supplemented by actual visits”.

The Education Commission⁷ (1964-66) recommended that “guidance and counselling should be regarded as an integral part of education meant for all students and aimed at assisting the individual to make decisions and adjustments from time to time”. The commission further clarified this by stating that one of the aims of student guidance is to initiate children into the world of work when it suggested the need to produce ‘occupational literature’ as part of the school guidance functions.

The recommendations of these commissions obviously highlight the responsibility of educational institutions to develop proper concepts about the ‘world of work’ along with its responsibility to provide academic education.

The present study, as indicated in earlier contexts, intends to make a scientific and objective assessment of the vocational information of higher secondary students, together with some of its determining variables.

1.2 Statement of the problem

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

1.3 Definition of key terms

‘Vocational information’ as used in the study is operationally defined as information relating to education in certain critical vocational areas, including qualification for admission to vocational/professional colleges providing advanced training in the selected vocational areas, the range of subjects to be learned for qualifying for the professions, aptitudinal/other personal qualities which will ensure success in such vocations, details about institutions where such education can be obtained and other supporting information relating to the courses offered in such institutions, qualifications available, duration of each course, modalities for entering such institutions, financial requirements for course completion, possibility of professional advancement once a person enters a profession, emoluments, vocational satisfaction etc to be expected in a professional setting etc. The term ‘vocational information’ is used in a restricted sense to stand for three science-based professional areas viz medical, agricultural and engineering.

‘Higher Secondary Schools’ as used in this study stands for the 11th and 12th years of schooling in the state-recognized institutions of the state of Kerala, under different streams like the Higher Secondary, Vocational Higher Secondary, CBSE, and ICSE schools.

1.4 Variables of the study

The study is conceived essentially as a survey, has been designed in terms of a few ‘independent’ and one ‘dependent’ variable, as presented below:

Dependent variable of the study:

‘Vocational Information’ viz, the sum of the vocational information in three vocational areas--Medical, Agricultural and Engineering areas--is treated as the dependent variable.

Independent variables of the study:

The following independent variables were selected as causal variables which are likely to affect a student’s ‘vocational information’ viz,

- (a) Intelligence
- (b) Prior Science Achievement
- (c) Socio-Economic Status
- (d) Gender of Subjects (Boy-Girl), and
- (e) Locale (Urban/Rural)

1.5 Hypotheses set for the study

The study has been conceived around the following hypotheses:

- I. Vocational information acquired by higher secondary science students of Kerala in the three vocational areas selected for study (viz, Medicine, Agriculture and Engineering, treated as single variable) is inadequate for making a realistic professional choice.
- II. There will be significant differences in the clustering of ‘vocational information scores’ for different groups, which will be reflected as

differences in the distribution of scores for the total sample and the relevant sub-samples covered by the study.

- III. Vocational information of higher secondary science students will be significantly influenced by all the five independent variables selected for study and this influence will be visible as either significant mean differences in the vocational information scores of relevant contrasted groups based on each of the above variables and or in terms of significant correlations between each of the above independent variable and vocational information.

1.6 Objectives of the study

The hypotheses formulated above helped the investigator to spell out the objectives for the study, as stated below:

1. Assess how the total scores on vocational information (sum of the scores of the vocational information in three vocational areas) are distributed in the total sample of higher secondary students and the relevant sub-samples selected for study, with a view to determine whether the students under study have acquired the expected levels of vocational information.
2. Assess the influence of “intelligence” on the “vocational information” of higher secondary science students
3. Assess the influence of “prior science achievement” on the “vocational information” of higher secondary science students.
4. Assess the influence of “socio-economic status” of higher secondary science students on their “vocational information”

5. Assess the influence of “gender of subjects” on the “vocational information” of higher secondary science students
6. Assess the influence of “rural-urban” residence on the “vocational information” of higher secondary science students

1.7 Methodology

The study has been conceived basically a normative survey supported by a few statistical techniques like ‘t-tests’, correlation techniques, etc.

(a) Sample

The study used a basal sample of 818 pupils of higher secondary schools, attending standards XI and XII, selected using proportionate stratified sampling technique. The basal sample, after rejecting incomplete data entries and other cases of experimental mortality etc, was reduced to 720.

(b) Tools used for the study

The following tools were used for data collection:

1. “Vocational Information Inventory” standardized by the investigator
2. The Kerala University Group Test of Intelligence For Adults, standardized by Nair and Amma (1978)
3. The Kerala Socio-Economic Status Scale (Revised), developed by Nair (1970)

Measure of 'prior science achievement' was obtained using the marks of students in the Common Public Examination (the S.S.L.C Examination) - the total of the marks obtained in different science papers. The scores were collected from school records. All the entries were tabulated and used for analysis.

(c) **Statistical techniques**

The scores of different variables were analyzed using:

- (i) score distribution using graphical techniques and measures of skewness of the distribution.
- (ii) comparison of the vocational information of different sub-samples formed on the basis of differing levels of independent variables (high or low levels of intelligence/ science achievement/socio economic levels or groups based on gender of subjects, or residence) using 't' test of significance for difference between means, and
- (iii) correlation between the dependent variable with each of the selected independent variables (product-moment 'r')

1.8 Scope and limitations

The study was confined to the vocational information of higher secondary students for obvious reasons. The study also was confined to a survey of the vocational information of the selected students

in three vocational areas viz, medicine, agriculture and engineering, treated as a single variable. The scope of the study was confined to an analysis of impact of a few select independent variables-intelligence, achievement in science, socio-economic status and gender of subjects and the locale of the school.

The sample for the study was selected to represent of higher secondary school students (attending standard XI and XII from selected schools of Kerala State), using proportionate stratified sampling technique. The analysis was also confined to the use of a selected set of procedures--skewness of the distribution, test of significance for difference between independent means and the Pearson's product-moment 'r'.

The survey of 'vocational information' was done by treating selected variables listed earlier as independent variables, as influencing the level of vocational information. Other possible variables were eliminated from the scope of the study for practical reasons. But within the defined parameters, care was taken to make the study as precise as possible.

1.9 Organization of the report

The study has been reported under six chapters, following the conventional sequence suggested for reporting social science research, with details as shown below:

Chapter 1: Rationale for selecting the present problem, its need and significance, statement of the problem, definition of key terms used, variables used for the study, statement of hypotheses and

objectives of the study, a brief outline of the procedure employed and scope and limitations of the study.

Chapter II : Conceptual bases of vocational information - A theoretical overview.

Chapter III : A detailed review of related literature and studies bearing on the theme; major conclusions based on the reviews, gaps in research as indicated by the review.

Chapter IV : An outline description of the design of the study defining details of the procedures used for sample selection, tools used for data collection and the statistical techniques used for analyzing the data.

Chapter V : Analysis of the data collected to throw light on the research questions listed as objectives and the interpretation of the findings.

Chapter VI : A brief summary of outline of the study, the major findings of the study, educational implications of the findings and suggestions for further research.

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CHAPTER II

CONCEPTUAL BASES OF VOCATIONAL INFORMATION

A Theoretical overview

- **Concept of vocational information**
- **Theoretical overview**
- **Developmental perspective**
- **Differentialist perspective**
- **Decision -making perspective**
- **Behaviourist perspective**
- **Structuralist perspective**
- **Organizational theory**
- **Vocational counselling theory**

CONCEPTUAL BASES OF VOCATIONAL INFORMATION

The present study, as indicated in an earlier context, is an attempt to assess the vocational information of higher secondary students of Kerala. The natural beginning for an exercise of this kind is to develop a theoretical overview of the work already undertaken, to be used as the background for conducting the present study. The details are presented the succeeding sections.

2.1 Concept of vocational information

Vocational information consists of information regarding jobs in different areas and fields with special reference to supporting information needed for entering specific vocations and jobs. Examples are: aptitudinal dispositions expected and qualifications for entering specific jobs, courses to be completed to get qualified for specific jobs, duration of the courses, institutions offering the necessary courses, personal qualities expected for success in a course and for advancement in a profession, financial requirements to complete selected courses, basic qualifications to get entry into selected courses, salary, promotion possibilities and other benefits relating to specific vocations, and other related information for entering a job. Hoppock¹ (1957) emphasizes the basic nature of vocational information for

students as follows: "One cannot choose what one does not know, and many occupations are unknown to most of us. One may stumble into an appropriate occupation by sheer luck, but the wise choice of an occupation requires accurate information about what occupations are available, what they require, and what they offer".

Occupational information by itself is not enough for making a right vocational choice. For a person to choose an occupation, knowledge and acceptance of one's own aptitudes, abilities, limitations, interests, values, feelings, fears, likes and dislikes etc are also essential, together with a clear understanding about the relative significance of all the above facts.

Hoppock² further asserts: "It is obvious that knowledge of occupations can be effectively applied only when one knows some thing about oneself. It is equally clear that knowledge of oneself can be effectively applied to the choice of an occupation only when one knows certain things about occupations. Either without the other is incomplete".

Vocational information is a powerful tool in the choice of a career. Information about the world of work is indispensable for the selection of appropriate and suitable vocations. The individuals' life satisfaction depends essentially upon job satisfaction. An individual's vocation determines many things in his life, for example his income, his associates, his usefulness to the society, his status in society, his standing within his family circle, etc. Intelligent self-direction is also a factor in the wise choice of an occupation. For that, one should have adequate information, which will make one aware of possible occupations, their

nature, the social worth, the services they render, the preparation they require and the salaries they pay, and such other things.

Tolbert³ (1959) states: “Theoretical bases for understanding how individuals develop vocationally, gives the counsellor guidelines for helping them to solve problems, avoid blocks and progress with efficiency and satisfaction. Each counsellor, guidance worker and counsellor aide has a set of assumptions that guides his actions and constitute his theory. A carefully formulated, tested and consistent theory gives the counsellor a rationale for helping that transcends his own intimate guesses”.

According to Zaccaria⁴ (1970) “Career development theories are relatively new, roughly analogous to that of adolescents”. Even those theories which have been introduced in educational practices have not been properly applied for improving the quality of educational delivery in the country.

2.2 Theoretical overview

“Theory is a way of organizing and systematizing what is known about a phenomenon. A theory serves as a model which is used to know what to look for, what to expect, and where to go” (Hampreys and Traxler⁵, 1954). This statement is supported by evidences. Psychologists, sociologists, psychiatrists and economists have all formulated converging approaches to vocational choice and development. Many factors underlie the choice and vocational development of individuals. Theory-making in respect of vocational choice is a continuous process, since new knowledge adds new clarity to an event, behaviour etc.

Theories of career development and occupational choice derive from different perspectives like the following: developmental, differentialist, behaviourist, decision-making, structuralist, organizational, and vocational counselling approaches.

The important theories under the above heads have been organised and summarised as under:

2.2.1 Developmental perspective

2.2.1.1 Ginzberg's theory

2.2.1.2 Super's theory

2.2.1.3 Beilin's theory

2.2.1.4 Roe's theory

2.2.1.5 Hoppock's theory

2.2.1.6 Bordin's theory

2.2.1.7 Steffle's theory

2.2.2 Differentialist perspective

2.2.2.1 Holland's theory

2.2.3 Decision making perspective

2.2.3.1 Hilton's theory

2.2.3.2 Tiedeman and O'Hara's theory

2.2.4 Behaviourist perspective

2.2.4.1 Krumboltz's theory of social learning

2.2.5 Structuralist perspective

2.2.5.1 Robert's theory

2.2.6 Organizational theory

2.2.6.1 Schein's theory

2.2.7 Vocational counselling theory

2.2.7.1 .Williamson's Trait-Factor theory

2.2.1 Developmental perspective

2.2.1.1 Ginzberg's theory - 1951

Ginzberg and his associates⁶ developed a specialized theory of occupational choice. He divides the process of occupational decision-making into three distinct phases: the period of fantasy choice, the period of tentative choice and the period of realistic choice.

The first phase coincides with the latency period, between the ages of six and eleven; the second, with early and late adolescence, between eleven and seventeen and the third, with early adulthood after seventeen. The period of tentative choice progresses through four stages: i) the interest stage, where the pre-adolescent makes choices in relation to his interests; ii) the capacity stage, where the individual becomes more aware of the necessity for introducing realistic elements into his considerations; iii) the value stage, which is characterized by the adolescents' attempts to find a place for himself in society and iv) the transition stage, where the individual reaches the end of high school and must look forward either to work or for additional education. The period of realistic choices again can be divided into three distinct stages: exploration, crystallization and specification.

During the stage of exploration, the individual tries to acquire the experience he needs to resolve his occupational choice. During the crystallization stage, the individual assesses the multitude of factors which influence the occupational choice he had under consideration and is finally able to commit himself. During the specification stage, alternatives are reviewed with respect to a field of specialization and to particular career objectives.

There are three basic assumptions contained in this theory. First, occupational choice is a process. It takes place over a minimum of six or seven years and over ten years or more. Second, each decision during adolescence is related to one's experience and in turn has an influence on the future. The process of decision making is basically irreversible. Finally, occupational choice involves the balancing of a series of subjective elements with the opportunities and limitations of reality. So the crystallization of occupational choice inevitably has the quality of a compromise.

2.2.1.2 Super's theory of vocational development and vocational self-concept

Super and his associates tried to develop and test a theory of vocational development which he has reported in three different contexts in 1953, 1963 and 1990. The details are presented below:

(i) Super's⁷ 1953 theory of vocational development

The essence of the theory as enunciated by Super⁸ will explain its meaning. He states: "In expressing vocational preferences, a person puts into occupational terminology his idea of the kind of person he is; that in

entering an occupation, he seeks to implement a concept of himself: that is getting established in an occupation where he achieves self actualization. The occupation thus makes possible the playing of a role appropriate to the self-concept”.

To Super, vocational development is a continuous process. He sees occupational choice as a synthesizing process. It synthesizes individual's personal needs and resources on one side and his economic and social demands on the other side. This synthesizing is a learning process. Learning takes place in role-playing and role-taking. The individual will have, in his mind, some adults as models. Through learning one will understand the function of interests, values, attitudes and behaviour patterns which are valued by his models.

Super further believes that vocational development is intra-individual and individual-environmental. This interaction is not always at the level of consciousness.

Individual's career pattern is determined by his parental socio-economic level, mental ability and personality characteristics and by the opportunities to which he is exposed. Super's⁹ theory of vocational development takes the form of ten propositions, stated below:

1. Individuals differ in abilities, interests and personality traits
2. They are capable of entering a number of occupations by virtue of their abilities, interests, etc
3. Different occupations require different patterns of abilities, interests and traits

4. Vocational preferences change with time and experience, although self-concepts are generally fairly stable from late adolescence until late maturity
5. In the process of vocational development, there are a series of life stages such as growth, exploration, establishment, maintenance and decline. The stage of exploration can be subdivided into fantasy, tentative and realistic phases while the establishment stage can be subdivided into trial and stable phases
6. The nature of a career pattern is determined by the individuals' parental socio-economic level, mental ability, personality and opportunities.
7. Development is guided by the maturation of ability, interest, reality testing and the self-concept.
8. The process of vocational development is essentially that of developing and implementing a self-concept
9. The process of compromise between the individual and social factors, between self-concept and reality, is one of role playing; the role may be played in fantasy, in the counselling interviews, or in real-life activities
10. The work satisfactions and life satisfactions depend upon the extent to which the individual finds adequate outlets for his abilities, interests personality traits and values

(ii) Super's self-concept theory of 1963

The second stage of Super's¹⁰ theory of vocational development, starts with the assumption that the process of vocational development is essentially that of developing and implementing a self-concept; it is a compromise process in which the self-concept is a product of the interaction of inherited aptitudes, neural and endocrine make-up, opportunity to play various roles, and evaluations of the extent to which results of role playing meet with the approval of superiors and his peers.

Occupational choice is a means of implementing the individuals' self-concept. The basic elements in self-concept approaches to vocational development are self-concept formation, exploration, self-differentiation, identification, role playing, reality testing, translation of self-concepts into occupational terms, and implementations of the self-concepts.

Self-concept is developed by observations and impressions of oneself, called 'self-percepts' which are related, organized and meaningfully interpreted. The self-concept system is defined as the "constellation of all the self-concepts". When this constellation is considered in the occupational context or made relevant to occupational choice, it is referred to as the vocational self-concept. The self-concept is usually assessed through tools like self-reporting. Self-reports are very important for this purpose and are relevant to an understanding of how the individual perceives himself.

During the process of vocational development, the stage of exploration occurs at the time of change of status and development, at different points of one's educational career-entry into high school, graduation etc.

Exploration helps in choice, preparation, entrance, adjustment or progress in an occupation. Exploration provides a source of information for the formation and modification of self-concepts and vocational concepts because due to exploration, the individual will get knowledge and understanding of self-environment and the world of work.

(iii) Super's 1990 theory of the development of vocational self-concept

In this part of Super's theory¹¹, he depicts career development as a process of implementing and testing vocational self-concept in the context of various roles (for example, parent, worker, spouse, etc) in different life stages, (for example, home, school, community, work place, etc). The work role, in particular, affords the opportunity to establish an identity as competent and valued. Super's analysis situates career in life-space, generally. This view recognizes that careers are unique to individuals, but are, to an equal level, limited by role-expectations and different life-stage considerations.

The life-stage, vocational tasks, attitudes and behaviour provide a basis for assessing vocational maturity by comparison of one's vocational maturity to that of others in the same life stage or by longitudinally comparing one's vocational maturity, to that of an earlier stage in one's own development.

2.2.1.3 Beilin's theory - 1955

Beilin¹² built a theory, clarifying the distinction between vocational choice and vocational development. He suggested that both concepts are needed in the study of vocational behaviour. He also related general development concepts such as continuity, irreversibility and

increasing maturity to vocational development theory. His analysis is particularly relevant to the theories of Ginzberg and Super. His article¹³ "The application of General Development Principles to the Vocational Area" (1955), along with a critical appraisal of their theories, form a sound basis for an understanding of vocational development of children.

2.2.1.4 Roe's theory - 1957

In her theory, concerning the determinants of vocational choice, Roe¹⁴ emphasizes the importance of early satisfactions in the development of interests and the unconscious needs that determine the nature of these interests. She has presented a schema which includes the child's pattern of early experiences with parents, the relationship between parental attitudes and need satisfaction, and the style of parental handling of the child. This schema leads to the prediction of the broad and general vocational orientation that develops in the individual.

Roe has developed an occupational classification scheme based on groups and levels. She employed Maslow's¹⁵ hierarchical classification of needs as a working formula for needs. Roe has formulated seven basic hypotheses, in connection with Maslow's theoretical interpretation of needs. The most important among these assumptions are (i) the intensity of unconscious needs and their organization is a major determinant of the degree of motivation as expressed in accomplishment; (ii) routinely satisfied needs do not develop into unconscious motivators; (iii) the higher order needs which are not satisfied will become expunged; (iv) the unsatisfied lower order needs, present the appearance of higher order needs and will become dominant and

restricting motivators; (v) the satisfaction of needs which are delayed but eventually accomplished will become unconscious motivators; they depend upon the degree of satisfaction of the subject.

Roe asserts that these needs develop to a great extent from the attitude of the parents towards the child during the child's early formative experiences. The developed attitudes, interests and capabilities will give expression in the general pattern of adults' life, including in his vocational choice.

2.2.1.5 Hoppock's theory - 1963

Hoppock's¹⁶ theory includes ten basic propositions. Four of them which indicate the rationale of his theory are listed below:

- (i) occupations are chosen to meet the emotional needs and particular values; they are often unconscious (as for example, a need to remain in a familiar environment or a need to play a dominant role); the self-concept is considered essentially as a constellation of needs;
- (ii) the individual chooses the occupation which he feels will best meet his needs;
- (iii) needs may be individual and personal; in certain cases they may be intellectually perceived or they may be only vaguely felt as attractions which draw the individual in certain directions, but in either case, they influence his choice; and
- (iv) occupational choice is always subject to changes; choices may change as frequently as a person's awareness of his needs changes or when he discovers that another occupation might better meet his needs.

This theory is based on many psychological studies. In Hoppock's¹⁷ words: "Psychological factors influence the extent to which one perceives his own needs, accepts or suppresses opportunities and of his own abilities and limitations, and thinks rationally about all these facts".

2.2.1.6 The theory of Bordin and his associates - 1963

Bordin, Nachmann and Segal¹⁸ developed an analytical scheme of vocational choice, based on an identification of the gratifications that varieties of work situations (available to individuals) provide. The theory emphasizes the importance of early experiences to occupational pursuits. This theory seeks to cover the entire life-span of an individual. Bordin and his associates make the following assumptions, in developing their theory:

1. There is continuity in the vocational development of individuals. It links the earliest work of the individual in eating, other bodily activities and coping with the stimulations of the environment, to the most highly abstract and complex of intellectual and physical activities.

2. The instinctual sources of gratification are retained in the adult activities as the simple infantile ones.

3. The strengths and configurations of human needs are subject to continued modification throughout the life span. But the essential pattern of needs is determined in the first six years of life. During the school years, the precise appropriations of occupational outlets are sought out. But needs which are the driving forces of occupational outlets are set before that time.

The authors¹⁹ establish a series of dimensions (needs, motivations, impulses

and activities) which account for the major gratifications that work offers. Occupations are then described in terms of the relative strengths and modifications of the component dimensions. Achievement of these dimensions comes through "...repeated weaving back and forth between job analysis, personality traits and assumptions regarding childhood experiences which generate...traits".

2.2.1.7 Steffle's theory of vocational development - 1976

Steffle's²⁰ (1976) theory of vocational development is based on the following propositions:

1. An occupation permits the expression of an individual's personality.
2. The individual's choice of a particular occupation represents the mask he would like to wear in society.
3. An occupational role usually represents an approach-reaction and simultaneously an avoidance-reaction, that is, it appears attractive and hence tempting enough to be chosen; but it also suggests the less apparent and possible hazards leading to avoidance-reaction.
4. Society exerts certain limiting forces which determine the occupational personality of any individual.

In short, the factors which lead an individual to choose an occupation are influenced by his age, sex, social class etc. For some individuals occupational choice may be critical and ego-involving while for others, it may be peripheral to their personality identity.

2.2.2 Differential perspective

2.2.2.1 Holland's theory of vocational choice - 1959

Holland's²¹ theory of vocational choice is based on a theoretical frame-work of varied differentialist perspectives. The differentialist approach assumes that optimal career outcomes for both individual and organizations are facilitated by ensuring the basic congruence between individual characteristics and job/organizational demands.

In 1959, Holland, based on his experience of career counselling, argued that individuals develop preferred methods for dealing with environmental tasks called 'vocational orientations' or types. The more closely an individual resembles a particular vocational type, the more likely he or she is to exhibit the associated traits and behaviours. Knowledge of vocational type is used to 'pair' the individual with a particular environment with a view to 'optimising' the match between them. The theory proposes that 'other things being equal', the better the match between type and environment, the more beneficial the outcome.

Each type is the product of an interaction between a variety of cultural, familial and personal factors, and indicates a preference for some activities over others--an occupational interest. The evolution of particular occupational interests frames thinking (for example, self-expectations) and feeling (for example, satisfaction) behaving (for example, seeking out particular types of activity, experience and people). People vary in their orientations. The stronger the orientation, the greater it will predict career

choice. Holland proposed that individuals seek congruence between their vocational interests and the environments in which they work. Congruent individuals should be more satisfied and do not like to change their work environment than incongruent individuals. Incongruence can be a major cause for stress and dissatisfaction and individual is motivated to search for other environments, which will support the needs based on his traits.

2.2.3 Decision -making perspective

2.2.3.1 Hilton's theory of decision-making -1959

Hilton's²² theory stresses the basic principle relating to human behaviour that the recognition of dissonance leads to decision-making. The individual thinks that an occupation has more unattractive than attractive features and since the dissonance level is high, he is convinced that the decision to choose to enter it will not be satisfactory. He feels the need to reduce the level of dissonance in his life.

The universally accepted principles associated with this theory are:

1. Uniqueness of the individual and his traits, interests and abilities.
2. Interaction of the individual with the situation which determines his development
3. Career development begins early and continues throughout the life of the individual
4. Career development involves growth and synthesis of the self and the environment. Career development involves the making of increasingly responsible choices.

The choice of career is based on:

1. Subjective factors like personal values
2. Occupational opportunities
3. The degree of expectation that the individual has of being accepted; and
4. The expectation of satisfaction

The direction and career choice are guided by familial and cultural factors.

2.2.3.2 Tiedeman and O'Hara's theory - 1963

All career theories make statements about career decision-making. Tideman and O'Hara²³ support the use of 'frontiers of decision making' in career development. They²⁴ define career- development "as the process of fashioning a vocational identity through differentiation and integration of the personality as one confronts the problem of work in living".

Tideman and O'Hara treat personality as a basic determinant of career development. Differentiation and integration are the mechanisms which are used by human beings as tools for career development. In personality development also, the processes of differentiation and integration are dominant. Differentiation comes through visual perceptions, thoughts, feelings and experiences. Stimulation for differentiation originates both internally and externally.

Integration is the combination of differentiated parts into an appropriate context. Integration is not achieved without prior differentiation.

Differentiation and integration occur in rational solutions to the problem of the individuals' vocational situation.

Tideman and O'Hara present a paradigm of the process of differentiation and integration. This model presents how the decision-making process operates. The processes involved in decision-making could be divided into two aspects, viz, the 'aspect of anticipation' and the 'aspect of implementation'.

Anticipation aspect can be divided into the following four steps:

- (i) Exploration: during this step, the individual considers different alternatives and possible goals; he is influenced by past experience, his abilities and capabilities and seeks help to modify or continue his present state.
- (ii) Crystallization: after considering the advantages and disadvantages, cost and value of each alternative, crystallization or stabilization emerges
- (iii) Choice or decision: a relevant goal orientation to the individual for solving his problem.
- (iv) Clarification: a step where the individual is able to get perfect image of his future and gets ready for action

Implementation (adjustment) aspect involves the following three steps:

- (i) Induction
- (ii) Reformation and
- iii. Integration

Induction: in this step the individual gains acceptance of others

Reformation: the individual gets accepted by the society; he asserts his convictions of his role in society

Integration: synthesis of the convictions of the older group and the convictions of the individual

Differentiation and integration are repeated many times in one's course of life. Career development is self-development related to choice, entry and progress in educational and vocational pursuits. Career development occurs not in just one decision, but within the context of several decisions.

Tideman and O'Hara have paid due attention to time and occupation. They discuss the 'work history' of man and methods for assessing career development. Man is not required to stick to one occupation throughout his life. Many events will occur; new goals can be decided upon, new occupations may arise, jobs may be abolished, and time may permit the holding of more than one position at a time.

The decision-making aspect of career development is important to the contemporary organizational world which is characterized by continual change and transition. The opening up of multiple potential career pathways heightens the importance of individual career choices and decisions.

2.2.4 Behavioural Perspective

2.2.4.1 Krumboltz' theory of social learning -- 1976

In the late 1970's, career theories were heavily influenced by

the application of social learning theory to the issue of occupational choice, as pointed out by Krumboltz *et.al*²⁵ (1976). This approach is closely associated with Bandura's²⁶ (1977) work proposing that people learn from the consequences of their own behaviour and from their observation of other peoples' behaviour. In this tradition Krumboltz *et.al*²⁷ (1979) have paid particular attention to the influences on career decisions posed by learning experiences. There are two approaches to the resulting learning-instrumental learning and associative learning. Instrumental learning arises from the consequences of such feed back from others, and the observable results of one's own action.

Associative learning occurs when an individual pairs one factor or situation with another--for example, particular occupations become associated with particular feelings and thoughts. Individuals tend to form generalizations about occupations from a few examples; often the first associations formed are long lasting, for example, a nurse conceived as 'ministering angel', in a beginning course.

Krumboltz *et. al*²⁸ hypothesises that an individual is more likely to express a preference for a particular occupation, job or field of work, under the following conditions:

(i) if he or she has been positively reinforced, and or has observed a valued model (parent, sibling) being reinforced for engaging in activities known to be associated with the success in a particular line of work, for example, "my mum is a doctor";

(ii) if he or she has been positively reinforced by a valued person

who models or advocates engaging in activities associated with a particular line of work;

(iii) if he or she has been exposed to positive words and images associated with a particular occupation, for example, medicine associated with power, status and prestige

This theory seems highly mechanistic and has been criticized as one which is difficult to understand. But there is research evidence which shows that the power of association will help to dictate the images people hold about particular occupations or fields of work.

The value of the social learning approach is in highlighting the basis of decisions, often in abstractions and ideals that are not consistent with reality. In being provided with information and 'preview' experiences, an individual may at least have the opportunity to road test their learned preferences and assumptions. There is theoretical support to this view that of 'modeling' experiences help in formulating the way in which careers are pursued in organizational contexts. It is in this connection that the concept of career self-efficacy derives importance.

2.2.5 Structuralist Perspective

2.2.5.1 Roberts' theory of opportunity structures-1977

Roberts'²⁹ theory relating to occupational choices starts with the assertion that the concept of 'occupational choice' itself is meaningless. People can only take what is available. There is often very little scope for choice. Job preferences are not mere matters of individual taste, but are

determined by a system of stratification and opportunity. Aspirations are products of anticipatory socialization and not preliminaries to decisive occupational choices. Career workers, should concentrate on practical employment problems. Vocational guidance cannot change the employment realities of society or create opportunities for personal growth and development. This analysis highlights the importance of putting careers into an opportunity structure that may pose limits on the kinds of choices made, and then realized by young people.

2.2.6 Organizational theory

2.2.6.1 Schein's theory - 1978

The theory of Schein³⁰ is what is described as an 'organization-centred' theory of career. Its focus is on the managerial career. Schein³¹ (1990) argued that people enter work, with particular career anchors, summarizing their hopes and expectations, occupational interests, values and skills, which constrain their career decisions. Five career anchors (assumed to provide a stable basis for self-evaluation, particularly during times of change) were proposed: technical-functional competence, managerial competence, security and stability, creativity and autonomy/ independence. The small size and select nature of the sample (well-educated, career-oriented) on which this analysis is based has been strongly criticized. Despite this, it is clear that individuals do bring various career orientations with them to the workplace involving expectations critical to understanding how individuals interface with the institutions that afford them career opportunities. The role of values in accounting for variations in career outcomes has increased in

importance because of an ever widening choice coupled with the inextricable link found today between career choice and personal development.

2.2.7 Vocational counselling theory

2.2.7.1 Williamson's trait – factor theory of vocational counselling - 1965

The trait-factor type of vocational counselling (Williamson³², 1965), consists of techniques based on an early German and French concept of personality which states that man is an organization or pattern of capabilities (Hall & Lindzey³³ 1957). These capabilities were originally referred to as 'faculties of the mind'. Factor theory originated from faculty psychology. This theory is grounded on a theory of personality organization. In this, the role of counsellor is to help the individual, learn to understand and to apply to his own self-information, arrived at through psychometric means, vocational information and case study in the context of his whole perception of himself as a unique individual.

The most renowned proponent of this theory is Williamson³⁴ (1939). Fundamental to trait-factor type of counselling is the assumption that man seeks to use self-understanding and knowledge of his abilities as a means of developing his potentiality. According to Williamson³⁵, "The task of trait-factor type of counselling is to aid the individual in successive approximations of self understanding and self management by means of helping him to assess his assets and liabilities in relation to the requirements of progressively changing life goals and his vocational career".

The theory is based on the following premises:

- (a) Individuals are organised in terms of a unique pattern of capabilities and potentialities (traits)
- (b) These traits are correlated with the requirements of different jobs
- (c) Testing is the best means of predicting future job success
- (d) Each individual attempts to identify his own traits in order to find a way of working and living which will enable him to use his capabilities effectively

Williamson laid great emphasis on man as a rational being, who once possessing adequate information about himself is then capable of making a wise choice.

The different theories related to vocational choices of school children present a wide range of concepts and theoretical interpretations relating to all aspects of the development of the concept of vocational information and vocational self-concept. The theoretical positions taken by many prominent psychologists and educators underline the importance of providing vocational information through formal education. Despite the diverging (and in some cases at least mutually supporting views), we have to take a stand that the concept of vocational information and the related terms like development of a vocational self-concept on the part of school students need to be given special attention in the school curriculum and treated as one of the major focuses of modern education. The importance of developing proper conceptions about future vocations and making a rational choice of one's vocation is critical in the present fast-changing world scenario where conventional vocations and vocational choices are getting outdated, and new vocations are appearing so fast that they create difficulties in the vocational choice for school students.

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CHAPTER III

REVIEW OF RELATED LITERATURE

- **Studies related to vocational information and socio-economic status**
- **Studies related to vocational information and intelligence**
- **Studies related to interest of school children**
- **Studies related to vocational maturity of school children**
- **Studies related to occupational preferences and choices of school children**
- **Studies related to the impact of guidance and counselling programmes in schools**
- **Other miscellaneous studies**

REVIEW OF LITERATURE

The present study, as explained in a number of earlier contexts, is an attempt to assess the vocational information of students of higher secondary classes of Kerala, in three major professional areas viz, medicine, agriculture and engineering, and examine how this variable is distributed in the general population of secondary school students, and how the scores of the subjects in vocational information are influenced by factors like intelligence, class achievement in science subjects, socio economic status, as well as gender and residence of the sample of students.

The investigator reviewed the literature bearing on the main theme with a view to developing a general background of the area under investigation. The survey was used to develop a perspective of the information available, identify the procedures used by the investigators and obtain an overview of the theories bearing on the theme and use these for designing the hypotheses for the present study as also for designing the procedure, interpreting the findings etc. The studies reviewed include those conducted in foreign countries as well as those conducted in India. The reviews, however, were done with greater importance given to Indian studies

Classification of related studies

The collected studies have been organized and summarized as under:

- 1.1 Studies related to vocational information and socio-economic status
- 1.2 Studies related to vocational information and intelligence, class achievement, gender of subjects and locale
- 1.3 Studies related to vocational interests of school children.
- 1.4 Studies related to vocational maturity of school children.
- 1.5 Studies related to occupational preferences and choices of school children.
- 1.6 Studies related to the impact of guidance and counselling programmes in schools.
- 1.7 Other miscellaneous studies

3.1 Studies related to vocational information and socio-economic status.

Selecting a career is often a long, difficult and unsettling experience for a school student. High school students are expected to possess the basal information on many kinds of careers or jobs, if they have to obtain dependable information for making a correct vocational choice at a later point of time. The world of work in the present-day social scenario is changing so rapidly that the latest information about vocations get outdated within a short period. So students should be trained to develop useful vocational information, which have a carry over value for later use, during their school career itself. Studies reveal that the pupils, coming from low socio-economic strata, are in general, less

knowledgable about the types of jobs, courses and training opportunities in various kinds of vocations as compared with students from higher socio-economic strata. A number of studies show that social class of the school pupils is significantly correlated with their career choices.

Studies by Form and Miller¹ (1949), Galler² (1951), Smelser³ (1963), and Youmans⁴ (1956) found that cultural and sociological factors which impinge upon the vocational choices of the higher secondary students are indices of the vocational information available to students. Socio-economic status of students was found to be significantly related to their vocational choices, in all these studies.

A number of research studies indicate that high school boys and girls from lower socio-economic classes (as defined by fathers' occupation and in other related variables) have lower vocational aspirations. Similar findings have been reported from farm children, as compared to urban children (Burchinal⁵, 1961), although there is some evidence to the contrary when intelligence is concerned (Grigg⁶, 1959).

Generally, the results of studies comparing the occupations, or occupational levels of fathers and sons reveal that children generally follow careers that resemble those of their fathers, within the context of a general upward striving in American society. Thus, some upward movement may be seen, but generally it is slight. Jensen and Kirchner⁷ (1955) indicate that sons tend to follow the general type of occupation that their fathers have engaged in; when they do not, sons tend, in general, to enter an occupation at a higher

socio-economic level. This choice is an indirect indication of the superiority such children have about their fathers' professions as compared to other students.

Nelson⁸ (1963), reports that school students from higher socio-economic families, with higher IQ's and from urban areas knew more about occupations and of different statuses associated with different professions than children coming from less favourable home circumstances.

George and Mathew⁹ (1966) studied the vocational preferences and vocational aspirations of school leaving pupils and the relationship of vocational aspirations to sex, caste, parental income, parental occupation, urbanization, neuroticism and academic achievement of pupils. The researchers concluded that religion and caste can influence the vocational aspirations of the pupil in many ways. The study showed that the professional grouping based on castes followed in India could be seen reflected in the vocational preferences of children. The study showed that fewer backward Christians aspire to become doctors and engineers, fewer Muslims and Ezhavas opt to become teachers and fewer members of the scheduled castes opt to become doctors. The study by Rehberg and Westly¹⁰(1967) found that the frequency of parental encouragement was positively associated not only with the educational expectations of adolescents, but also with their occupational expectations as well.

The National Career Thresholds' Survey¹¹ (1970) tapped a

wide range of socio-economic levels. The result indicated a strong relationship between the amount of knowledge of subjects about the labour market and the socio-economic level of father's occupation. Sons of white collar workers scored higher on the test compared to sons of service and blue collar workers.

Defleur and Menke¹² (1975) surveyed the occupational knowledge of high school males. The findings revealed that the high social class subjects did not possess more knowledge about the higher status occupations. The lowest social class levels had significantly higher knowledge scores than these at the highest level, on certain select occupations, more specifically occupations towards the lower end of the socio-economic scale like saw-mill workers, local truck drivers, mechanics and salesmen. These occupations were more fully understood by the sample, as a whole. They were most sharply understood by youth in the lower social class level than others.

Osuji¹³ (1976) studied the patterns of vocational choice and aspirations of 319 students (average 18 years) from 5 secondary schools in Nigeria, using a questionnaire schedule. The results revealed a durable and early crystallization of vocational decision and commitment. Excepting the girls, socio-economic status of the students had little influence on their level of vocational aspirations. Results were in contrast with the findings in many studies in some industrialized western societies where students differed vocational decision and commitment as long as possible, and also to use students' socio-economic background

in conditioning their level of vocational aspirations. These differences in vocational behaviour and aspirations between Nigerian students and their West European counterparts are explained in terms of socio-cultural differences and differences in the level of technology, industrialization and economic activities.

In an Indian study Bharadwaj¹⁴ (1978) studied the impact of creativity and intelligence upon the vocational interests of college students, for various of socio-economic strata. The study showed that the creativity components such as creativity production, fluency, originality and flexibility played a negative role in bright adolescents, but played a positive role in less intelligent adolescents of this category. Intelligence consistently demoted vocational interests of high-SES groups. SES promoted vocational interests when adolescents possessed high-creativity with low intelligence. At the high-SES level, creativity components promoted vocational interests in less intelligent students and demoted them in the case of bright adolescents.

Bharadwaj and Gupta¹⁵ (1980) examined the interests of high school students in scientific pursuits as it relates to fluency, intelligence and socio-economic-status. The findings indicate that only fluency tended to promote or demote interest in scientific pursuits, for differing levels of intelligence and SES. Intelligence was seen to play an important role where there is a variation in the levels of SES. It was also found that interest in scientific pursuits was higher in mid-SES groups.

Holland¹⁶(1981) investigated the relationships among variables like career maturity, self-concept, socio-economic status, race, sex, place of residence and age. He studied 300, students of 6th grade (146 males and 154 females); the study showed that although race was not a significant source of variance on the Career Maturity Inventory and Attitude Scale (CMI-AS), the interaction of race and socio-economic status was significant. But sex, place of residence (urban and rural) and age were not significant sources of variance on the CMI -AS.

Uplaonkar¹⁷ (1982) investigated the social background and occupational aspirations of college students. Based on semi-structural questionnaires administered to 1300 second-year students in all the colleges of Gulbarga city (Karnataka, India), it was found that the occupational aspirations, due to modernization in India, continues to be influenced by the social background of college students.

Sashi¹⁸ (1982) investigated the role of socio-economic status and occupational values as determinants of occupational choices of adolescents. The study proved that the persons in low-economic status evinced higher interest in executive jobs, while persons belonging to the upper classes had an average interest in executive jobs. The middle-class persons, evinced least interest in executive jobs. The low-class had the highest degree of interest in agriculture while the upper class had least interest in agriculture-related jobs. Persons of lower socio-economic status evinced the highest degree of interest in social work. The middle class had an average degree of interest in the same area where as upper class evinced least

degree of interest in social work. In household jobs, the upper class had highest degree of interest, the middle class had an average degree of interest and the lower class showed only a low degree of interest in this area.

Kakkar¹⁹ (1983) studied the impact of vocational attitudes, interests and work values on the job satisfaction of 800 women belonging to teaching, mechanical, clerical and medical occupations in BHEL, Bhopal. In addition, the occupational aspirations of these women were compared with those of 113 higher secondary girl students in vocational streams. Age, educational level, vocational attitudes and work values turned out to have positive and significant relationships with job satisfaction as well as with work attitudes and vocational interests of women in different occupations. Age and SES had a significant relation with vocational interests and occupational aspirations of girl students.

Strudwick²⁰ (1985) investigated the relationships between education and anticipated future employment and/or continued education mediated by social background. The sample of grade eleven students (N=1010) were drawn from 19 of Jamaica's 45 high schools. Analysis of the data led to the conclusion that students from a higher social background were more confident of gaining further education, more concerned about their employment opportunities, less concerned about the island's future and much more likely, to anticipate migrating overseas than were students from the less fortunate backgrounds.

Dabir²¹ (1986) studied how variables like aptitudes, motivation, socio-economic status and vocational aspirations of secondary school students are related to one another. The study showed that the relationship between socio-economic status and vocational aspirations was the most dominant relationship. Vocational aspirations were seen to be a function of the aptitudes as also of the socio-economic status of subjects. Achievement motivation was seen to be a major determinant of the vocational aspirations of the subjects.

Robert's study²² (1988) was intended to test whether the vocational choices of higher secondary students depend upon their socio-economic status. The study used an SES Scale, a Vocational Interest Record and a questionnaire for measuring Parental Aspiration on Childrens' Vocations. The study found that vocational choices of higher secondary students were independent of their socio-economic status and the vocational aspirations of their parents. Both boys and girls had similar vocational dispositions towards areas like agriculture, arts, literature, executive, commerce, science and social works. However, more girls preferred 'house hold work' as a vocation as compared with boys.

Srivastava²³ (1988) studied the influence of variables like academic achievement, personality, socio-economic status on the vocational development of higher secondary students. The study concluded that vocational development of the subjects was related to academic achievement and socio-economic status, but not to their sex and levels of education.

Mishra²⁴ (1990) investigated the relationship between educational interest and SES of high school students. His study also explored the effect of sex and residence on their vocational interests. The sample consisted of 200 high school students, 100 urban and 100 rural. SES was found to be positively related with administrative and scientific interests and negatively related with agriculture and social service areas of interest.

Kaur²⁵ (1990) studied the educational and vocational aspirations of high school students belonging to different socio-economic locales of Jammu Division. It was found that both educational and vocational aspirations were influenced by SES, sex and locality when taken independently. Urban students differed significantly from their rural counterparts in their educational preferences and vocational aspirations. Rural students were found to aspire for high academic degrees or for a degree in arts, as against urban students who aspired for high professional degrees or for a degree in science.

The study by Sharma *et al*²⁶ (1990), explored the differences in the vocational interests of socio-economically advantaged and non-advantaged students of higher secondary schools. The results revealed that the socio-economically advantaged group had significantly stronger vocational interests in literary, artistic and persuasive areas than their non-advantaged counter parts.

3.2 Studies related to intelligence /achievement / gender / locale.

A number of studies have been conducted to find out the effect of intelligence / achievement / gender / locale on vocational information.

A study by Sparling²⁷ (1933) show that aspirations are closely related to intelligence, despite influence by the family and social pressures. Intelligence has been found to be related to the occupational level aspired i.e. the brighter the individual, the more likely he aspired for higher level occupations, and the duller he is, the more likely he is to be interested in lower level occupations.

Yum²⁸ (1942) in a study of college juniors and seniors enrolled in the biological and social science divisions, found statistically significant and consistent differences between men and women in their vocational preferences. While men were found to be significantly higher than the women in their choice of scientific and persuasive activities, women were significantly higher than men in their choice of artistic and social service activities.

A study by Singer and Steffle²⁹ (1954) was addressed to the question of whether sex roles influence adolescent desires in the fields of occupational selection and adjustment. Study compared the job values and desires of seventeen-year and eighteen-year old male and female high-school seniors. The boys were found to desire a job offering power, profit and independence more often than the girls, who were found to be more inclined

to select or value jobs characterized by interesting experiences and social service.

Lipsett³⁰ (1955) studied the differences in the occupational aspirations of those raised in rural and urban communities and concluded that urban-reared youth have greater acquaintance with the broad spectrum of occupational possibilities that exist in the cities than to rural youth. It is the knowledge of these opportunities which stimulates urban youth to aspire and work toward high-status occupations.

Stinchcombe³¹ (1964) found that higher performance in a high school occupational information test indicates more concern with the future higher performance, may indicate more commitment to and involvement in conventional values and activities, such as the legitimate occupational world, and more perceptive to occupational information.

A study by Kumar³² (1966) revealed that normal group of higher secondary boys showed interest in humanitarian and computational areas. Normal girls showed greater interest in physical science and executive areas. Below-normal boys showed greater interest in computation as against below-normal girls who showed greater interest in biological science areas. Super normal children showed interest in linguistic and biological areas.

Lawson and Hartley³³ (1967) made a study to identify the important factors which determine the vocational choice of high school children. The investigation revealed that the boys appear to be more affected by the family and by jobs with which they are in daily

contact than the girls, who are more influenced by the peer-group and the school vocational programmes. The study further concluded that the influence of the peer-group on the girls create interests and needs in society related interests rather than in an area providing better vocational opportunity.

Almquest and Angrist³⁴ (1971) investigated the effect of role models and reference groups on college women's career aspirations. They found that career-oriented women have working mothers and have been exposed to occupational role-models in choosing a career. Non-career-oriented women in the study who found to have mothers who are more often active in leisure pursuits.

Reddy³⁵ (1972) carried out an investigation to study the vocational needs of the boys of secondary schools in relation to their occupational choices. The study revealed that the occupational choices of the subjects were found significantly related to their social status, irrespective of their grade/ class or locality differences. There was a significant difference between the vocational need scores of high mental ability and low mental ability groups of subjects on the vocational needs, working conditions, monetary returns, job security, variety, suitability of activity, moral values, recognition, advancement and independence.

In his study, Yadav³⁶ (1979) found that intelligence and socio-economic status influenced the vocational preferences of the adolescents in choosing their courses of study. Intellectually brighter and economically better students went to science and commerce streams

where as poorer ones went to arts subjects. This conclusion extended support to Super' developmental theory of vocational behavior. Intellectually, academically and socio-economically superior adolescents were more definite and specific in their vocational preferences than their opposites.

In their study of kindergarten and sixth grade students, Schlossberg and Goodman³⁷ (1972) found that these students, regardless of age, can identify traditionally masculine and feminine occupations. In addition, these children choose occupations that fall within the usual solid stereotypes. A study of fifth-graders revealed similar results. Although girls are less willing to reverse traditional sex-tied jobs, they are more willing to see occupations open to either sex. The study also found that girls have varied career aspirations.

Bayti³⁸ (1972) studied the vocational aspirations of adolescents as related to adjustment. In determining the factors involved in occupational choice, some forms of sex differences were noticed. Factors preferred by boys were opportunity, qualifications for the job, healthy environment and permanency. Girls on the otherhand mentioned opportunity for social service, interest in the job, healthy environment, good future prospects and high social status as reasons for their job preference.

Kaur³⁹ (1976) investigated the relationship between career patterns and individual's intelligence, scholastic achievement, parental background and other personality characteristics. The sample consisted of girl students who have passed their higher secondary examination. The study showed that the relationship between intelligence and career patterns did not

reach the highest acceptable level of significance. There was little evidence to relate career pattern with scholastic achievement. On the other hand, there was evidence of relationship between career patterns and parental background and present living conditions.

Vohra⁴⁰ (1977) conducted a study to investigate the relationship among intelligence, aptitude, personality, academic achievement with occupational choice of polytechnic students. The results proved that intelligence played only a minor role in their choices for technology group occupations. Occupational choice and aptitude were seen to be significantly and positively correlated. Personality and academic achievement did not play any role in the choice of occupational courses.

Chadha⁴¹ (1979) in his study investigated the influence of certain psychological and social factors on vocational aspirations. The study found that some psychological and social factors are related to vocational aspirations of rural and urban high school children. The urban boys aspired for engineering, and health science areas where as the rural boys aspired for teaching, social welfare and engineering vocations. SES and intelligence were seen to be positively and significantly related to the levels of aspirations of fathers and sons of both rural and urban children. The social adjustment of rural children and level of their aspirations were significantly related. The urban fathers' aspirations were related to the need achievement and need persistence of their sons who preferred higher level occupations.

A survey of 2,112 high school seniors in Alabama by Fotler and Bain⁴² (1980) indicated that only 3.3 % of all students and 4.1% of students who had made an occupational choice aspired for management careers. Sex was found to be a major discriminator.

Sahib⁴³ (1980) in a study indented to find out academic and non academic abilities of higher secondary students in relation to their vocational interests, The study came to the following conclusions:

- (a) Academic and vocational-stream students differed markedly in their academic abilities; the academic stream students displayed higher academic abilities.
- (b) Academic students were better in leadership, writing and science talent whereas the vocational students were better in social service, music, games and sports.
- (c) Academic and vocational stream students differed in their distribution of primary interests; academic stream students showed primary interest in the areas of physical science and biology whereas vocational stream students, indicated primary interest in the areas of business and computations; both the streams showed equal interest in music.

A study carried out by Uchat⁴⁴ (1981) to find out the relationship between the level of intelligence and the vocational aspirations of the high school students, and their fathers' education and occupation levels. The major findings of this study were: boys with higher level of intelligence aspired higher level vocations and girls who aspired for higher

level vocations possessed higher levels of intelligence; subjects of higher intelligence level (irrespective of sex) possessed higher vocational aspirations; the subjects of both sex whose fathers had higher educational qualifications belonged to higher intelligence levels than subjects who had fathers of lower educational qualifications; the intelligence level of subjects (irrespective of sex) was related to the occupational level of their fathers. Also students whose fathers were in higher level occupations, belonged to higher levels of intelligence.

Siegfried *et al*⁴⁵ (1981) conducted an investigation to find out sex differences in job preferences. It was found that female job preferences were related to their mother's educational achievement.

Toong⁴⁶ (1982) in his study on vocational aspirations in relation to creativity, personality, achievement and socio-economic status of high school students, found that the major portion of students aspired for the teaching and welfare fields of activity, while only a small portion of the students opted for artistic and literary fields. Nearly 65% of the group aspired for work in the fields of engineering and health.

Bhatnagar⁴⁷ (1983) made a survey of the occupational choices of adolescent high school girls and the factors influencing their choice. The study found that girls make highly diversified occupational choices. The most significant factor influencing vocational choices of girls was interest in the areas of their choice. This was followed by variables like 'yearning to serve humanity', 'serving the poor / backward', 'serving sick/disabled', etc. Other factors were 'motivation to see different places',

‘to please oneself’, ‘to be a model for youngsters’, and so on. The study further showed that only ten percent of the girls were able to make occupational choices in accordance with their vocational interests.

Holleran *et al*⁴⁸ (1984) examined the relationship between selected personal attributes and career choice in 44 male and 69 female undergraduates. The results showed that biological sex was the most influential predictor of sex-dominant career choices for all students, particularly for males.

Mehtha *et al*⁴⁹ (1985) studied the effect of residential status and sex on level of occupational aspirations of adolescents as also the relationship between socio-economic status, fathers’ education, fathers’ occupation, intelligence and scholastic achievement with the level of occupational aspirations. The study revealed that the residential status and intelligence did not influence the level of occupational aspirations of adolescents. There was a strong indication of sex differences on the level of occupational aspiration, in favour of girls among both semi-urban and urban students. The girls did not consider the role played by scholastic achievement in realizing their career aspirations. For boys, significant predictors of their level of occupational aspirations were number of occupations known, and scholastic achievement.

Grevious⁵⁰ (1985) found that males’ aspirations are significantly more prestigious than those of females. There are sex differences in choice field, and when males and females aspired to the same general fields, they select different areas of specialization.

Sing and Sengar⁵¹ (1990) found that class VIII rural subjects' vocational experiences were influenced by self-concept and socio-economic status. The negative self-concept showed lower vocational aspirations.

3.3 Studies related to vocational interest

Berdie⁵² (1943) studied a group of 136 male college students in an attempt to determine the factors that are associated with vocational interests. The study indicated the importance of factors in the individual's back ground and value factors. Berdie identified a number of value factors as related to vocational interests. The major findings of the study were:

1. There is a strong association between a value one holds and his vocational interests; many occupational choices are influenced by hero worship.
2. Interest in an occupation is related to the financial rewards offered by the occupation.
3. Family attitudes and influences shape one's value factors.

Sidhu⁵³ (1974) conducted a study on the vocational interests of higher secondary students with a view to developing proper guidance programmes in selecting appropriate careers. Once students were given scientific proof of their interests, they tended to devote whole-heartedly to the courses selected on the basis of their interests.

Sinha's⁵⁴ (1978) study was intended to find out the vocational interests of high school students and the role of the family in developing such interests. The study showed that interests of students in artistic and musical fields were engendered in the family environment. The study also

showed that where children were not accepted by their parents, and there was an absence of democratic values among children. Family environment characterized by parental avoidance and projection of high economic and social values motivated the students to take up vocations in computational business and persuasive fields. Family environment characterized by amicable parent-child relationships, inculcated among children a liking for vocations in the scientific and executive fields.

John⁵⁵(1981) carried out a comparative study to understand the relationship between vocational interest and self-concept as well as perceptions about the future of adolescents. The sample consisted of 180 high school students and 540 adolescents from outside the school.

It was observed that vocational interests of adolescents were directly related to their socio-economic status. Middle class adolescents had a more stable self-concept and a more extended future orientation. The ideal actual discrepancy in self-concept was greater among non-school going lower strata of adolescents.

In a study of vocational interests of higher secondary school students by Jayapoorani⁵⁶ (1982) found that a majority of students (84%) of the sample preferred subjects like Natural Sciences, Mathematics and English. While boys showed greater interest in engineering jobs, girls preferred to work as doctors. The study also found that both boys and girls developed their vocational interests between 13-15 years of age.

Jain⁵⁷ (1984) studied the comparative development of different interests of urban and rural high school students of Delhi. He concluded that

the urban boys had higher interest in academic subjects than rural boys. While the rural boy was not much concerned with the choice of a career, the urban boys showed greater appreciation for art, poetry, music, dance, painting and drama, than rural boys. Also, the urban pupils had higher mechanical and scientific interests than rural pupils. Urban and rural subjects were seen to have identical interests in sex and romance.

The study by Tomer⁵⁸ (1985) was designed to explore the occupational interest trends of adolescents relating to sex, rural-urban residence, socio-economic background and prevalent job trends of employment. The study revealed that the dominant occupational interest trends of boys in the descending order of importance were agriculture, literature, fine arts, science, crafts, outdoor activity, technology, medicine, sports and household activities. The dominant interest trends of the girls, in the descending order of importance were fine arts, literature, craft, technology, science, household matters, sports, outdoor activities, agriculture and medicine. There was considerable conformity between the occupational interest trends of adolescents and the prevailing job trends of employment.

Sharma⁵⁹ (1986) found that a majority of adolescents in the high- intelligent and high-creative groups showed varying degrees of vocational interests--high, above average and average interests in vocational areas. Most of these subjects came from the middle strata of society. Gifted adolescents who showed high or average interest in different vocational areas came from the upper-middle socio-economic strata of

society. Because of very high parental aspirations, the parents of the intelligent, creative and gifted adolescents exerted commendable influence on the future vocational interests of their wards.

Gautam⁶⁰ (1988) investigated the educational and vocational interests of students at the delta stages in schools—classes VIII and X. Significant correlation was found in the preference orders of boys of classes VIII and X in both educational and vocational interest areas; no significant correlation was found in the case of girls, especially in interests relating to the educational areas, while a significant correlation was noticed in the case of vocational interests. Significant differences were found between the scores of boys and girls in all the areas of educational and vocational interests. Also, significant correlation was noted in the preference order of urban and rural students of class VIII in both areas of interests, which showed that their interest preferences were similar.

A study of risk-taking, self-esteem and family status in relation to vocational interests of higher secondary students was conducted by Makhiza⁶¹(1988). The study found that risk-taking and vocational interests were significantly related. Risk-taking was found to be significantly and positively related to literary interests, scientific interests executive interests and outdoor interests, but negatively related to agriculture, constructive, commercial, persuasive, social and house-hold interests. Self-esteem was seen to be positively related to social jobs and negatively related to constructive and agricultural jobs. Further, a study of vocational interests of males showed that they were high in executive, social and

scientific jobs. There was moderate interest in persuasive, artistic and literary jobs and low interest in commercial, agricultural, household and constructive jobs. Family status was found to be a significant determinant of artistic and agricultural interests.

Sodhi⁶² (1988) made a study of vocational interests and occupational choices of adolescent girls of class X. The study found that, very few adolescent girls were able to make correct occupational choices in accordance with their vocational interests. It was also observed that occupational choices and vocational interests were comparatively more congruent for girls of urban background and those belonging to the high-income group, as against their counter parts from semi-urban areas and the low-income groups.

Studying the economic parameters and interests of vocational stream students, Pattinsthr⁶³ (1989) found that the parents of the vocational stream students marginally differed in their level of income and expenditure. The study also concluded that occupation, income and expenditure are the determining factors of a student's vocational interest.

Javed⁶⁴ (1990) made a critical study of the vocational interests of the senior college students of arts, science and commerce. It was found that the rural students showed more interest in science-based vocations than agriculture while, students of arts and commerce expressed high interest in persuasive and executive jobs. Students of all the three subject areas evinced low or little interest in social vocations. They preferred and were highly interested in white-collar jobs as against

vocations requiring physical labour in which they were least interested.

Das⁶⁵ (1991) made an analytical study of vocational interest of primary teachers. It was found that the vocational interest of urban primary teachers (male and female) differed from that of rural teachers. The female primary teachers had higher vocational interest than the male primary teachers. Both male and female primary teachers had the same level of interest in science, but female teachers were found to have more interest in literature. The rural primary teachers--both male and female--showed more interest in teaching than the urban teachers.

Sarawathy⁶⁶ (1992) undertook a study to investigate the dimensions of the personality of the high school students related to their vocational interests. The study on a sample of 400 students concluded that personality dimensions and vocational interests of tenth standard students were not related. Vocational interests did not show any relationship with their academic achievement.

3.4 Studies related to vocational maturity

The study of Maynard and Hansen⁶⁷ (1970) compared the black and white 8th graders on vocational maturity and found that white suburban boys possessed a high degree of vocational maturity as against black inner city students who possessed a very low degree of vocational maturity. Only students from urban schools had developed a plan for their higher education.

Parlikar⁶⁸ (1973) examined the differences in the vocational maturity of boys and girls. Using a sample consisting of 600 high school

students, the study investigated the differences in the behaviours of vocationally mature and immature students. The study showed that the vocational maturity of the sample of boys in the group was characterized by competence as well as a defined choice attitude. Intelligence was seen to be associated with over-all vocational maturity for the whole group. A positive correlation was noticed between the academic achievement and over-all vocational maturity of the subjects. The study also showed that intelligence, as well as achievement, were associated with the measures of vocational maturity. Family adjustment was associated with over-all vocational maturity among both boys and girls in the sample.

The study of Kathuria⁶⁹ (1974) was intended to assess the relationship between three variables viz, 'vocational maturity', 'vocational indecision' and 'manipulative treatments' affecting personality variables like anxiety. The sample consisted of 1000 female under-graduates in arts and science streams. The sample was in the age range of sixteen to twenty one years. The major findings of the study were:

- 1) Informal experience resulted in higher scores on vocational indecision scale.
- 2) The scores on vocational indecision scale were lower for the 'undecided group' than for the 'decided group'; the scores on vocational maturity scale were higher for the 'immature group' than for the 'mature group'.
- 3) There was no significant difference on the anxiety scores of the two groups of subjects.

Chapin⁷⁰ (1975) conducted a study on students of grades eleven and twelve to identify certain predictors of career maturity. The study showed that those possessing conscientious, trusting, adaptable, imaginative and forthright nature exhibited higher degree of career maturity. Personality traits accounted for only 34 percent variance in the vocational maturity of the group.

Chand⁷¹ (1979) investigated the correlates of vocational maturity and found out that intelligence and self-concept of higher secondary adolescents together with indicators of their S E S (in terms of the education of parents, occupation and income of fathers, and total income of the family from all sources) are important correlates of vocational maturity. Academic achievement of students was also directly related to their vocational maturity.

Agarwal⁷² (1981) carried out a study to find out the factors related to career maturity of high school students. His study revealed that sex differences were found in career maturity on the dimensions of self-appraisal, occupational information, planning and choice attitude. There existed a positive relationship between career maturity and socio-economic status, intelligence, level of vocational aspiration and participation in school and out of school activities. Personality factors such as sociability, ego-strength, and super-ego strength influence the career maturity of the school students.

O' Sullivan⁷³ (1982) found that upper status high school students exhibited more educational and vocational maturity than lower status students. But there was no statistically significant differences

between boys and girls of upper and lower strata in the case of occupational maturity and educational maturity.

The study of Tulsi⁷⁴ (1983) found that higher secondary students, of average intelligence scored significantly higher in vocational maturity as compared to the low intelligence group of students. The effect of career guidance strategies was found to be significant on all dimensions of vocational maturity. The self awareness and occupational information presented together proved to be more effective than career guidance alone in elevating the vocational maturity of students.

Gaur *et al*⁷⁵ (1987) investigated the role of psychological characteristics like self-concept, occupational aspirations, values, intelligence and career maturity in accelerating the educational and vocational maturity of scheduled caste high school students. The study revealed that the non-scheduled caste boys have achieved higher self-concept than scheduled caste boys. Non-scheduled caste group had higher verbal intelligence as against the scheduled caste groups. There was significant difference between rural and urban boys on all the variables relating to knowledge of occupations.

Saxena⁷⁶ (1988) studied the pattern of vocational development in students and also the relationship between grade level and vocational maturity. It was found that XII graders were more mature vocationally than , XI graders while XI graders were vocationally more mature than X graders. XI graders were also found to be having more self-knowledge, goal selection skills and problem solving insight in the career decision-making process, than XII graders.

A study by Mangat⁷⁷ (1988) intended to study the factors contributing to vocational maturity, conducted on a sample of 525 students studying in colleges of Punjab, arrived at the following conclusions:

1. Intelligence is significantly related to various areas of vocational maturity, viz, self-appraisal, occupational information, goal selection, planning total competence and total maturity
2. Socio-economic status exhibited a significant relationship with all the areas of vocational maturity.
3. Academic achievement was significantly related to occupational information planning, total competence and total maturity.

Kaur⁷⁸ (1992) attempted to investigate the ability of career maturity, self-concept, locus of control, and sex to predict career maturity of senior secondary students of Delhi. The study used a sample of 700 students. She found that self-concept and locus of control are significant predictors of career maturity.

3.5 Occupational preferences and choices

Small's⁷⁹ (1953) study dealt with the occupational choices of adolescent boys--fifty better-adjusted boys and fifty disturbed boys between the ages of fifteen and nineteen. It was found that: (1) the better adjusted boys were consistently more realistic in their vocational choices than were the disturbed boys; (2) the better-adjusted boys showed more of the needs with environment-involvement, the forming of relationships with people and

that are associated with environment-involvement, the forming of relationships with people and the exercise of skills and talents, while the disturbed boys showed the needs more associated with environment avoidance and restrictions of relationships with people and the exercise of talents; and (3) the second vocational choice of better-adjusted boys was less realistic than their first choice, whereas the second choice of the disturbed boys tended to be more realistic than their first choice.

Stephenson⁸⁰ (1957) studied the occupational aspirations and occupational plans of one thousand ninth graders and found significant difference between the students' occupational plans and aspirations. Males' planning approach was more realistic than that of females in the sample. The students in lower socio-economic levels have lower aspirations. The study concluded that "a specific occupational choice is probably an indication of a youth's general orientation to the occupational hierarchy when expressed as an aspiration and a judgment of his general expectation and life chances when expressed as a plan".

Getzels and Jackson⁸¹ (1962) investigated the career choices of high-creative high school adolescents in comparison to high IQ students. Their results revealed that with respect to the nature of occupational goals, high creative were more diffused in occupational goals while with regard to the quality of the occupations, high creative adolescents were more eccentric in their occupational goals than high I.Q students.

Grewal⁸² (1971) studied educational choices and vocational preferences of secondary school students offering science, agriculture, humanities, home science and commerce as electives. The Vocational

and both parents; and (d) girls reported closer relations with parents when they aspired to occupations that were similar in prestige to the parental work role-model, while boys reported closer relationship with parents when they aspired to occupations that were different in prestige from the parental work role-model.

O'Bryant *et al*⁸⁶ (1978) found in their study that boys and girls studying in fifth grade through college were found less stereotyped in their occupational preferences than is generally believed. The study also revealed that there was no change in the students' attitude even after they were made aware of the fact that jobs of higher status level offer more rewards in terms of money and prestige. The sample chose a higher-status non-traditional job rather than a lower-status traditional job. This appeared to be more true for females than males.

Wilson⁸⁷ (1982) in his study of the career choices of higher secondary adolescent gifted males and females found that both gifted males and females chose male-dominated professional fields.

Chandana⁸⁸ (1990) conducted an investigation to study the attitudes of high school students towards career choice process and to find out the relationship between selected psycho-social variables and aspects of the career development of high school students' attitude towards career choice process. She found that factors related to career maturity may differ for males and females and that there is a relationship between self-concept and career choice attitudes of adolescents.

Choudhary⁸⁹ (1990) conducted a study to find out the vocational aspirations, occupational choices and academic choices of higher secondary students. Using the descriptive survey method, the study found that 40% of the total sample wanted to become doctors or engineers. The majority of the students preferred the science stream for continuing their studies and future career.

Knapp⁹⁰ (1990) in a study on adolescent high school students found that personality traits along with other variables influence students' career preferences.

Pennamma⁹¹ (1991) attempted to study the patterns of occupational choice of secondary school pupils and school leavers. The study of 736 school pupils and 400 school leavers found that the school pupils and school leavers differ in their choices of ideal, preferred and actual occupations for the total sample as well as for the different sub-samples such as boys-girls, urban-rural pupils, etc. The students covered by the study indicated quite strongly that they wish to choose their own careers.

Duge⁹² (1996) investigated 'factors influencing females choosing non-traditional vocational - technical occupations'. The descriptive study examined the factors that influence the occupational choices of females, specifically those females choosing non-traditional vocational-technical occupations. Eight research questions were used for this study, including questions designed to compare females choosing non-traditional occupations and females choosing traditionally female occupations. The survey covered were 151 subjects at eight

post-secondary schools in Illinois, Missouri and Minnesota in USA. Students were asked to select from a list of barriers--those barriers they perceived to exist for their chosen occupations. The study concluded that non-traditional students most often perceived sexual harassment, lack of information about the occupation, inadequate child care and financial expence of training as barriers to entering non-traditional occupations.

Remmers and Radler⁹³ (1957) in their well-known survey found that 75 to 80 percent of high school students like shcool but 60 percent would like more help from teachers and others in the school, in planning their education and making an occupational choice. About 50 percent felt that active work experience would be a more valuable use of time than extracurricular activities.

A research by Glanz and Waltson⁹⁴ (1958) on the reasons behind vocational choice concluded that an individuals' choice of occupation may be definitely related to his basic personality needs.

Study by Super and Overstreet⁹⁵ (1960) on ninth-grade boys suggested, as have others before them, that taking the student's occupational aspirations at face value is often a mistake and that seeking to help him formulate a specific occupational objective at the ninth-grade level may be a strategic error. They further asserted that the task of planning in the ninth-grade is essentially a matter of furthering vocational development, rather than that of fostering specific vocational choices. The major value of planning at this level encourages students to start thinking early about vocational plans.

Eleanor⁹⁶ (1976) in a study concerning the status of women in society found that (i) men and women prefer working for men (ii) job reallocation is difficult for a woman (iii) there is a lack of qualified women for administrative positions; (iv) there is a negative bias towards women in authority and (v) women are frequently passed for jobs.

Haber⁹⁷ (1976) examined the variance of innovative vs. traditional occupational choice and career-oriented vs. non-career oriented occupational choices. The study found that the employment status of the mother was not related to the daughter's orientation and also that all women anticipated difficulties in combining work and family roles.

Pendharkar⁹⁸ (1979) studied the vocational aspirations of 300 Hindu undergraduate students of Indore, through the case study method. He found that the home atmosphere is an important factor in occupational aspiration.

Chausmir⁹⁹ (1983) in a study of women who make a non-traditional vocational choice found that such women are active, autonomous, dominant, non-traditional in sex role, psychologically masculine and self-confident. They show needs for achievement, self-identity and status. They are also internally motivated and have a high career commitment. A synthesis of research findings showed that women who choose a career in a male-dominated occupation are likely to possess many such personality and motivational characteristics commonly attributed to men.

Omlinson and Smith¹⁰⁰ (1983) studied the career aspirations of gifted college students as a motivational variable in their investigation. The

results showed that the gifted females who had been intensely involved in a gifted curriculum had significantly higher career aspirations than those who learnt the conventional curriculum.

Shenoy¹⁰¹ (1989) conducted a study on the career choices (the traditional and non-traditional career choices) of 120 subjects belonging to various occupations, which had been labelled as masculine or feminine occupations. She studied the sex-role orientation of the subjects and the psycho-social factors related to their choices. The study found that psychological sex rather than biological sex influences choice of occupations, whether traditional or non-traditional and also influences three psycho-social variables under the study--job stress, mental health and fear of success.

Kumar¹⁰² (1989) in a follow-up study of creatively talented college students tried to find the occupational choices and work values of less creatively talented subjects and compared them with those of a less-creative group. He found that these subjects tend to differ from their less-creative counterparts on different work values.

Relationship of parental stress to school achievement and educational and vocational aspirations was studied by Anderson¹⁰³ (1995). A total of 67 teen-parents located at three different sites participated in the study. The majority of teen-parents in the study had educational and vocational goals. Overall, forty one of the teen-parents aspired towards a particular vocational goal while twenty five of the teen-parents were undecided regarding their

future vocational calling. Even with this finding, vocational aspirations were not significantly related to parental stress. All other studies conducted on the vocational aspirations of teenage parents have produced similar inconclusive results. The majority of teen parents aspired towards either a high school diploma or a post secondary degree.

Alexander¹⁰⁴ (1996) conducted a study of women with unusual jobs. There are the narratives of 10 women from the United States who have an unusual work, a work that even if performed by men would be considered unusual. Women working in such careers included a Protocolist, a Buddhist Priest, an Ethicist, a Cow Girl and an Eco-terrorist Investigator. The purpose of this study was to collect oral narratives of the career lives of the ten women in order to document their unusual work and provide first hand information about their careers. The method of qualitative interviewing was used to obtain each women's story. The interviews were open-ended and allowed the women to speak freely about their lives in an everyday way rather than in sociological terms. The remarkable finding was that these women were able to ignore outside influences and restrictions.

Susan's¹⁰⁵ (1996) study was intended to examine the meaning and experience of career as it is lived by women artists. Little has been written in the literature on women's career or identity development specifically addressing the experiences of women artists. Yet there are reasons to believe that these women, by virtue of their gender and their career choice, may have a particular perspective on how career is

understood and lived, and how this group differs from the majority of women and men who have chosen more traditional career paths.

3.6 Studies related to guidance and counselling programmes

Kline and Schneck¹⁰⁶ (1950) in reporting the results of a project 'An Hypnotic Experimental Approach to the Genesis of Occupational Interests and Choice', concludes that what has not been stressed in vocational guidance is the origin of vocational interests, their relationship to personality organization and their relationship to individual aptitudes. There is empirical evidence which shows that changes in personality organization greatly influence not only occupational interest, but the level of job-adjustment. The prescribed approach to vocational maladjustment in a great number of cases appears to be psychotherapy, rather than vocational guidance.

Dasgupta's¹⁰⁷ (1972) study of high school students' opinions about school guidance concluded that school guidance services needed more social acceptance than is universally given. A large number of guardians were quite guidance-conscious. The study showed that more facilities were needed for dissemination of occupational information. The study also found that career masters required more time for guidance work.

Fernandez¹⁰⁸ (1984) investigated the effect of guidance and counselling on the academic achievement of under-achieving pre-adolescent and adolescent girls. The results showed that the academic achievement of counselled pre-adolescent under-achievers was significantly greater than that of non-counselled

under-achievers and also that the achievement of counselled adolescent under-achievers was significantly greater than that of non-counselled adolescent under-achievers.

Tripathi *et al*¹⁰⁹(1986) undertook an investigation to identify guidance needs of pupils of secondary and higher-secondary schools and assess the relationship between the guidance needs and some variables like gender, grade, birth order, parents' educational level, size of the family and type of school. Major findings were that there exists a significant relationship between grades of pupils and their social, personal, educational, financial, vocational and religious guidance-needs. Female pupils specifically were seen to be in need of higher degree of attention.

The studies of Bhatnagar and Gupta¹¹⁰ (1988) found the effect of a short-term group guidance programme on the affective domain of career-decision-making of class IX students. Sex differences were also studied in the career choice attitudes of adolescents after the guidance intervention. The results revealed that higher career maturity resulted from guidance intervention.

Gaikwad¹¹¹ (1989) conducted an investigation to study factors that affect Class X students' decision-making abilities related to educational and vocational career, and the effect of vocational guidance on these abilities. The findings revealed that the students who were above-average in intelligence showed definiteness and those who were below-average in intelligence were not certain about their further course of study. Also those with higher intelligence had more occupational information as

compared to those with lower intelligence possessing lower degrees of occupational information. The study showed that psychological testing, occupational information and group-guidance programmes helped students in making appropriate educational and vocational choices.

Phitaktanakhom¹¹² (1990) surveyed the socio-economic conditions and guidance services in the government secondary schools of the Nonthaburi Province of Thailand. The purpose of the study was to assess the nature of vocational guidance services provided in these schools, and the attitudes of the school administrators, guidance teachers and classroom teachers towards vocational guidance services which are related to Thailand's Sixth National Education Development Plan (1987-91). The study found that the vocational guidance services provided in the special, large, medium and small-sized schools were different. The attitudes of school administrators, assistant school administrators, guidance teachers and class teachers towards guidance services were not different.

Gupta¹¹³ (1991) made a study of the impact of training in career-awareness and career-decision-making skills upon career-related attitudes and the guidance needs of secondary school students. He found significant impact of training on career planning skills of the students covered by the study.

The study of Akhilesh¹¹⁴ (1991) aimed at generating a comprehensive data-base of vocational patterns of young urban

adolescents, which could be useful for school counsellors and vocational guidance experts. The influence of the adolescents' age, socio-economic status and gender on students vocational patterns was examined through a survey conducted on a sample of 240 adolescents, who were asked to rate 176 occupations. Differences were seen in the vocational choice patterns of the sample, especially in respect of their SES and gender, but not on the age of the subject.

Kaur¹¹⁵ (1991) evaluated the guidance programme in general, and service-wise guidance programme in particular, in high and higher secondary schools of Punjab and Chandigarh. The study found that guidance is not a regular feature in most of the schools of the area under study. Because of many unavoidable limitations, the existing guidance programmes in the schools under study are not able to achieve the objectives of the school guidance programme.

Sirohi¹¹⁶ (1991) conducted a study to assess the extent of Utilization of career guidance inputs provided by the NCERT to the selected minority-managed schools and to identify difficulties faced by these schools in the utilization of the career guidance received under the NCERT's technical assistance to minorities' schools. It was found that the teachers made best use of the inputs available to them and organized guidance services in their schools in the best manner possible.

Bhatnagar *et al*¹¹⁷ (1991) prepared a multi-media package on developmental and career guidance, consisting of 10 audio programmes, six video programmes and one volume of print material for developing

self-awareness among students. The purpose of this package was to use the available media for preparing instructional material for training of teachers, career teacher, counsellors and parents. The package was found to be extremely useful in an educational setting where there is a dearth of multi-media instructional material in India. Teachers operated the services under constraints like lack of time, pressing multiple job requirements, poor administrative support etc.

Joneja¹¹⁸ (1992) carried out an action research for the development of a guidance programme to promote the career potential of senior secondary school girls. The purpose of the study was to identify the barriers in career development of girls, and to help them to become more career-oriented. The programme was found to be successful.

3.7 Other related studies

In a study of the value assigned to nine different aspects of work by high school freshmen and seniors, Dipboye and Anderson¹¹⁹ (1959) found that all groups ranked the value of "interesting work" first. Even though there were significant mean sex-differences, the authors felt that the clarity about the notion of an interest type will vary positively with the degree of knowledge of the true occupational stereotype. The occupational stereotypes used in the interest test are true stereotypes of the occupations involved, and that all occupations involved can be stereotyped.

Pant¹²⁰ (1992) developed self-guidance modules for reaching the maximum number of students for guidance benefits. The modules

ackage was intended to develop in the students the skills of learning, career development, enhancing self-esteem, etc. These modules aim at communicating to students the problems which emerge from a lack of those skills, and the way they can develop those skills by following guided steps and examples. The module was found to be effective in developing the expected skills.

Roy¹²¹ (1978) investigated the socio-psychological factors associated with vocational development of vocational stream of higher secondary students. He found that the socio-economic status of students significantly relate to their concept of vocational development. The academic achievement also had significant correlation with vocational development. Regarding psychological factors, attitude towards education was significantly correlated to vocational development of all types of students.

Paul¹²² (1981) carried out a study to find out the educational and psychological factors influencing the goal behaviour of students in the vocational and academic spectrums of the higher secondary school. The study revealed that the vocational spectrum students had higher mean scores in goal aspiration, goal perception, goal locus of control and in scholastic achievement. The academic spectrum students had higher mean scores in goal-risk-behaviour. In the academic spectrum, science group differed significantly from humanities group in the perception of future goals; science group students were superior to others in the preparation of perception of future goals.

Krammer and Perrone¹²³ (1982) described the career-related

attitudes of adults, previously identified as gifted high school students. They indicated that most of them felt unprepared to make career decisions on leaving high school and a quarter of them found it difficult to relate career opportunities to their interests.

Mowji¹²⁴ (1983) studied educational and vocational problems of higher secondary students and concluded that the students of Junior Colleges faced educational and vocational problems. They had to face difficulties due to absence of guidance services at school and college levels. Science students had little time for co-curricular activities. The implementation of vocationalisation programmes had completely failed to achieve their aims due to lack of trained teachers and appropriate books and other facilities.

Premlata's¹²⁵ (1984) study revealed that adolescents faced a large number of problems about which parents were mostly ignorant. The problems covered a wide spectrum of areas—personal, educational and vocational. But the counsellors in charge were able to resolve most of the problems faced by adolescents.

Dahmann¹²⁶ (1984) attempted to study the effects of mothers' occupations on the occupations of their children. The study showed that mothers' occupation significantly influenced the occupation of their children, even when the effects of fathers' occupation have been included in models of mobility and that these mother-child effects are not simply a product of the fact that a mother is in the labour force and not in the home. Further the results indicate that the effects of a mother involve more than a simple

re-inforcement of the occupation of the father.

Dhammi¹²⁷ (1988) in his study of pre-vocational and vocational training in occupational therapy for the mentally retarded, concluded that the group needed help in transition from school to work, especially in the development of motivation, emotional skills like expression of different emotions, social skills, personal skills and physical-motor skills.

Mehta *et al*¹²⁸ (1989) conducted an exploratory field study to assess the level by vocational planning among the tribal first-generation learners of Meghalaya. The tribals were found to differ on a number of family and environmental factors from others. However, they did not differ too much on most of the vocational planning variables from the later generation learners.

Kumari and Sethi¹²⁹ (1990) studied 100 college girls who were classified as high and low on self-esteem on the basis of the median split of their combined scores on a self-acceptance test, and on their differential career and family values. The results obtained were used for encouraging career-aspirations of women.

Nicole *et al*¹³⁰ (2004) has concluded that vocational identity is an important construct for career development as physicians. This form of vocational development (grouped into three tasks viz, crystallization, specification and implementation) were collated with personality factors of 620 first-year medical students who exhibited different career choice patterns based on the results of the Medical Career Development Inventory. The findings of the study provided information helpful in identifying students

based on certain personality characteristics, who are struggling ‘ with the vocational developmental tasks associated with becoming physicians’. The study also concluded that there is an urgent need for developing proper inventories (designed and implemented by medical school advisers, counsellors and educators) to assist medical students in making proper vocational choices.

Jung *et al*¹³¹ (2004) studied the school-to-work transition arrangements in two educational systems - South Korea and South Australia and the improvements that are required to enable students to make this transition better. The importance of class-connection between vocational education and training systems and industry is highlighted in the report. The findings confirmed that both the countries need sound information about industry demands for skills and for greater access of workers and students to the needed expertise. There is need for larger exposure to skills acquisition and practice, supported by adequate facilities and equipments.

In a descriptive report, Tim¹³² (2004) critically examined two approaches to bench-marking Vocational Education and Training, using performance indicators and comparative case studies. The author found that both approaches provide useful information, although the case study approach enabled a more thorough analysis of particular issues and can take greater account of complex and diverse institutional structures. The study further found that this approach accommodates the complex links between education, the labour market, and other factors. To make the bench-marking most useful, it has to be supported by

individual studies closely linked to Australia's VET policy agenda.

Mark and Lyn¹³³ (2005) compared two school-based case studies of Vocational Education and Training in the areas of Information Technology and Hospitality, from the perspective of the agendas developed for "life long learning". The case studies suggest that current approaches to vocational education and training in schools cover only part of the total agenda. The study noted that the present policies help to remove institutional barriers and work placements ensured in school programmes. The study showed that it is the teachers rather than the students who take the initiative in adopting new learner-worker identities, consonant with the attributes of life long learning to answer the demands of the contemporary workplace.

Linda¹³⁴ (2005) in his research on gender segregation in apprenticeships in Britain found that, there are strongly segregated sectors where gender segregation is dominant as in construction technology which is male-dominated, while areas like child-care are female-dominated.

The project by Beddie *et al*¹³⁵ (2005) investigated learning and career development services for adults, particularly those who are in some way disengaged from labour market or educational systems. The study examined the question whether a single career development services model could be broadly applied. The study found that many job-seekers or those marginally employed (needing career advice), were reluctant to seek it and that such advice was best provided by affordable impartial and community-based agencies.

Simon and Salim¹³⁶ (2006) in a study which examines the role that Vocational Education and Training can play in bringing about major socio-economic challenges in a South African community, concludes that this role will be most pronounced if it is articulated within a broader educational and economic vision that is shared by a range of stake-holders in society, supported by an adequate funding base.

Conclusion

Analysis of the literature helped to identify the major trends underlying the studies relating to vocational development in the educational context, in different cultures.

Of the 138 studies reviewed, the majority of studies indicated that among the factors which critically determine appropriate vocational development, most important is the socio-economic status of the students. The level of vocational aspirations is determined considerably by family aspirations. The studies also revealed that social class of the school pupils is significantly correlated with their career preferences and career choices. Students coming from low socio-economic strata, in general, have an inferior understanding about the types of jobs, courses, and training opportunities available in various kinds of vocations. Other factors remaining the same, boys with higher levels of intelligence, ordinarily preferred and selected higher level occupations. There is also some evidence to show that sons tend to follow the occupations of their fathers. The studies broadly indicate the fact that vocational interest is related to the socio-economic status of urban boys who evince a disposition for selecting higher mechanical and scientific interests as compared to their rural

counterparts. Most of the studies highlight the fact that there is need for a supplementary form of education (through vocational guidance and counselling, or through regular channels) to impart vocational information to students. Girl students are generally weak in their vocational information and as much should be given more focused career guidance in order to promote and utilize their career potentials.

Studies connecting factors like intelligence, socio-economic status, gender and locale-with vocational choice, vocational aspirations and vocational maturity of students all showed that there was clear relationship between vocational information and these variables.

The review provided the necessary background information to the investigator to identify the various factors which are likely to influence vocational information and the vocational development of school children and helped the investigator to formulate the objectives and hypotheses for the present study and to shape appropriate tools for measuring the basal concept--vocational information--and also for selecting suitable techniques for the analysis of data. The survey provided a theoretical rationale for designing a study which would help to highlight the urgent needs for developing vocational information on the part of school children and use this for accelerating their vocational development and related forms of mental maturity.

From the review, it can be noted that the studies conducted in this area in Kerala are few. This shortcoming needs to be corrected.

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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**

METHODOLOGY

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 focussed 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--medicine, 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--the 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 Frisbie¹ (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 = Number of right responses in the 'lower group'

U = Number of right responses in the 'upper group'

N = 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 measure 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-Moment² 'r'. The following formula was used for estimating 'r'.

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

- Where, r = Coefficient of correlation between X and Y
 ΣX = Sum of X scores (Scores obtained during the first testing)
 ΣY = Sum of Y scores (Scores obtained during the second testing)
 ΣXY = Sum of the product of the corresponding paired X and Y scores
 ΣX^2 = Sum of the squared values of the X scores
 ΣY^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: 1. $\frac{1}{2}$, $\frac{1}{4}$, —, $\frac{1}{16}$, $\frac{1}{32}$

(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.

G	F	E
J	I	H
M	L	

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

answer: (d)

2.

AC	BD	CE
DF	EG	FH
GI	HJ	

(a) IJ; (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

The 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 Nair⁴), 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 Nair⁵ (1970). The scale used three parameters defined by Kuppuswamy⁶ (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 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

Junior Managers, Junior Lawyers, Head of Divisional Offices, Sub-divisional/Junior Officials, Junior Medical Personnel, Junior Engineers, Senior Nurses, Small-scale Land Owners, Junior Military/Police Officers, Heads of Small Colleges/Schools/Junior Administrators in the School System, Govt Officers Heading Officers in the Sub-district Levels, District Level Public Health Workers, District Panchayath Members and Equivalent categories.

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 /Equalents 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 component 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

Education	Score	Occupation	Score	Income	Score
Masters Degree/ Professional De- gree & Above	10	High Professional	10	Above Rs. 24,000	10
Bachelor's Degree	8	Semi Professional	8	Rs. 14,401-24000	8
Pre degree/T.T.C/ I.T.I	6	Skilled Workers	6	Rs. 9601- 14,400	6
Std VIII-X	4	Semiskilled Workers	4	Rs. 4801-9600	4
Std I-VII	2	Unskilled Workers	2	Rs. 2401-4800	2
Illiterate	1	Unemployed	1	Below Rs. 2400	1

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 Kahn⁶ (2002) was used as a guide line. 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 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

Sl.No.	Name of the School	Locale	Nature of School	Type of Management	Efficiency Level	Number of Students		
						Boys	Girls	Total
I	Thiruvananthapuram District							
1	L.M.S.H.S.S. Amaravila	Urban	Co-Educational	Aided	Above Average	28	32	60
2	L.M.S.H.S. Vattappara	Rural	Co-Educational	Aided	Average	23	37	60
3	G.H.S.S. Ayiroorppara	Rural	Co-Educational	Government	Below Average	25	35	60
II	Ernakulam District							
4	S.N.H.S.S. Okkal	Rural	Co-Educational	Aided	Above Average	24	36	60
5	S.R.V.H.S.S. Ernakulam	Urban	Co-Educational	Government	Average	52	8	60
6	G.H.S.S. Narakkal	Rural	Co-Educational	Government	Below Average	31	29	60
II	Thrissur District							
7	Vivekodayam Boy's H.S.S	Urban	Co-Educational	Aided	Above Average	33	27	60
8	G.H.S.S. Villadam	Urban	Co-Educational	Government	Average	22	38	60
9	T.M.V.H.S.S Perumpilavu	Urban	Co-Educational	Aided	Below Average	33	27	60
IV	Malappuram District							
10	H.M.Y.H.S.S. Manjeri	Urban	Co-Educational	Aided	Above Average	26	34	60
11	G.H.S.S.C.U. Campus	Rural	Co-Educational	Government	Average	35	25	60
12	G.H.S.S.Chelari	Rural	Co-Educational	Government	Below Average	28	32	60

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 formula⁷.

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

Where 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 formula⁸:

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

where M_1 , σ_1 and N_1 are the mean, standard deviation and size of the sample of the first group, and M_2 , σ_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.

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CHAPTER V

ANALYSIS

- **Preliminary analysis of the scores of different variables**
- **Analysis of data as per objectives**
- **Interpretations of the findings**

ANALYSIS

The data was analyzed in two stages. The first stage was used for examining the nature of the distribution of scores for different variables. The second stage was used for answering the questions posed as objectives of the study. The details are presented below:

A. PRELIMINARY ANALYSIS OF THE SCORES OF DIFFERENT VARIABLES

- The first part of the analysis was done by
- (a) calculating the major statistical indices which will reflect the important properties of the score distributions--the important measures of central tendency, measures of scattering and the index of skewness--indices which will indicate the degree of conformity or deviation of the score distributions from normality as first-level indicators of the representativeness or otherwise of the sample used; and
 - (b) examining the graphical presentations of the score distributions of different variables for the total sample as well as for the major sub-samples, to confirm the conclusions reached using the calculated statistical indices.

(a) Statistical summary of the properties of the score distributions for different variables

The major statistical indices of the score distribution viz, Mean (M), Median (Md), Mode (Mo), Standard Deviation (S.D.), Quartile Deviation¹ (Q.D.), and Coefficient of Skewness² (Sk) are summarised in Table 3.

The statistical indices provide first-level information relating to the nature of the distributions. They need further processing before we can arrive at more dependable conclusions. This has been done in the succeeding sections of the analysis.

(b) Graphical representation of the score distributions for different variables

This helped the investigator to obtain a better insight into the adequacy of the sample selection, and the peculiarities, if any, of the distributions before they are subjected to more rigorous statistical analyzes. More dependable and sharper methods are adopted in the formal presentation of the analysis using advanced statistical techniques.

The score distributions for the different variables are presented in figures I to XX

TABLE 3. SUMMARY OF THE STATISTICAL INDICES OF THE DISTRIBUTION
OF DIFFERENT VARIABLES

GROUP	VARIABLES				
	VOCATIONAL INFORMATION	INTELLIGENCE	SOCIO-ECONOMIC STATUS	SCIENCE ACHIEVEMENT	
TOTAL (N=720)	M	26.23	55.00	31.12	364.07
	Md	26.00	58.00	28.00	365.00
	Mo	26.00	63.00	25.00	405.00
	S.D	7.38	13.11	12.13	72.81
	Q.D	5.00	9.50	8.00	52.00
	Sk	+0.093	-0.832	+1.343	-0.370
RURAL (N=349)	M	26.81	55.65	32.44	364.68
	Md	27.00	59.00	30.00	375.00
	Mo	25.00	66.00	25.00	405.00
	S.D	7.34	12.98	12.57	71.86
	Q.D	5.00	9.00	7.50	45.00
	Sk	-0.078	-0.887	+1.172	-0.438
URBAN (N=371)	M	25.68	54.39	29.88	363.49
	Md	26.00	57.00	27.00	365.00
	Mo	26.00	63.00	25.00	455.00
	S.D	7.39	13.21	11.58	73.78
	Q.D	5.00	9.00	6.50	60.00
	Sk	-0.130	-0.787	+1.541	-0.312
RURAL (N=360)	M	24.7	52.11	27.98	346.44
	Md	25.00	55.00	25.00	345.00
	Mo	26.00	61.00	25.00	325.00
	S.D	7.69	12.03	13.25	75.92
	Q.D	4.50	8.50	5.00	45.00
	Sk	-0.117	-0.890	+1.551	+0.057
URBAN (N=360)	M	27.76	57.89	34.26	381.69
	Md	28.00	61.00	32.00	405.00
	Mo	21.00	63.00	25.00	455.00
	S.D	6.73	13.51	9.97	65.04
	Q.D	6.00	9.00	8.00	55.00
	Sk	-0.107	-0.712	+0.101	-0.824

M=Mean Md=Median Mo=Mode S.D.=Standard Deviation;

Q.D.=Quartile Deviation Sk= Coefficient of Skewness

Figures I to V present the shape of the score distributions for the main variable viz, 'vocational information' for the total sample and the major sub-samples based on the gender of subjects and their locale (rural-urban residence)

Figure I. Frequency Distribution of Vocational Information Scores (Total Sample)

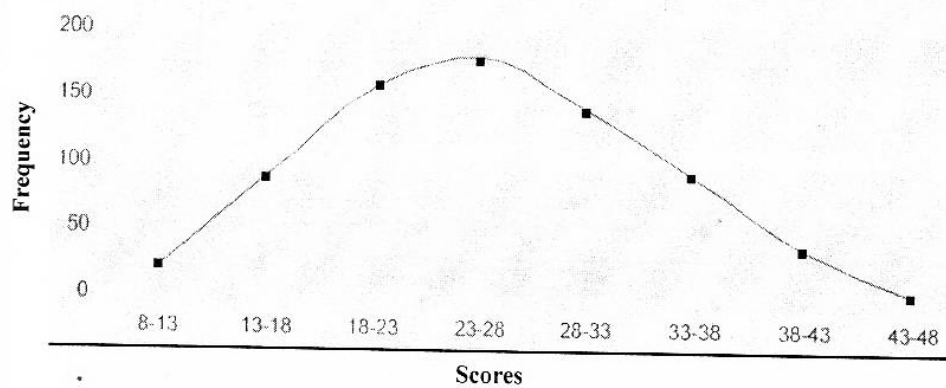
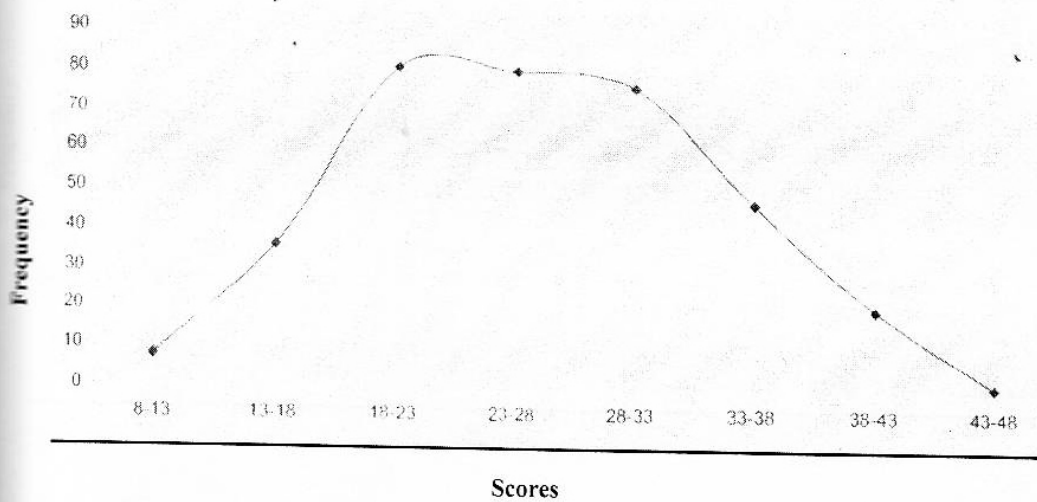
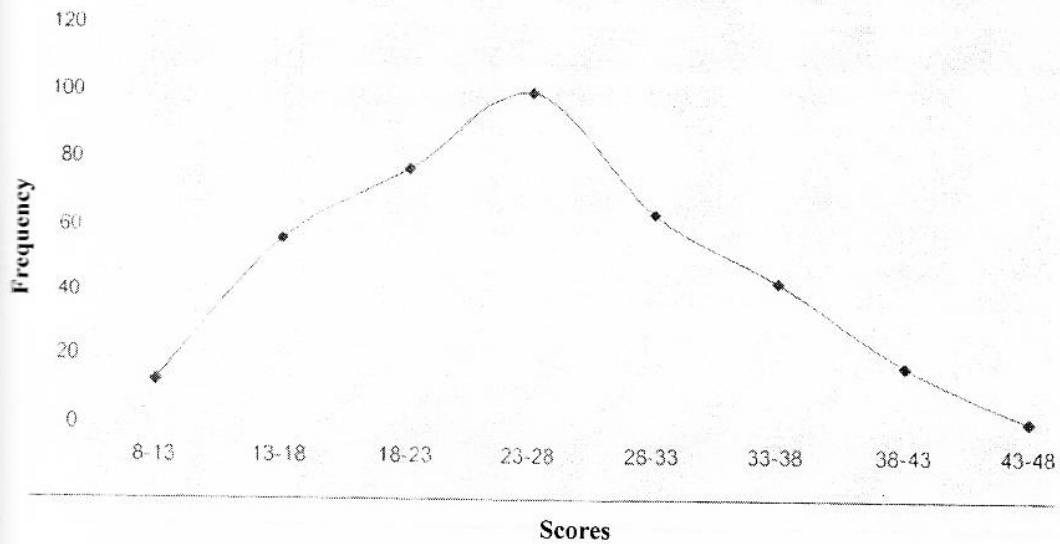


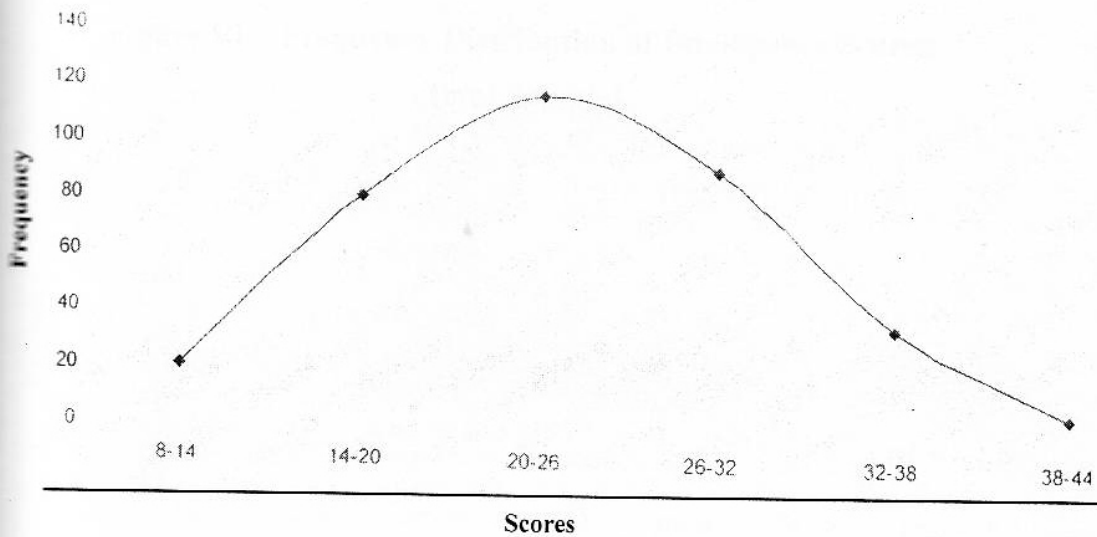
Figure II. Frequency Distribution of Vocational Information Scores (Boys)



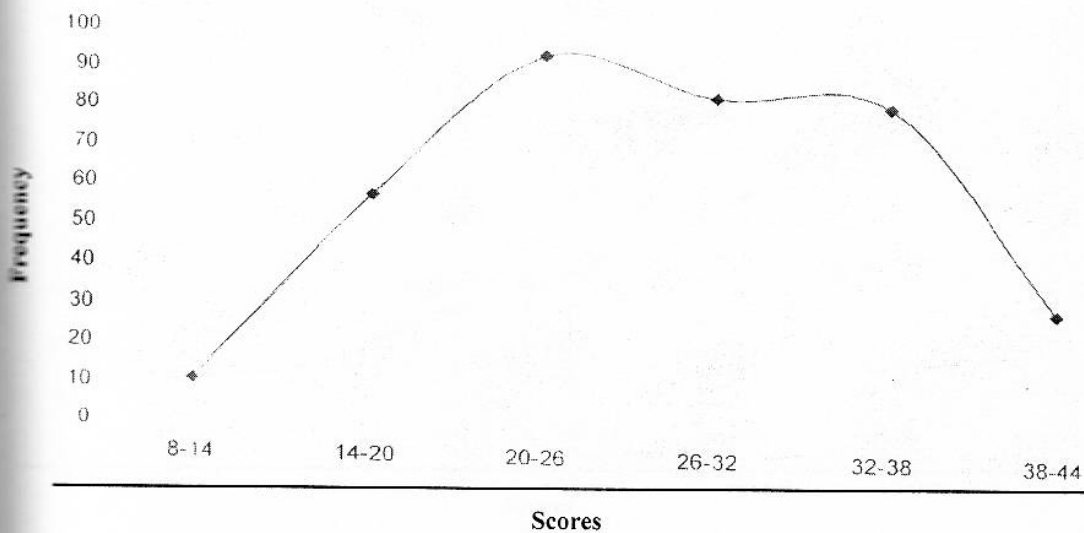
**Figure III. Frequency Distribution of Vocational Information Scores
(Girls)**



**Figure IV. Frequency Distribution of Vocational Information Scores
(Rural Subjects)**

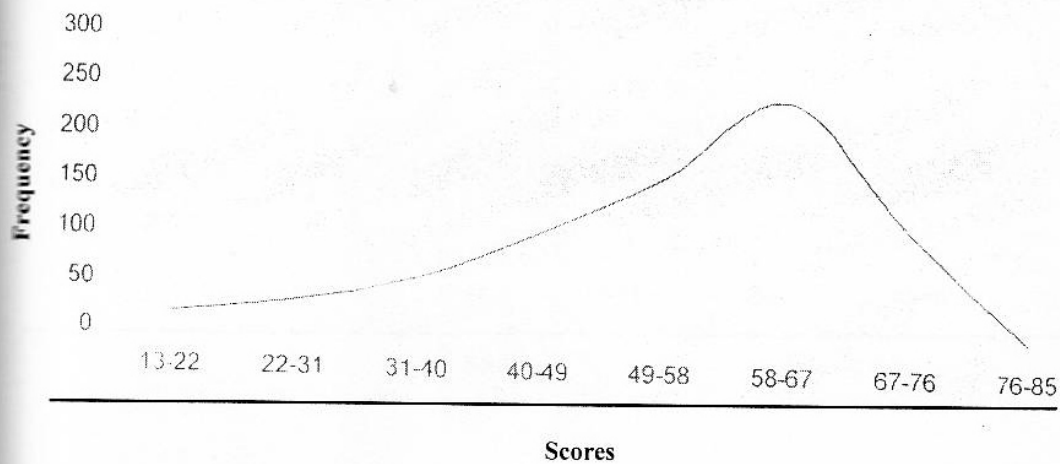


**Figure V. Frequency Distribution of Vocational Information Scores
(Urban Subjects)**

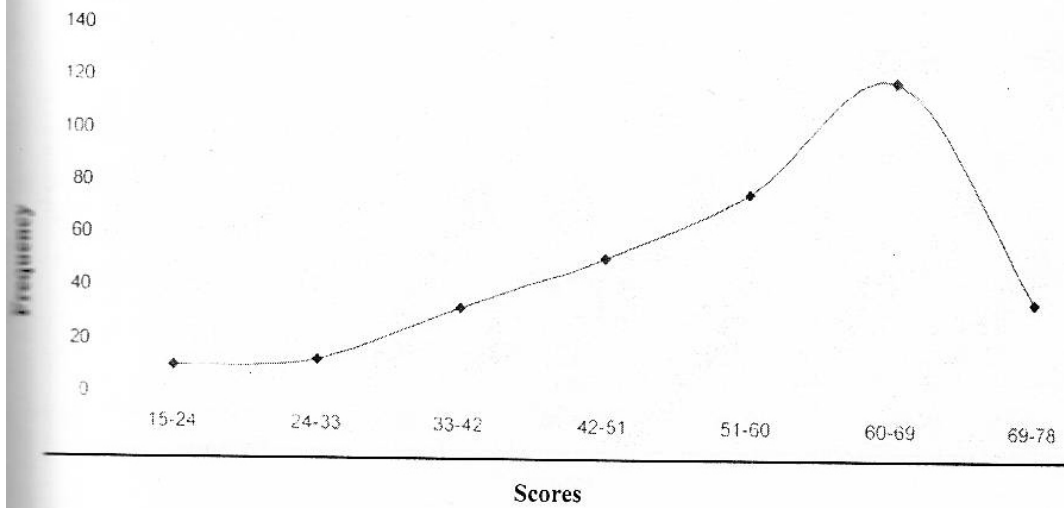


Figures VI to X present the distribution of 'intelligence scores' for the total sample and the sub-samples defined above

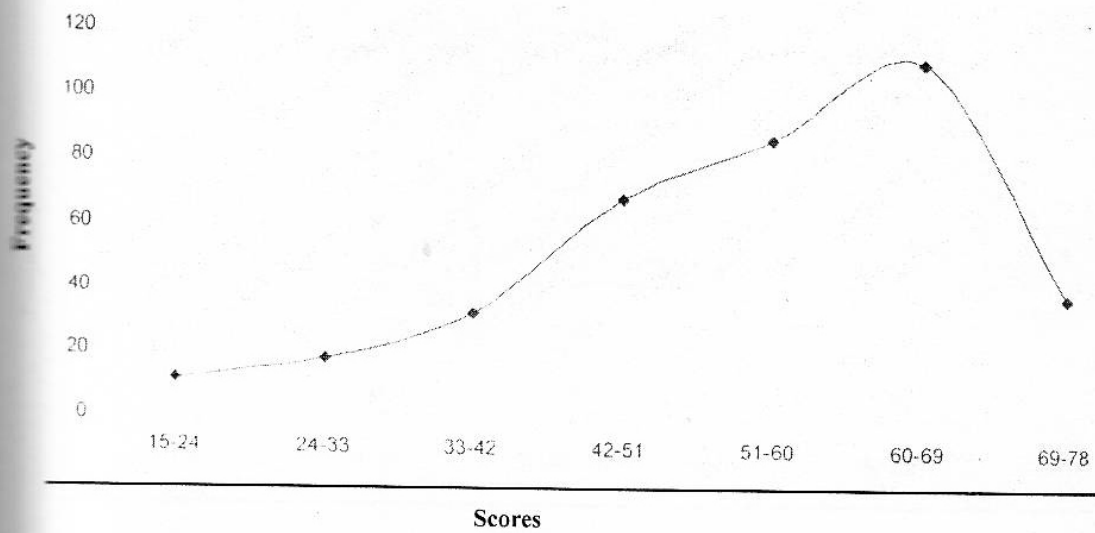
**Figure VI. Frequency Distribution of Intelligence Scores
(Total Sample)**



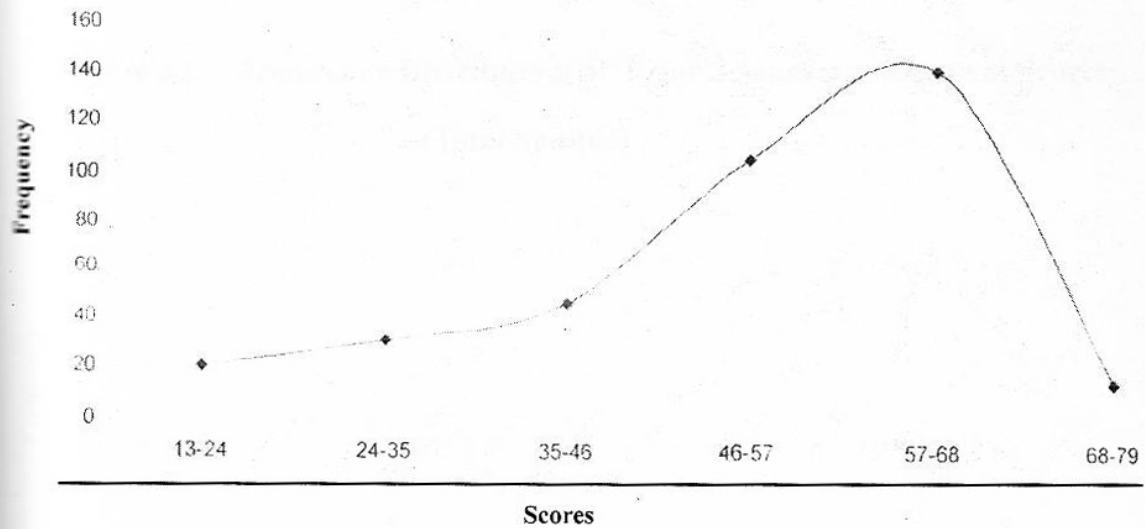
**Figure VII. Frequency Distribution of Intelligence Scores
(Boys)**



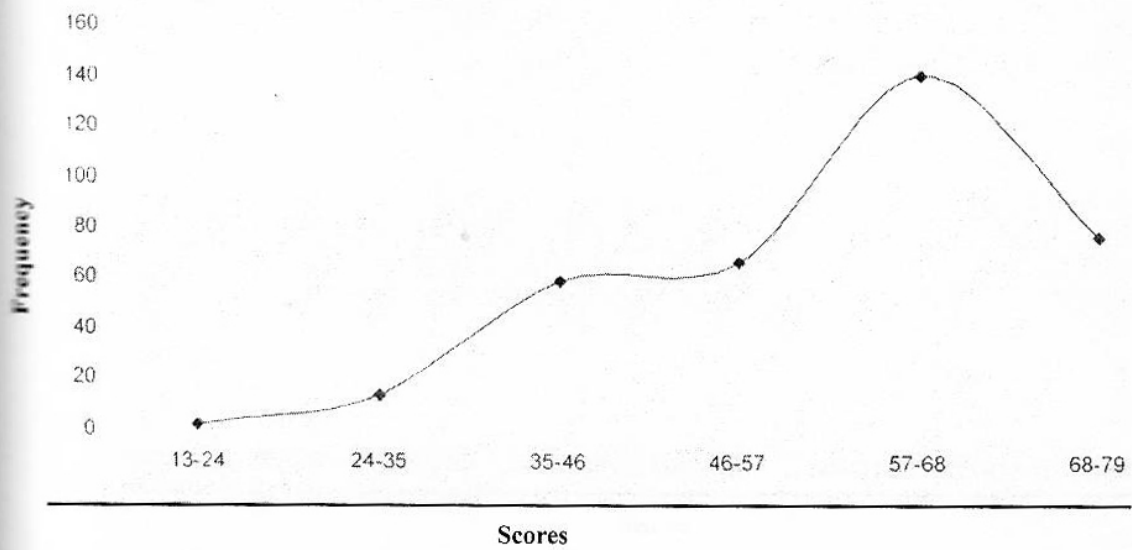
**Figure VIII. Frequency Distribution of Intelligence Scores
(Girls)**



**Figure IX. Frequency Distribution of Intelligence Scores
(Rural Subjects)**



**Figure X. Frequency Distribution of Intelligence Scores
(Urban Subjects)**



Figures XI to XV present the distribution of 'prior science achievement scores' for the total sample and the different sub-samples.

Figure XI. Frequency Distribution of Prior Science Achievement Scores

(Total Sample)

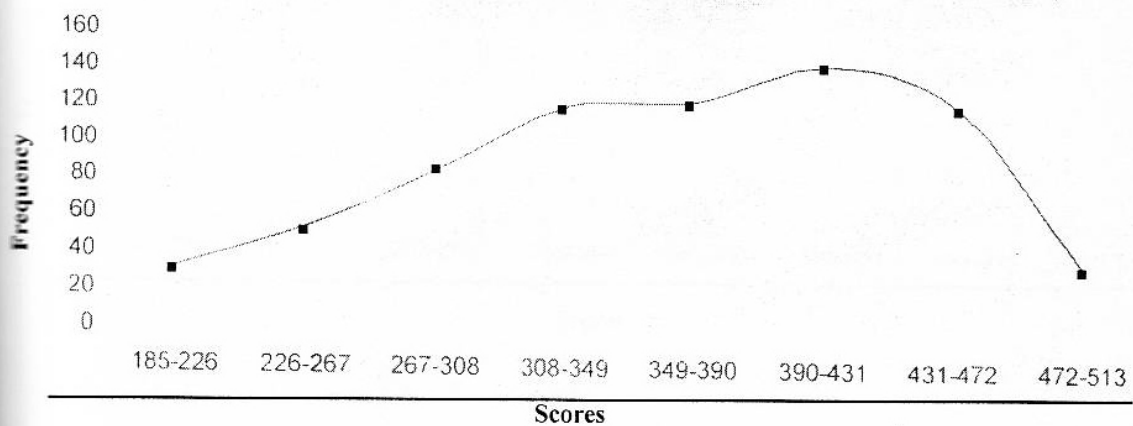


Figure XII. Frequency Distribution of Prior Science Achievement Scores

(Boys)

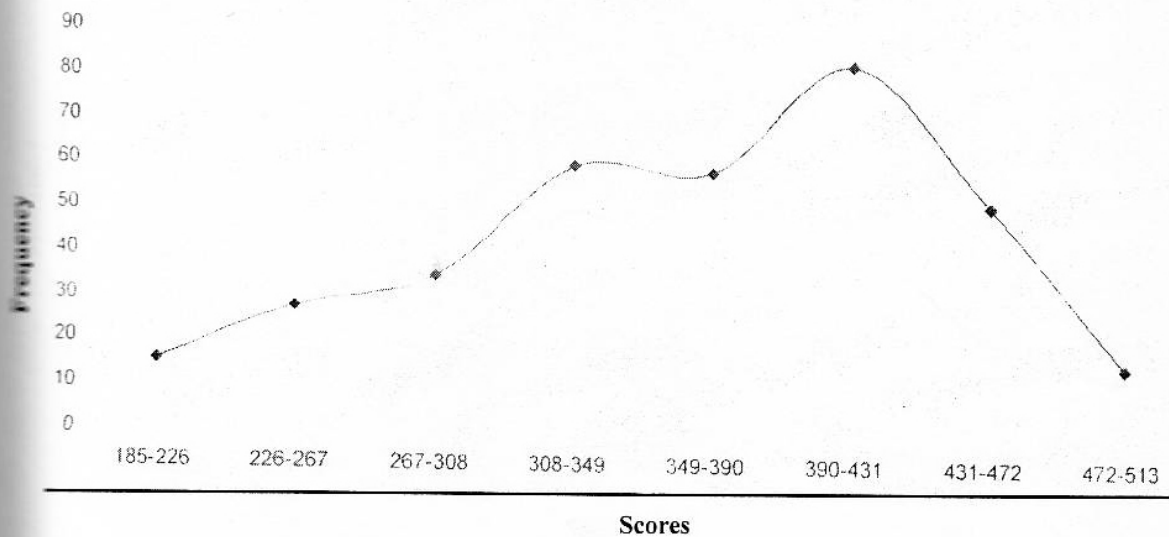


Figure XIII. Frequency Distribution of Prior Science Achievement Scores (Girls)

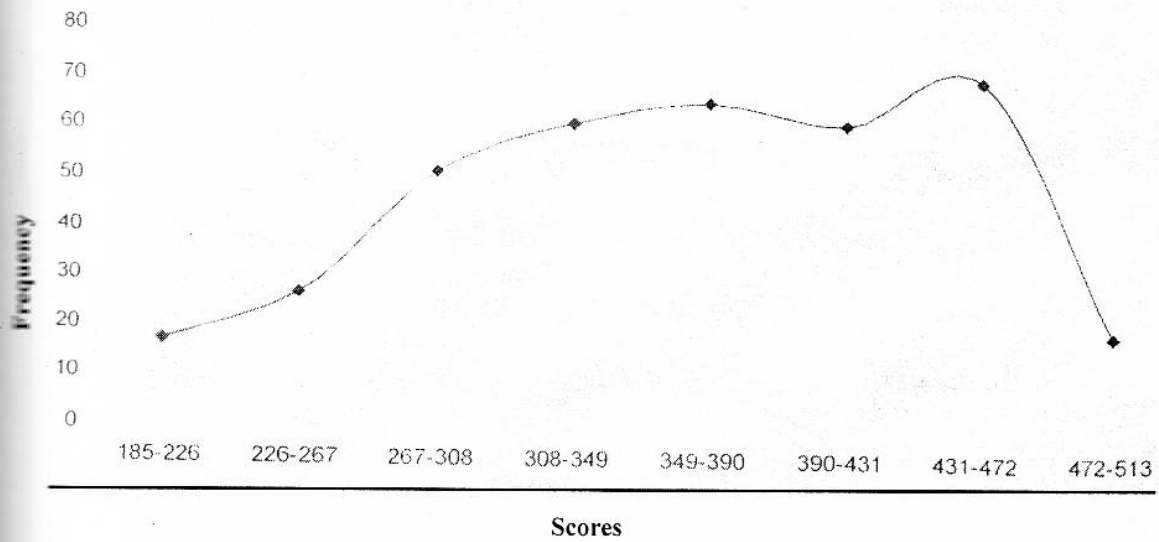


Figure XIV. Frequency Distribution of Prior Science Achievement Scores (Rural Subjects)

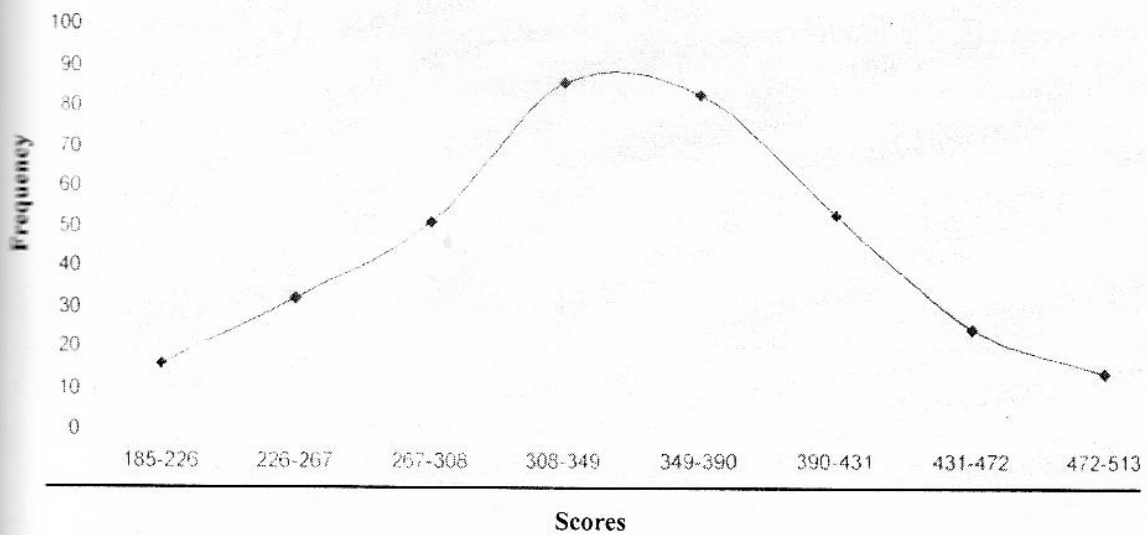
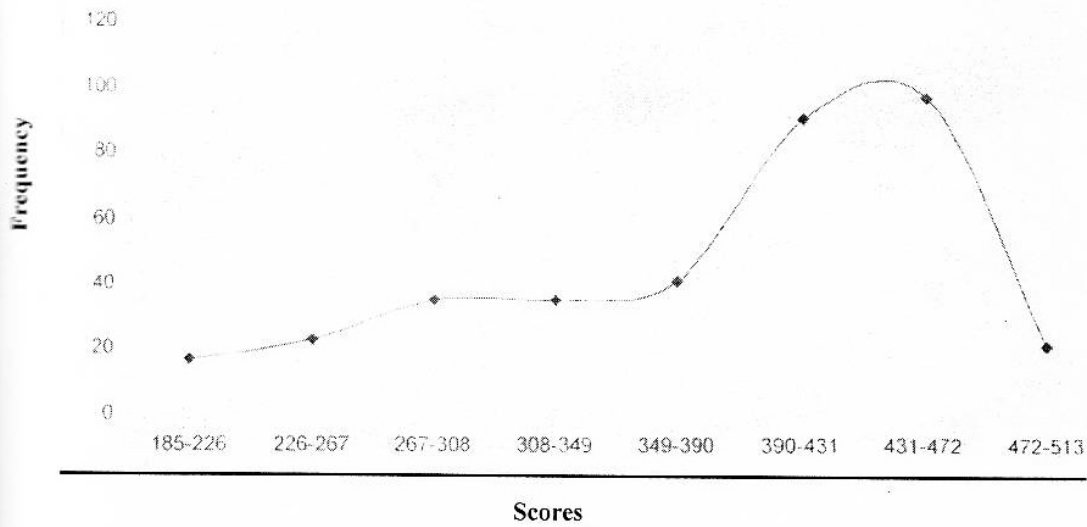
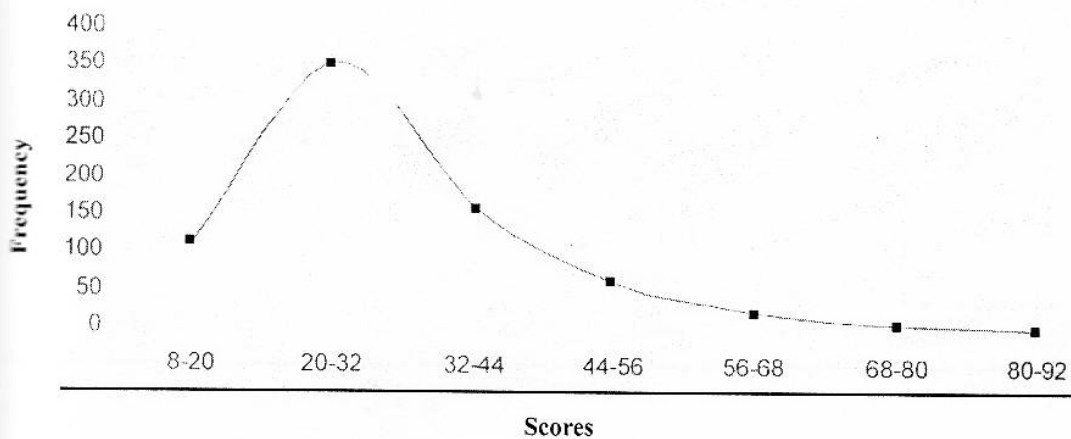


Figure XV. Frequency Distribution of Prior Science Achievement Scores (Urban Subjects)

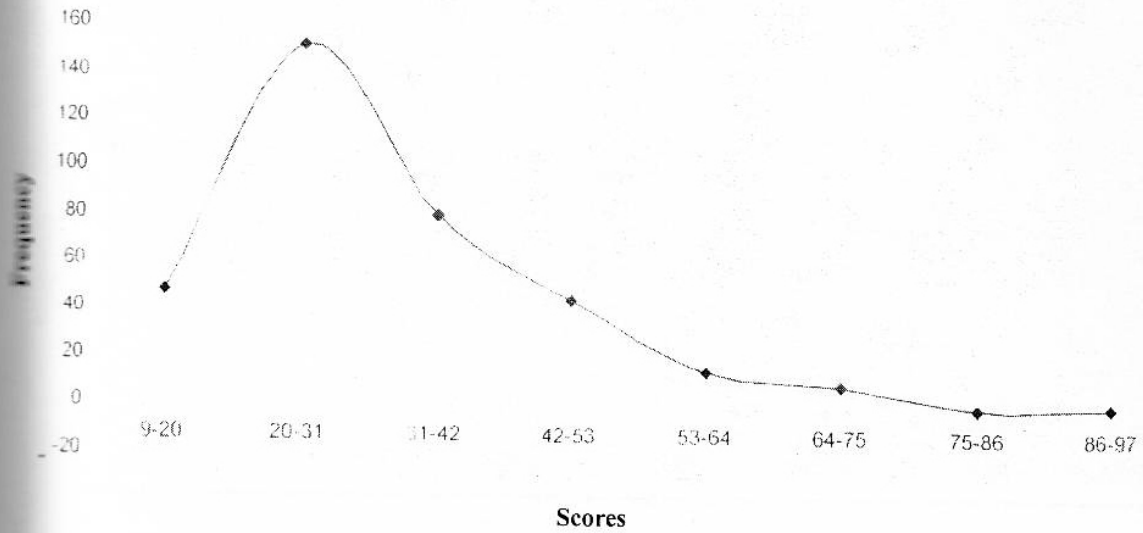


Figures XVI to XX present the distribution of 'socio-economic scores' of the total samples and its sub-samples.

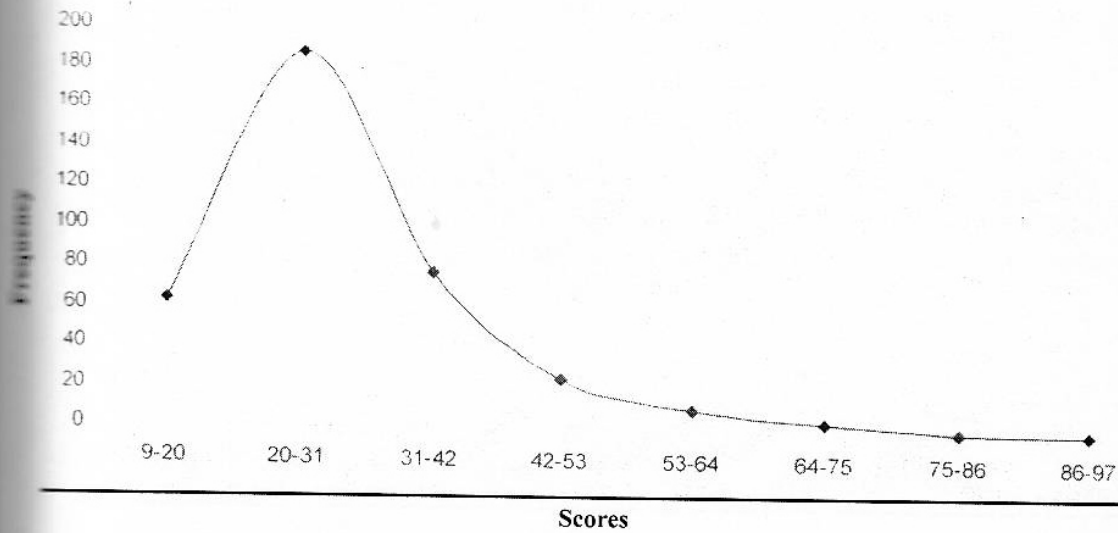
Figure XVI. Frequency Distribution of Socio-economic Scores (Total Sample)



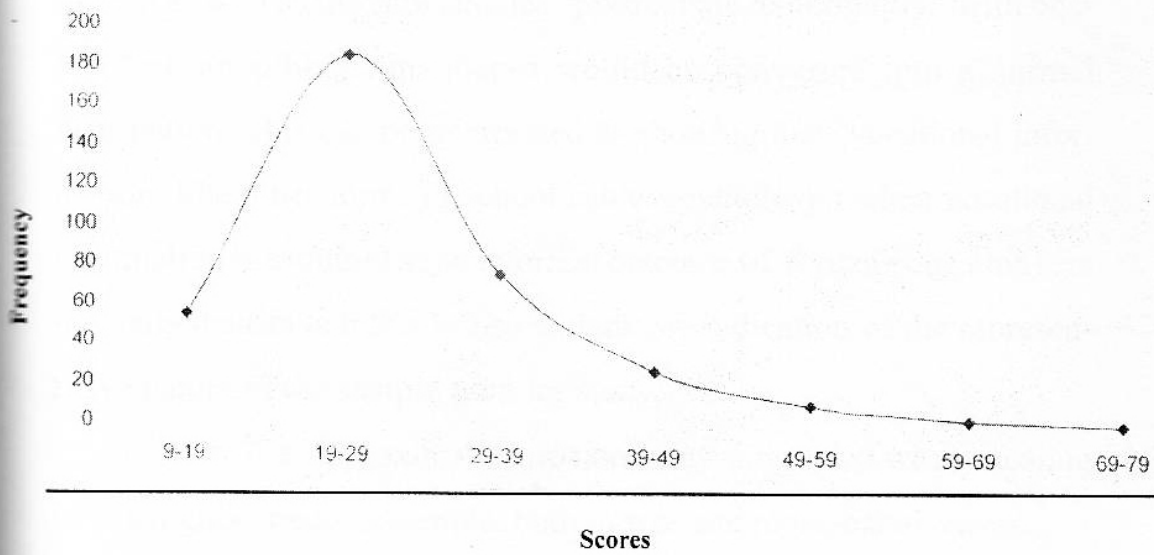
**Figure XVII. Frequency Distribution of Socio-economic Scores
(Boys)**



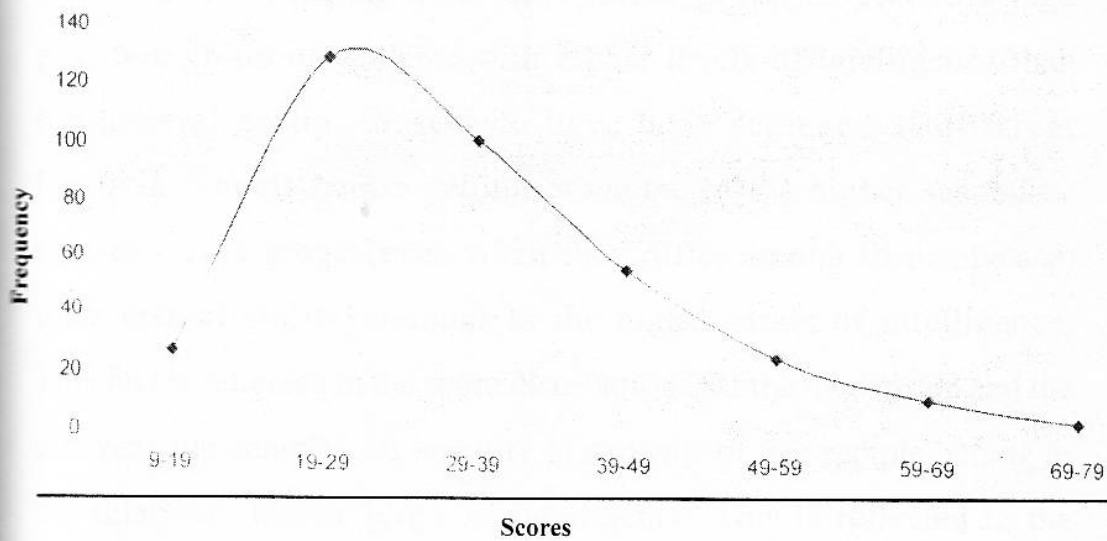
**Figure XVIII. Frequency Distribution of Socio-economic Scores
(Girls)**



**Figure XIX. Frequency Distribution of Socio-economic Scores
(Rural Subjects)**



**Figure XX. Frequency Distribution of Socio-economic Scores
(Urban Subjects)**



The graphical presentations when interpreted along with the major statistical indices, lead to the following conclusions:

(i) The 'vocational information' scores for the total sample as well as the sub-samples approximate to normality. With one-level of smoothing, the shapes would be converted into a normal distribution. This can be interpreted as showing that 'vocational information' like other forms of school achievement (even when vocational information is acquired as an informal outcome of formal education) are normally distributed; this is also an indirect indication of the representative nature of the sample used for study.

The approximation to normality shows that we are dealing with a highly adequate sample, both in size and representativeness.

(ii) The score distribution for 'intelligence', as distinct from the distribution of 'vocational information scores' shows some visible departures from normality. This is only to be expected since we are dealing with an atypical group of students or a selective group of students with higher levels of intelligence than the general group--those who have been screened at different levels in schools before getting promoted to the higher secondary classes. This group (even when they differ among themselves in their mental ability) belongs to the higher strata of intelligence. This fact is reflected in the score distributions for the total group and the different sub-samples. A majority of students of this sample belong to the relatively higher levels of intelligence. This is reflected in the

shape of the score distributions for the total sample as well as the sub-samples.

(iii) The scores for 'prior science achievement' for the total sample and the four sub-samples exhibit a common property which is to be expected in view of the selection procedures used in the state for admitting students to higher secondary science groups. Only those getting relatively higher scores in science (or science-related areas) at the secondary level gain admission to higher secondary science groups. A vast majority of students in the sample are those who succeed in getting higher scores in secondary school science areas. This is indicated by the shape of the distribution for the total sample. The usual rural-urban differences is also reflected in the relevant sub-sample distributions. That the urban students are one shade better than rural students in their school performance in all areas of the curriculum is borne out by the shape of the distribution of the scores in the area. A vast majority of urban students are ahead of their counterparts in rural institutions in their 'prior science achievement'. But boys and girls are seen to stand almost at the same level in their prior science achievement, with girls even having a slight advantage over boys. This is possibly because of the known trend that girls in Kerala out perform boys in most school subjects, including science subjects. While boys of all shades of mental ability continue in schools at the higher levels, only relatively superior girls continue their studies beyond the secondary level. Such girls evince higher

degrees of achievement motivation which is reflected as higher science achievement. Normally, only girls with relatively higher scores in science decide to offer science subjects at the higher secondary levels. But men students who get even relatively low scores in science often opt for science optionals at the higher secondary level, and use this as a channel for entering better careers in the science and science-related areas, like engineering, medicine, agriculture, etc. They are willing to join less popular institutions where they can gain admission to science optionals to achieve their aim of pursuing prestigious science-related professions.

(iv) The distribution of SES scores for the total sample and the four sub-samples indicate the general trend in the state, where a greater number of students in the higher secondary classes are those drawn from the socially deprived groups (mostly from rural areas) who have now access to higher secondary education in their localities. This denied to them about 5-10 years back because of the absence of higher secondary education in many rural areas. The pre-degree stage which originally was run by universities have recently been delinked from the high-profile Arts and Science Colleges (located mostly in urban areas) and have been handed over to several new institutions started in rural and culturally deprived areas of the state. The new generation higher secondary institutions located in culturally disadvantaged areas of the state are willing to admit students with lower levels of achievement in science to higher secondary science groups. Higher Secondary Education (especially in sciences) is currently utilized by more students

drawn from the low SES groups than in the past. Such students want to enter science-based education, along with high SES students to advance their vocational prospects. There is considerable similarity between the SES distributions of boys and girls and those of rural and urban students, which shows that those of almost the same SES levels enter higher secondary education in the rural and urban areas. The SES levels of boys and girls are also almost of the same level because of the new social trend explained earlier.

B. ANALYSIS OF DATA AS PER OBJECTIVES

This part of the analysis presents the analysis in the order of the objectives of the study to throw light on the questions raised as specific objectives and obtain answers to each of the questions stated as objectives. The details are presented below.

1. To assess the adequacy of vocational information acquired by the subject by examining the nature of the score distributions.

This objective attempts to answer the most important question which the study intends to answer: are the higher secondary students in possession of adequate vocational information to make a realistic selection of their future vocations? In the absence of any benchmarking for answering this question, the analysis has attempted to answer this question in terms of the shape of the distribution of vocational information scores.

The vocational information test was so constructed as to

provide a profile of essential vocational information absolutely needed by all students if they are to make a scientific selection of their future vocations. The ideal type of score distribution expected is relatively higher vocational information scores for a vast majority of the subjects, especially since this level of education (higher secondary stage of education) is supposed to cater to a specialized group of students different from a general sample of school students, who are aspiring to enter important professions like medicine and engineering. The selection or diversification for the higher vocations and all forms of higher education happen at this level. Rational selection of courses for the higher levels and beyond depends upon the quality of vocational information acquired by the students, informally. The adequacy or otherwise of the 'vocational information' of the subjects was assessed by examining the nature of the score distributions.

Higher levels of vocational information for a majority of the subjects will be indicated by a more dense clustering of higher scores at the right end of the graph (more higher scores to the right end than to the left). The reverse (more lower scores at the left than at the right) would indicate a relatively less satisfactory level of achievement in vocational information of the group, showing that the informal exposure to vocational information fails to develop the desired degree of vocational information.

The departure from the ideal normal distribution has been

used to assess the degree of adequacy of the vocational information available to the group.

The score distribution for vocational information was assessed using appropriate statistical techniques to find out whether the vast majority of the sample ($N = 720$) are able to achieve higher scores in vocational information or *vice versa*. A normal or near-normal distribution will have a near-zero coefficient of skewness. This would indicate that the vocational information achieved is incidental and therefore will be normally distributed, with near-equal shapes on either side of the mean or median.

It is interesting to note all the coefficients of skewness for 'vocational information' are close to zero. The coefficients for the total sample and sub-samples are + 0.093, - 0.078, - 0.130, - 0.117, and - 0.107. Considering the fact that the total sample is highly representative in terms of size and coverage ($N = 720$), and the different sub-samples themselves are large enough to represent the respective populations, and the fact that the indices of skewness are all close to zero, needs to be interpreted as evidence of the fact that the distribution of scores is what is to be expected by a system which is not very much concerned with the development of this educational outcome and what is in evidence as vocational information is the result of informal learning by students. The acquired knowledge is based on random acquisition of facts. The existing knowledge has not been acquired as a result of any systematic teaching or through formal instruction provided by the system. The role of the system in the acquisition of vocational information is just

marginal. This is an indictment of the formal system which has ignored the responsibility to develop an important educational outcome, viz, the development of vocational information which is likely to play a significant role in the lives of the students who are to play critical roles in the society of the future.

If active educational intervention had been provided in the late secondary school stage, possibly the nature of the distribution would have been different. The distributions would have reflected a different trend--distributions where a considerable number of students will be getting higher scores and only a small number will be getting low scores. The score distribution in this case would all be negatively skewed (left-skew). This is not in evidence.

It is to be inferred that the present system of education has ignored a basic responsibility which it should have undertaken--educating secondary students about vocations and the background of vocational information in different forms. The present system is not keen on developing the much needed vocational information on the part of the secondary and higher secondary students.

Departure from normality are generally attributed to factors like the following:

- (a) selection of a biased sample
- (b) poorly made tests where the items of undesirable difficulty levels bias measurement;
- (c) when the variable itself is normally distributed; and
- (d) errors in test development

We know that none of these conditions would explain fully the empirical evidence available except that the system has ignored the need for educating higher secondary students about the basic information to be used for making proper vocational choice. Instead of leaving students to acquire vocational information on their own through informal and unscientific means, if a concerted and systematic effort was made by the system to develop vocational information in a phased manner, a considerable left-skew (negative skew) would have been in evidence in the different distributions, especially when we note that the sample of students covered by the study are of higher levels of intelligence.

The highest and lowest scores obtained for vocational information can also be used to throw some light on the desirability or otherwise of the acquisition of vocational information.

Interpreting test scores using conventional methods (like converting the scores into percentages and interpreting them) are not fully justified since the minimum requirement for vocational choice is a very high score of around 90% - 95%. This is so because every piece of information measured by the test is essential for meaningful vocational selection. The ideal situation expected of every learner is 48 out of the maximum possible score of 48 or scores close to 48. What the learner does not know (even when such items are few) are as important as what the learner knows. When a person gets 60% as his score in vocational information, it also implies the absence of 40% of the essential

knowledge needed for making the right vocational choice.

The highest score for vocational information obtained in the study is 44. Converted into a percentage (out of a maximum possible score of 48), this score is the equivalent of 91.7%. This also means that the subject is ignorant of about 8% of the essential information needed for making a correct vocational choice. The lowest score, is 8. This is the equivalent of 12.5% of the maximum possible. The subject is ignorant of about 82% of the essential information needed for making a correct vocational choice. The average score for the sample is 27.8, which when converted into a percentage, stands for 43.38% of the total. Person getting the average score is ignorant of about 56.62% of the essential information. There are 336 subjects who have scores above 43.38%, which also means that 336 out of the 720 subject lack around 56.62% of the essential information needed for making a scientific selection of their future careers.

It is difficult to start with a benchmarking of the score limit which can be described as ideal/essential for making a correct vocational choice. The ideal situation envisaged is a negatively skewed distribution where a vast majority of the subjects in the sample are getting very high scores or scores close to the maximum possible. The trend indicated by the total sample is carried into the four sub-samples as well.

The analysis of the score distributions for the total sample and the sub-samples confirms the fact that the subjects on the whole are not in possession of the minimum vocational information needed for

making a scientific choice of their vocations. This lacunae is to be attributed to the fact that conventional educational system we practice confines all its attention to teaching the academic subjects, and ignores the need for developing proper vocational information atleast as part of formal teaching, especially informaiton relating to specialised science-based professions. Whatever vocational information that is acquired by an average student is what he/she has picked up through informal instruction with people or agencies outside the system.

2. The influence of 'intelligence' on 'vocational information'

The role of intelligence, on all forms of intellectual and educational performance of human beings, is well - accepted. Hence the role of intelligence on the acquisition of vocational information was investigated in some detail in the present study, using two parallel procedures. The first method was a comparison of two contrasted groups (into which the total sample was divided), based on intelligence, viz, high-intelligence (HI) and low-intelligence groups (LI), for their levels of vocational information. The dichotomy of the whole group into HI and LI was done using the mean intelligence score of the whole sample ($M = 26.23$). Those subjects in the sample getting scores at or above the mean intelligence score were classified as the HI-group while the others in the sample were classified as the LI-group. The means and standard deviations of the vocational information scores of the HI and LI groups and their sample sizes are presented in table 4. This data was used for testing whether the two groups differ in their vocational information.

- a) Test of significance of the difference between means of the 'vocational information' of the HI and LI groups.

TABLE 4

STATISTICAL INDICES AND THE RESULTS OF THE TEST OF SIGNIFICANCE FOR DIFFERENCE BETWEEN THE MEAN OF THE VOCATIONAL INFORMATION SCORES FOR THE HI AND LI GROUPS

Groups						
HI			LI			Critical Ratio (t)
Mean (M ₁)	Standard Deviation (σ ₁)	Sample Size (N ₁)	Mean (M ₂)	Standard Deviation (σ ₂)	Sample Size (N ₂)	
28.75	6.86	419	22.72	6.61	301	11.82*

* Significant at 0.01 level.

The test indicates that the two groups differ significantly in their vocational information. The critical ratio in this case is 11.82, a value which is very high. It exceeds the limit set for significance for two-tailed tests at 0.01 level, viz, 2.58. This is strong evidence to conclude that the two groups differ significantly in respect of their vocational information. The higher mean value from 'vocational information' of the HI group indicates that this group possesses significantly higher degree of vocational information than the LI group.

The result is consistent with general expectations. It indicates that the higher the level of 'intelligence' of the subjects, the higher will be their level of 'vocational information' and *vice versa*.

Since this score is composed of three sub-scores (vocational information in three science-related vocational areas viz, medicine, agriculture and engineering) it may be presumed that the difference in vocational information covers all the three forms of vocational information covered by the test. The finding has to be interpreted as showing that, in general, those with higher intelligence, possesses higher levels of vocational information relating to each of the three vocational areas covered by the test of vocational information. As the level of intelligence decreases, one could expect a corresponding decrease in vocational information.

b) Correlation between intelligence and vocational information

The relation between the above two variables viz, 'intelligence' and 'vocational information' was investigated using a second procedure viz, estimating the product-moment correlation 'r' between two variables.

The value of 'r' in this case (N = 720) was 0.477. For a sample of size 720, the value is highly significant. It could be described verbally as 'substantial' or 'marked' relationship once we adopt the scheme proposed by Garrett³. The positive value of the index shows that for any positive change or increase in the value of intelligence will be followed by a corresponding change in the value of vocational information. The common percentage variance of the two variables or the percentage overlap of the two variables can be expressed from the value of 'r'. This can be done by converting r^2 into a percentage. The common or shared variance in this case is 22.75. This

shows that 22.75% of the variance of vocational information scores is accounted for by variation in intelligence.

The estimated sample value of 'r' obtained viz, 0.477 is likely to change for different investigations using differing samples. We can fix the two limits within which the real 'r' or the population 'r' would lie, once we work out the two confidence limits--the confidence intervals at the 0.01 level. The two limits will be given by the formula $r \pm 2.58 \times \frac{1-r^2}{\sqrt{N}}$. Substituting the value 'r' = 0.48 and N = 720 in the above, we find that the two limits are 0.48 ± 0.0748 , which is the same as 0.5548 and 0.4052 respectively.

The limits are to be interpreted as showing that the real population value of 'r' could be expected to lie between these two limits (viz, between 0.4052 and 0.5548) at the 0.01 level of confidence. This would mean that if 100 experimenters replicate the same study, 99 experimenters will get correlations which fall within these two limits while the probability of it falling outside these limits is only one out of 100.

The noticed correlation between 'intelligence' and 'vocational information' confirms the finding obtained in the earlier sections of the present analysis using the t-test. Both the methods support each other, and point to the existence of a relatively strong dependence of 'vocational information' scores on 'intelligence' scores. As per existing conventions, intelligence is to be treated as the independent variable and vocational information is to be treated as the dependent variable. The analysis confirms the considerable role that intelligence plays in determining the level of vocational information of higher secondary

students. More intelligent students acquire more useful vocational information through informal learning, even when this is not an expected formal outcome of the system.

The fact that vocational information is not included as a part of a school curriculum does not stand in the way of intelligent children from acquiring the essential vocational information on their own.

3. The influence of 'prior science achievement' of subjects on their 'vocational information'

This section of the analysis explored the possibility of how another independent variable selected for study, viz, 'prior science achievement' of higher secondary students influences their 'vocational information'. The science achievement of higher secondary students at the end of their secondary schooling was treated as the independent variable for the purpose. This obviously was based on the assumption that science learning, in general, would contribute directly or indirectly to the acquisition of science-related vocational information of students.

The influence of 'prior science achievement' on vocational information was assessed in two ways, as in the previous analysis. The first method used was to divide the total sample into two contrasted groups based on their prior science achievement--high-science achievers (HSA) and low-science achievers (LSA)--and compare the vocational information of the two groups using the conventional t-test. The means of the vocational information scores of the two groups were compared in the t-test. The second method used for the purpose was the estimation of product-moment 'r' between science achievement and vocational

information. This was used as a supporting evidence to what was revealed by the t-test. The details relating to the two procedures are reported below.

a) **Test of significance for difference between the mean vocational information scores of contrasted groups based on prior science achievement (HSA and LSA)**

The whole sample ($N = 720$) was divided into two contrasted groups based on their prior science achievement based on the percentage marks obtained by the subjects in the common state level secondary school examinations for the four science subjects, viz, physics, chemistry, biology and mathematics, totalled with equal weightage given to the four measures. The dichotomy into high-science-achievers and low-science-achievers was effected by dividing the total sample using the mean science achievement score of the total group as the cut-off point.

The dichotomy yielded two contrasted groups of science achievers-the High Science Achievers (HSA) and Low Science Achievers (LSA). Subjects getting scores at or above the mean prior science achievement score ($M = 26.23$) were classified as HSA's while others were classified as LSA's.

The mean and standard deviation of the 'vocational information' scores of the two groups (HSA and LSA), together with the two sample sizes are reported in Table 5

TABLE 5

STATISTICAL INDICES AND THE RESULTS OF THE TEST OF SIGNIFICANCE FOR DIFFERENCE IN VOCATIONAL INFORMATION OF THE HSA AND THE LSA

Groups						
HSA			LSA			Critical Ratio (t)
Mean (M ₁)	Standard Deviation (σ ₁)	Sample Size (N ₁)	Mean (M ₂)	Standard Deviation (σ ₂)	Sample Size (N ₂)	
28.38	7.08	390	23.7	6.9	330	8.95*

* Significant at 0.01 level

The critical ratio was calculated using the standard formula for test of significance of difference between means of large independent samples. Details are presented in the same table. The critical ratio in this case is 8.95. This is much higher than 2.58, the limit set for significance at 0.01 level. We may therefore strongly conclude that there is significant difference between the 'vocational information' levels of the two contrasted groups. The higher mean value of the 'vocational information' of the HSA, as compared to the LSA, indicates that the HSA group possesses significantly higher degree of vocational information than the LSA. This is also evidence of the fact that those who show higher performance in science subjects also pick up more useful vocational information, from all available sources--from both outside the curriculum or from within the curricular areas. Those with

higher science achievement are seen to possess higher levels of vocational information in respect of the three vocational areas viz, medicine, agriculture and engineering.

b) **Correlation between prior science achievement and vocational information.**

The validity of the finding reported above, using the test of significance was further examined using another supporting statistical technique -- the coefficient of correlation.

The two variables (viz, 'vocational information' and 'prior science achievement') were correlated to find out the degree to which 'prior science achievement' influences the acquisition of vocational information.

The value of 'r' in this case (N = 720) was 0.420. The obtained value of 'r' is significant at 0.01 level. The value could be described using the classification suggested by Garrett⁴. This coefficient can be described as a 'substantial' or 'marked' relationship between the variables.

The positive value indicates that for any positive change in the independent variable (prior science achievement), we can expect a commensurate positive change in the dependent variable, viz, vocational information. The overlap of the two scores (overlap of 'vocational information' with 'prior science achievement') is nearly 17.64 percent in terms of shared variance. This has to be interpreted as showing that nearly 18 percent of the scores of 'vocational information'

is accounted for in terms of variance in 'prior science achievement'.

The sample value of correlation ($r = 0.420$) will help us to work out the 0.01 level confidence intervals within which the real (population) value of 'r' would lie. The 0.01 confidence levels (calculated using the formula used in the case of intelligence) are 0.4999 and 0.3400. We may assign 0.01 level of confidence (99 out of 100) when we draw the conclusion that the population value will lie between the above two limits. This is consistent with expectations. It will be logical to assume that learning of science would expose the learner to certain forms extra information relating to professions connected with science areas.

A knowledge of bio-sciences, for example, would expose one certain aspect of vocations in areas like agriculture or medicine. A sound background of physics will help the learner to understand more of electrical or mechanical engineering, etc. Expressed differently, formal science learning in terms of the conventional curriculum will help learners to acquire certain forms of vocational information relating to science-based professions. The suggestions provided in the formal curriculum is likely to be used by interested learners to search for additional information relating to these professions from other sources. This form learning is acquired as a by-product of, formal learning of conventional science subjects.

Both the methods presented above (t-test and correlation) lead to the same result. Both the approaches help to draw the identical conclusion that 'prior achievement in science' of the

subjects has a determining influence on the level of 'vocational information' acquired by higher secondary science students.

4. The influence of 'socio-economic status' of subjects on thier 'vocational information'

Another important independent variable selected for study was 'socio-economic status' of subjects. The influence of this variable on the 'vocational information' of the subjects was explored, first using the test of significance and again using the size and direction of correlation, as was done for the two previous independent variables. The findings are presented below.

The two contrasted groups based on socio-economic status were formed by dividing the total sample into two--classifying those getting socio-economic scores (SES) at or above mean for the total sample ($M = 26.23$) as the high socio-economic group (H-SES) and the others in the total sample as the low socio-economic group (L-SES). The means and standard deviations of the two groups in 'vocational information' were calculated and used for the test of significance. Also, the correlation between the 'SES' scores and the 'votional information' scores for the whole group was worked out (product-moment 'r') and the results were simultaneously interpreted.

a) Test of significance of the difference between means of vocational information of H-SES and L-SES groups

Statistical indices and the results of the test of significance are summarised in Table 6

TABLE 6
STATISTICAL INDICES AND THE RESULTS OF THE TEST OF SIGNIFICANCE
FOR MEAN DIFFERENCE IN THE VOCATIONAL INFORMATION
OF H-SES AND L-SES GROUPS

Groups						
H-SES			L-SES			Critical Ratio (t)
Mean (M ₁)	Standard Deviation (σ ₁)	Sample Size (N ₁)	Mean (M ₂)	Standard Deviation (σ ₂)	Sample Size (N ₂)	
28.06	7.26	271	25.12	7.24	449	5.27*

* Significant at 0.01 level.

The test shows that there is significant difference between the two groups in their vocational information. The 't' value is 5.27, which is far higher than the limit set for significance at the 0.01 level viz, 2.58. Higher mean value in vocational information is seen to be associated with the higher SES group and *vice versa*. The difference noticed could be interpreted as showing a dependence of 'vocational information' on the 'socio-economic status' of the subjects. The higher mean value in 'vocational information' of the H-SES, as compared with the mean scores of the L-SES, shows that higher one's SES, higher will be one's 'vocational information' and *vice versa*. This has been further confirmed by calculating the correlation between the two variables.

b) Correlation between 'socio-economic status' and 'vocational information'

This has been examined, as in the case of the previous variables, using the supporting statistical technique -- coefficient of correlation 'r'. The value of 'r' (between socio-economic status and vocational information) was worked out. This was found to be 0.233 (N = 720). The value of the correlation is not as high as in the case of the two previous independent variables, viz, intelligence and prior science achievement. But the relationship, even when it is low is positive and significant. The relationship could be described as 'low', 'present, but slight' as per Garrett's classification. The positive value shows clearly that positive changes in the independent variable (SES) will be followed by positive changes in the dependent variable (vocational information). This would mean that the higher one's socio-economic status, higher will be his vocational information with the reverse being true -- the lower ones SES, lower will be their vocational information. The overlap between the two variables (in terms of shared variance) is 5.42 percent, confirming the fact that the two variables are some what interdependent, though not to be extent they overlap with intelligence and prior science achievement. The confidence interval for 'r' in this case are 0.3203 and 0.1397. This is to be interpreted as showing that the population value of 'r' will lie between these two intervals at the 0.01 level of probability.

The findings, on the whole, support the earlier finding

obtained using the t-test for comparing the vocational information of two contrasted SES groups for vocational information.

5. The influence of 'gender of subjects' on the 'vocational information' of higher secondary students

Gender differences are in evidence in most of the educational outcomes of learners. Vocational information being a variable which is related to educational performance, it was presumed that this is also likely to be influenced by the gender of the subjects. The influence of the gender differences was examined as a possible factor which is likely to influence the acquisition of the needed vocational information. This was done using the conventional method of dividing the total sample into two groups--boys and girls, and comparing their vocational information using a 't' test.

Statistical indices and the result of the test of significance for the two gender groups -- boys and girls -- are presented in the Table 7

TABLE 7
STATISTICAL INDICES AND THE RESULTS OF THE TEST OF SIGNIFICANCE FOR DIFFERENCE IN THE VOCATIONAL INFORMATION OF BOYS AND GIRLS

Groups						
Boys			Girls			Critical Ratio (t)
Mean (M_1)	Standard Deviation (σ_1)	Sample Size (N_1)	Mean (M_2)	Standard Deviation (σ_2)	Sample Size (N_2)	
26.81	7.34	349	25.68	7.39	371	2.05*

* Significant at 0.05 level

The mean and standard deviation of the scores in 'vocational information' of boys and girls were separately worked out and subjected to the t-test. The t-value (critical ratio) obtained in this case is 2.05 which is less than 2.58, the 0.01 limit set for significance. But this value exceeds 1.96, the limit set for significance at 0.05 level. We may conclude that the two groups differ significantly in their 'vocational information' at 0.05 level.

The higher mean score of boys shows that their vocational information is significantly higher than that of girls. This is consistent with expectations.

The above finding indicates that gender is a significant factor which determines the vocational information of higher secondary science students.

6. The influence of rural-urban differences on vocational information of higher secondary students.

Rural-urban differences are widely in evidence in most of the school-related outcomes, especially the cognitive performance of students. The present study also presumed that this difference will be present in the matter of vocational information as well, because this is an outcome very much close to different forms of educational outcomes.

The influence of rural-urban differences on vocational information was examined by classifying the total sample into two groups (rural and urban groups) and comparing them for their mean vocational information score.

Statistical indices and result of the test of significance are presented in Table 8

TABLE 8

STATISTICAL INDICES AND THE RESULTS OF THE TEST OF SIGNIFICANCE
FOR DIFFERENCE IN VOCATIONAL INFORMATION
OF RURAL AND URBAN SUBJECTS

Groups						
Urban			Rural			Critical Ratio (t)
Mean (M ₁)	Standard Deviation (σ ₁)	Sample Size (N ₁)	Mean (M ₂)	Standard Deviation (σ ₂)	Sample Size (N ₂)	
27.76	7.69	360	24.70	6.73	360	5.68*

* Significant at 0.01 level

The critical ratio is very high, viz., 5.68. This far exceeds 2.58, the limit set for significance at 0.01 level, showing that there is significant difference between the urban and rural groups of higher secondary students in respect of their vocational information. The higher mean value of the urban group in vocational information is much higher than that of the rural group. This has to be interpreted as showing that the level of vocational information of the urban group is significantly higher than that of rural subjects covered by the study. This is consistent with what is to be expected on the basis of earlier studies which show that urban students have an advantage over rural students in all their

education-related outcomes. This is true of vocational Information as well.

Interpretation of the findings

The study shows that all the five independent variables selected for study viz, intelligence, prior science achievement, socio-economic status, gender of subjects and rural-urban residence of subjects, all influence the acquisition of vocational information, of higher secondary students. The five independent variables selected for study all exert a significant influence on the dependent variable viz, vocational information.

It is of interest to note that even when the degree of dependence varies from one independent variable to another, there is general agreement that all of these significantly influence the acquisition of vocational information of higher secondary students.

The independent variable which influences the acquisition of vocational information most, as indicated by coefficient of correlation is, intelligence, followed by, 'prior science achievement', and 'socio-economic status', in that order. As per tests of significance, the highest t-value is for 'intelligence' ($t = 11.82$) followed by 'prior science achievement' ($t = 8.95$), 'socio-economic status' ($t = 5.27$), 'gender of subject' ($t = 2.05$) and 'rural-urban residence' ($t = 5.68$). In respect of the first three measured variables (intelligence, prior science achievement and socio-economic status) higher means in vocational information are

also associated with the groups associated with the higher levels of these variables. With respect to gender differences, higher vocational information is for boys. The rural-urban difference in vocational information is visible as higher scores associated with urban subjects.

There is broad agreement in the findings obtained for the three measured variables in respect of the t-tests and the product-moment coefficients of correlation. The critical ratios in all the three cases are $t = 11.82$, $t = 8.95$, $t = 5.27$. The values of 'r' are also significant in all cases ($r = 0.477$ for intelligence, $r = 0.420$ for prior science achievement, and $r = 0.233$ for socio-economic status). The first two could be described as 'substantial' or 'marked' while the corresponding value for socio-economic status is to be described as 'low' or 'slight'.

The common conclusion which is to be drawn is that all the selected independent variables selected for study influence the acquisition of vocational information of students significantly. The influence is considerable, except for one variable, namely, socio-economic status where the influence is one shade lower than for the other variables; but all relationships are significant. A detailed interpretation of the findings is attempted below:

(a) The noticed association between 'intelligence' and vocational information is in conformity with general expectations based on earlier researches. Intelligence is known to be the most important single determinant of different forms of cognitive performance, including school learning or education-related cognitive performances. Vocational information is not a curriculum-based educational outcome,

since there is no provision to systematically introduce vocational information in Kerala schools. Whatever information is acquired by the subjects is what they have acquired incidentally or informally. May be the most intelligent students understand the need to acquire vocational information as a method of securing their entry into worthwhile professions, without any formal initiation into the area. When motivated, they collect and retain such information informally and process this to serve as a basis for making a rational vocational choice.

The more intelligent a student, greater will be his/her ability to select appropriate information and retain it in mind for future use. Other factors remaining the same, more intelligent students will have greater motivation for acquiring all forms of learning which are likely to be useful for his/her future life. Such students are likely to identify the crucial nature of vocational information in different forms (as indicated by the items of the inventory). The opposite is also true--those with lesser intelligence are unlikely to understand fully the implications of vocational information for their professional choice and career advancement. They would generally sideline the need to acquire such information or operate with the inadequate information which they acquire incidentally. The positive correlation and significant 't' values are indications of the above possibilities.

(b) The noticed association between 'prior science achievement' and 'vocational information' is also what one would expect although for the same and or for different reasons. High

achievers are normally those of high intelligence. As such, all the arguments presented above for the high intelligence groups are valid for the high achievers as well. Another possible causal factor which links 'prior science achievement' with 'vocational information' is that proper science learning will expose students to the vocational dimensions related to the curricular areas.

Thus, a student of human physiology will obviously be exposed to certain ideas and certain practices relating to the medical profession. The interest stimulated will be followed up by making informal studies about the nature of the medical profession, educational qualifications needed to enter into this profession, aptitudes to be developed for the purpose, educational preparation and finances required for joining medical education, etc. The same is true of students who learn about electromagnetic induction and the working of dynamos and electric motors in physics. They will get attracted and exposed to certain aspects of the profession of electrical engineering informally. Thus science achievement in itself could also act as a motivating and contributing factor for acquiring select forms of vocational information. A good science curriculum will also contain information relating to science-related vocations.

(c) The relation between 'socio-economic status' and 'vocational information' is to be interpreted in terms of the established relation between SES and different forms of 'cognitive achievements'. All important studies about the role of socio-economic status of learners and their educational or education-related performance provide

convincing proof of the role that SES plays on all forms of human performance. The positive influence of SES on different forms of cognitive performance could be explained in terms of different positive factors (achievement-boosting factors) implicit in the concept of SES. Other things being equal, we find that those who get higher SES scores are those who have better heredity. Often a number of economic advantages go along with higher SES -- like a better environment for the development and utilization of one's innate learning potential, higher motivation for learning, access to superior educational institutions etc. Higher SES automatically ensures a number of supportive factors which lead to superior educational performance--higher self-concept, less of academic anxiety, higher social adjustment etc. Even better learning facilities like exposure to quality learning materials, powerful reinforcements for learning from family, special coaching etc, are automatically available for children from higher SES. All these are likely to cater to the development of better vocational information, which is to be treated as an informal learning outcome.

(d) The significant influence of 'gender differences' on 'vocational information' indicated by the study is also one which is in conformity with general expectations. Almost all studies relating to gender differences show that males and females differ in their levels of mental performance and in the quality of mental performance, especially in different areas of school achievement and their aptitudinal dispositions. The fact that girls in general excel boys in language development and communication abilities as against boys who are known

to excel girls in mathematical-spatial abilities and in abstract thinking, is well documented. These basic abilities are reflected in differing levels of school performance of the two groups.

Vocational information is one which is acquired more through informal learning, even when we admit that they exhibit some kind of overlapping with school learning. But the disposition to gain more information about vocations (more information relating to relevant aspects of different vocations) is, to a certain degree, decided by the gender-group to which one belongs. Preference for vocations is culturally determined in most cases. In the cultural context of the country, boys are assigned the role of wage earners and as such are subjected to an increasing social pressure to aspire for entry into a well-defined group of higher professions. This together with a number of gender-related genetic factors are responsible for a slightly better performance of boys in the test of vocational information. The explanations has to be sought in hereditary and social-environmental factors in operation.

(e) The significant influences of 'locale' (rural-urban residence) on the 'vocational information' of higher secondary students is also consistent with general expectations. A vast majority of studies relating to the educational performance of students from rural and urban areas show a consistent trend in favour of urban children. Even in a rural-urban culture like that of Kerala, the influence of the greater rural environment/urban environment becomes visible. This is

evident in the case of 'vocational information', as well. Rural-urban differences affect all forms of cognitive performance. Vocational information is one such. This outcome is very close to the educational performance in different conventional curricular areas. The usual trend, infavour of urban students, is visible here aswell. Very few exceptions have been noticed.

The reason for such differentiation based on rural-urban residence is to be attributed to a large number of factors. One such is the tendency for the higher-intelligence groups to migrate to the urban areas in search of better opportunities. Another is the availabiltiy of better learning facilities and higher social motivation for those who are reared in an urban environment. This is a general urban culture which children pick up from the social environment. The higher degree of competition for acquiring better learning present in the urban group is generally carried into all forms of formal and informal learning. It is not uncommon for urban children to take up courses for better communication, life-skills, personality development, and special coaching for excelling in national competitive examinations. Both formal and informal self-learnig methods are used for the purpose. Such advanges are carried into the domain of vocational information as well. It is this superiority of urban children which is reflected as an advantage among the urban children over their rural counter parts.

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CHAPTER VI

SUMMARY OF CONCLUSIONS, IMPLICATIONS AND SUGGESTIONS

- Restatement of the problem
- Procedure
- Major findings
- Tenability of the hypotheses
- Implications of the study for educational practice
- Suggestions for further research

SUMMARY OF CONCLUSIONS, IMPLICATIONS AND SUGGESTIONS

Restatement of the problem

The present study is an attempt to assess the degree of vocational information acquired by higher secondary students of Kerala and identify some of the major variables which influence the acquisition of essential vocational information which will help higher secondary students to make meaningful selection of their future vocations.

Procedure

The study was conducted on a sample 720 higher secondary students, obtained using proportionate stratified sampling technique. The study used a specially developed inventory developed by the investigator for measuring vocational information. A number of standardized tools were used for measuring the independent variables selected for study, namely, 'intelligence', and 'socio-economic status'.

Public examination marks obtained by students at the end of their 10th Standard Examination in different science subjects were totalled and used as measures of 'prior science achievement'. Other biographical/demographical data relating to subjects were collected using a standard data form. The information collected using the data sheet helped to classify the sample in terms of their gender and residence.

The data were analyzed using a number of statistical procedures -- graphical procedures for examining the nature of the distributions in terms of indices like skewness, t-tests and coefficient of correlation. The association between the dependent and independent variables were examined using t-tests for comparing the mean vocational information of contrasted groups based on intelligence, prior science achievement, and socio-economic status, and of differing gender groups and locale. The relationships of the measured independent variables with the dependent variable, viz, vocational information, were estimated using product-moment coefficients of correlation.

The analysis of data were done to throw light on the questions stated as objectives of the study, given below:

1. Assess how the total scores on vocational information (sum of the scores of the vocational information in three vocational areas) are distributed in the total sample of higher secondary students and the relevant sub-samples selected for study, with a view to determine whether the students under study have acquired the expected levels of vocational information.

2. Assess the influence of “intelligence” on the “vocational information” of higher secondary science students
3. Assess the influence of “prior science achievement” on the “vocational information” of higher secondary science students
4. Assess the influence of “socio-economic status” of higher secondary science students on their “vocational information”
5. Assess the influence of “gender of subjects” on the “vocational information” of higher secondary science students
6. Assess the influence of “rural-urban” residence on the “vocational information” of higher secondary science students

Major Findings

The major findings of the study are summarised and reported below:

(i) The study examined the distribution of the scores in the vocational information inventory obtained for the different samples to assess whether the subjects of the study (higher secondary students) have acquired desirable levels of vocational information either through formal education or through any form of informal learning. The distributions of ‘vocational information’ scores (for the total sample and the sub-samples based on gender and locale) showed

that the scores are nearly normal with an equitable distribution of scores on either tails of the distribution. The coefficient of skewness for the different distributions were close to zero (in the range -0.078 to +0.093) which further confirmed the conclusion that the score distributions tend to normality. The trend present in the total sample is visible in the sub-samples, with minor variations. These observations are to be interpreted as showing that the scores are not the result of the action of the educational system or of formal instruction, but the result of informal random learning, picked up by the subjects from the social-environment.

The average score in vocational information of the total sample (viz, 27.8 out of a maximum possible score of 48) expressed as a percentage of the maximum score is the equivalent of 43.38. This shows that around 56.62 percent of the essential basic learning needed for scientific vocational choice is absent among a vast majority of students. The highest score for the group is 44 which is the equivalent of 91.7 percent of the possible highest score. At the other end, the lowest score for the group is 8 which is the equivalent of 12.5 percent of the maximum score possible. While even the top most scorer in the sample lacks about 8.3% of the essential information needed for a proper career choice, the subject getting the lowest vocational information score lacks nearly 82% of the essential information for making a correct vocational choice.

The study throws adequate light on the fact that the educational system has to make adequate provision for developing vocational

information for students by the time they complete their secondary education, if they have to be enabled to make proper career choices, which has to begin with the selection of optionals at the '+2' level.

(ii) The role played by 'intelligence' in determining the level of vocational information of higher secondary students was assessed by (a) comparing the vocational information of two contrasted intelligence groups into which the whole sample was divided, viz, the high-intelligence (HI) and low-intelligence (LI) groups, and (b) by estimating the correlation between 'intelligence' and 'vocational information' for the total sample.

Both these techniques were used separately and the results were interpreted in combination which helped to reach the conclusion that there is a significant and considerable association between the two variables.

The contrasted groups (HI and LI) differed significantly in respect of their vocational information when tested for significance of the difference between their mean vocational information levels. The t-value obtained was 11.82, which far exceeds the limit set for difference at 0.01 level of significance, with the HI-group obtaining a significantly higher mean score than the LI-group. The observed difference in vocational information is to be attributed to the fact that other factors remaining the same, intelligence is an important determinant of one's vocational information. This can also be interpreted as showing that higher one's level of intelligence, higher will be his level of vocational

information and *vice versa*. Differentiation of the total sample on the basis of intelligence results in a parallel differentiation of the group in terms of vocational information

The relation between the two variables--intelligence and vocational information--estimated in terms of the product-moment coefficient of correlation--yielded a correlation of 0.477. The value is significant at 0.01 level. The correlation qualifies to be described as a 'substantial' or 'marked', relationship. The value of 'r' when converted into an index of overlapping shows that it is the equivalent of an overlap or common variance of around 22.75% for the two measures. The limits of the 0.01 confidence intervals for 'r' are 0.4052 and 0.5548 respectively. This shows that the probability of the population value of 'r' lying between these two limits in 99 out of 100 and the probability of 'r' falling outside this interval is only 1 out of 100.

The findings obtained using both the above techniques confirm the fact that intelligence is an important causal variable which determines one's level of vocational information.

(iii) The influence of 'prior science achievement' on 'vocational information' was investigated using the two procedures used in the case of the previous variable. The procedures used were (a) comparing the vocational information of two contrasted groups based on prior science achievement, obtained by dividing the total sample into high-science-achievers (HSA) and low-science-achievers (LSA), and (b) by estimating the correlation between 'prior science achievement'

scores and the vocational information scores of the total sample.

Comparison of the vocational information scores of the two contrasted groups of prior science achievers showed that the two groups differ significantly ($t = 8.95$). The t -value far exceeds the level set for difference at 0.01 level. The HSA-group is clearly superior to the LSA-group in its vocational information. The observed difference in vocational information is to be interpreted as caused by differences in the levels of their prior science achievement. This can also be interpreted as showing that the level of science achievement of the subjects, achieved earlier, while in secondary school is a determinant of their vocational information. This, again, would mean that when other factors are under control, the higher one's prior science achievement, the higher will be his/her vocational information and *vice versa*. Differentiation of the two groups on the basis of their 'prior science achievement' is reflected on the sample as a differentiation on the basis of their vocational information.

The direct association between the above two variables (prior science achievement and vocational information) was explored by estimating the product-moment correlation between these variables. The value of 'r' between these variables was 0.420. This is significant at 0.01 level. The obtained correlation could be described as 'substantial' or 'marked' in terms of accepted descriptive terminology. The positive sign of the coefficient shows that any increase in 'prior science achievement' will be followed by a corresponding increase in vocational information and *vice versa*. The percentage overlap of the two

measures is 17.64, this being the percentage of common variance present in the two variables. The 0.01 confidence interval for 'r' (interval within which the population 'r' would lie) are 0.3400 and 0.4999. This shows that the probability of the population 'r' falling between these limits is 99 out of 100, and that of missing this interval is 1 out of 100.

Both the techniques concur in showing that 'prior-science achievement' has a significant and determining role in deciding one's level of 'vocational information'.

(iv). The influence of 'socio economic status' on the 'vocational information' of the higher secondary students was examined using the two procedures used in the case of the two variables considered above viz, 'intelligence' and 'prior science achievement'.

Comparison of the mean vocational information scores of two contrasted groups based on SES into which the total sample was divided viz, the high socio-economic group (H-SES) and the low socio-economic group (L-SES)--showed that the groups differed significantly with respect to their 'vocational information'. The t-value obtained for the two groups was 5.27 which exceeds the limit set for significance at 0.01 level, viz 2.58. The test shows that the division of the sample on the basis of the socio-economic status of the subjects is carried into the sample as a significant difference in vocational information. The differentiation in terms of socio-economic status automatically leads to an equivalent differentiation in vocational information. This would lead to the conclusion that other factors being

the same, the higher one's SES, one would expect a higher vocational information and *vice versa*.

The estimate of correlation between the same two variables (viz, socio-economic status and vocational information) is indicated as a 'low' or 'slight' relationship ($r = 0.233$). The value of 'r' is positive and significant at 0.01 level. The positive value of 'r' shows that any increase in the value of SES will be followed by a corresponding increase in vocational information and *vice versa*. The percentage overlap of the two variables (indicated as a percentage common variance) is around 5.42% showing that SES plays a relatively minor role in deciding one's vocational information. The 0.01 confidence intervals for 'r' are 0.1397 and 0.3203 respectively. This indicates the fact that the population value of 'r' for the two variables may be expected to lie between these two values at the 0.01 level of confidence.

The findings using each of the above two techniques support each other in confirming that the two variables are interdependent to a certain extent, but not to the extent noticed in the case of 'intelligence' and 'prior science achievement'

(v) The influence of the 'gender of the subjects' on their 'vocational information' was assessed by comparing the mean vocational information of boys and girls covered by the study, using the t-test. Test of significance of difference between the means of vocational information for the two gender groups indicated clearly that the two groups differ significantly in their vocational information, where a higher mean

is associated with the boys in the group. The t-value obtained in the comparison is 2.05. This is higher than the critical level set for difference at the 0.05 level, but is less than 2.58, the limit set for difference at the 0.01 level.

The significant t-value shows that 'gender differences' have a determining influence on the acquisition of vocational information of higher secondary students in Kerala. But the influence is relatively not as high as for the three measured variables considered earlier.

(vi) The influence of rural-urban residence of subjects on their level of vocational information (when assessed using test of significance for difference between the mean vocational information scores for the two groups) showed that the two groups differ significantly ($t = 5.68$) in their level of vocational information; the groups differ at the 0.01 level of significance. Higher mean score in 'vocational information' is associated with urban students.

The high t-value shows that rural-urban differences have a determining role in deciding the level of vocational information of higher secondary students of Kerala.

Tenability of the hypotheses

The study was conceived with the following three hypotheses:

- I. Vocational information acquired by higher secondary science students of Kerala in the three vocational areas selected for study (viz. Medicine, Agriculture and

Engineering, treated as single variable) is inadequate for making a realistic professional choice.

- II. There will be significant differences in the clustering of 'vocational information scores' which will be reflected as differences in the distribution of scores for the total sample and the relevant sub-samples covered by the study.
- III. Vocational information of higher secondary science students will be significantly influenced by all the five independent variables selected for study and this influence will be visible as either significant mean differences in the vocational information scores of relevant contrasted groups based on each of the above variables and or in terms of significant correlations between each of the above independent variable and vocational information.

The findings provide conclusive evidence of the fact that all the three hypotheses set for the study are valid.

Implications of the study for educational practice

The study found that all the five independent variables selected for study influence significantly the acquisition of vocational information of higher secondary students of Kerala. The five variables viz, intelligence, prior science achievement, socio-economic status, gender of subjects and their locale are factors which determine the level of vocational information of higher secondary students covered by the present study.

Education is an applied discipline where the findings are specifically intended to improve the theory or practice of education, either directly or indirectly. The relationships established by the study are intended to be used for improving educational practice or our understanding of the concept of vocational information. How these noticed relationships are to be translated into educational operations (or are to be used for devising improved educational approaches/strategies/policies) was considered from differing angles. The results are presented below as suggestions for improving current practices.

(i) The most important finding of the study, that vocational information acquired by the sample under study is inadequate for making a proper vocational selection, needs to be specially noted and the appropriate corrections are made in our conception of curriculum framing and also in respect of educational strategies. The distribution of vocational information scores for the total sample and its major sub-samples provide ample evidence to show that this important educational outcome expected of higher secondary learners -- acquisition of sufficient degree of vocational information for making a realistic and informed choice of vocations -- is not achieved through the present-day formal education. This is an indication of a major shortcoming in our conception of educational outcomes, which are confined to outcomes in conventional academic subjects. The outcome currently indicated as vocational information for the sample is the result of random informal learning. The relatively inadequate learning which is in evidence, is what is to be expected when a variable like vocational information is left out of the scope of formal educational operations and left to the vagaries of informal learning.

Any formalised teaching of vocational information (as part of formal education or as a result of the operation of a systematised and organized supplementary guidance programme or both) would certainly have indicated a skewed distribution of vocational information scores with a concentration of higher scores at the positive end of the distribution. This, unfortunately, is not in evidence. The distribution is more or less normal, with an unbiased and equitable distribution of scores on either side of the mean. The low indices of skewness is to be interpreted as a failure of the system to take up vocational information as an important formal outcome of schooling.

The major decision which needs to be adopted in educational policy-making from this finding is that since the educational system has not contributed in any meaningful manner to the acquisition of vocational information of its learners, there is an urgent need for revising the policy that vocational information is something to be acquired informally. What is in evidence is a very important shortcoming of our system, especially in the present-day global scenario of education where learners are expected to acquire the right type of vocational information before they make their selection of a vocation, if they have to be empowered to make productive contributions to the nation's economic development or to function as world-class professionals elsewhere in the world. The finding highlights the need to pay greater attention to the development of 'vocational information' by the system and deal with this as an important objective of school education, by listing the acquisition of vocational information as an outcome of formal learning, interpreting them with the learning of accademic subjects or by including this as an outcome of a formal guidance service in

secondary schools. The modern concept of life-skill education will certainly take care of the new requirements. This can be done either by including this area as a part of the formal curriculum in different school subjects by specifying instances where this is possible and also by starting a full-fledged guidance programme in Standards VIII to X, which will help students to develop the minimum vocational information together with life-skill education wherever possible.

The guidance programme should make sustained use of assessment techniques (like intelligence, aptitudes and personality dimensions of individual learners) which will help learners to understand themselves and use this information for their vocational decision-making. The role of self-assessment by learners and understanding of the vocational environment in which they have to function should be given top priority in conceiving the secondary school curriculum. It will be best if the Department of School Education of the state organizes a systematic series of programmes for vocational information education by publishing booklets and organizing events like career clubs, career exhibitions, career talks etc, in a phased and systematic manner. It will be best if this outcome is included as a major component in the internal evaluation of secondary school students.

(ii) The fact that intelligence has a determining influence on the development of vocational information has to be interpreted as the confirmation of a well-established educational truism that intelligence is the most general determinant of all forms of learning. There are different ways in which this relationship is used in educational practice-like supplementary education for those of lesser intelligence levels, differing guidance programmes and special classes for vocational

information for students of differing intelligence, etc. Identifying students of higher intelligence levels for national competitive examinations, use of intelligence and aptitude scores for suggesting proper vocations for students of differing intelligence level etc are also areas to be covered by present day-guidance programmes.

The role of intelligence in the acquisition of vocational information will have to be more clearly identified and special education programmes will have to be specially designed to develop the minimum vocational information for all at the end of secondary schooling. Appropriate adjustments will have to be made and differing strategies will have to be used for developing vocational information for students of differing intellectual levels.

(iii) The fact that prior science achievement acts a causal or as a supporting variable in the acquisition of vocational information, has to be interpreted as indicating the need for using science curriculum in schools as a major source for developing vocational information. The first-level exposure to vocational information has to start in the science classrooms. Appropriate curricular strategies can be worked out for introducing vocational information in different forms when teaching different sub-areas of science. Good science teaching certainly expects that the social application of science is stressed when a particular subject area related to a particular vocation is taken up. Good science teaching, especially in physics will have to branch off to teaching the basic information relating to electrical/electronic or mechanical engineering when the related theoretical area is being discussed in physics. When

genetics is taught in biology, one certainly has to branch off to its modern applications in medicine or agriculture. The enriched science curricula, in itself, will help us to introduce vocational information and augment the quality and quantity of a student's essential vocational information.

(iv) The role that socio-economic status plays in the development of vocational information is what is to be expected, once we treat vocational information as an educational outcome. The superiority which the learner from higher socio-economic strata enjoys (in terms of facilities, in terms of higher motivation for learning and in terms of more favourable genetic disposition) can be created (at least to a lesser degree) among learners from the lower socio-economic strata by devising educational intervention strategies which will compensate for the lack of facilities/motivation for higher learning of learners from the lower SES, by creating an enriched learning environment preferably during the first one hour (on select days, before the commencement of school time, within the school system.) Where classes on vocational information, career information seminars etc can be held.

Enriched learning experiences for the lower strata of society and more focused educational interventions for the culturally and socially disadvantaged groups will help school systems in augmenting the quality of education in general and for accelerating vocational development of such students.

(v) How gender differences are to be dealt with in framing better educational strategies, especially for developing proper

forms of vocational information, is a fairly well-settled question in educational practice. These practices can be used with appropriate modifications for developing vocational information. Differentiated curricula for the two gender groups can be thought of with special areas included for the disadvantaged gender groups, and or for dealing with gender differences in ability, aptitudes, interests etc. Use of specialized methods, use of enriched alternate environment etc for differing gender groups can also be used for decreasing the disparity in achievement, of boys and girls, especially in the development of vocational information.

(vi) The differentiation noticed in the performance in the test of vocational information of urban and rural students (where urban students have a clear edge over their rural counterparts) projects a wrong social message that those born in an urban community are likely to become leaders in every walk of life. This conception will have to be corrected through appropriate educational policies. The noticed differences can certainly be minimised to a great extent by upgrading the quality of school performance in rural areas using procedures like those suggested under suggestion (v) above. Teachers with special training in diagnostic procedures and remedial teaching, and enrichment education, devising educational strategies for dealing with cultural disparities, enriching the educational environment of rural schools, empowering rural schools and school children, etc should be achieved using all available methods. Correcting disparities in all forms of

achievement among rural and urban subjects should be done using all the methods used for augmenting school performance. This implies the use of learner-active strategies for self-construction of knowledge, use of multisensory approaches in providing vocational information of the same quality to both urban and rural children, etc. All these procedures will have to be introduced in a systematic manner. More extended use of multi-media approaches for developing vocational information to secondary and post-secondary students in rural schools, in particular, will have to be evolved with stronger programmes of vocational guidance for all rural school children.

Suggestions for further research

In view of the fact that the present study relates to a virgin and relatively unexplored area of educational research in India, which highlights in unambiguous terms the need for providing more systematic programmes for the acquisition of vocational information to secondary and Higher secondary school students, we have to do some basic research which will help the educational system to take important decisions relating to education for developing vocational information. The study also provides adequate light on the background variables to be taken into account in developing an effective formal education programme for the purpose. Some of the major independent variables which determine the development of this component of educational outcome has been identified. The limitations of a first-level study have crept into the execution of the study. The findings are to be treated as a

crude framework for action. The study highlights the need for other studies to be conducted to obtain a more comprehensive picture of the area under study, if a broader programme is to be operated. The following are the important new research areas which emerged at the end of the study as desirable further areas of research:

- (i) Developing a supporting curriculum framework for helping secondary school students to develop more adequate scientific notions about vocational selection, and for acquiring the minimal vocational information for making realistic career choices.
- (ii) A comprehensive study to explore the interdependence of some major aptitudinal dimensions of school students and the vocational information they possess in relation to such aptitudes.
- (iii) A factor study of different vocational-aptitude variables and vocational information relating to major vocations to reveal possible overlaps.
- (iv) Developing and standardising a comprehensive test of vocational information to cover all the important vocational areas in current use in the country and developing norms for each component to be used in vocational placement.
- (v) A study of important motivational and adjustmental variables which influence the acquisition of vocational information among higher secondary students.

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APPENDICES

APPENDIX - I

**DRAFT TEST OF
VOCATIONAL INFORMATION INVENTORY**

By
K. GANGA DEVI
UNIVERSITY OF CALICUT
2004

SECTION-I

1. A medical doctor is one who is trained in
 - a) learning the use of medical instruments
 - b) examining a patient using stethoscope
 - c) writing papers on scientific aspects of treatment of diseases
 - d) study the effect of food on the human body
2. A surgeon is one who
 - a) operates upon human beings
 - b) diagnoses and treats human mental diseases and disorders
 - c) treats diseases
 - d) treats the disorders related to the eye
3. A professional who is not an indispensable for a hospital is a
 - a) Nurse
 - b) Compounder
 - c) Chemist
 - d) Laboratory Technician
4. The basic qualification required of a person who wants to start a medical store is
 - a) BSc
 - b) MBBS
 - c) D Pharm
 - d) None of these
5. A degree in pharmacology enables one to become a
 - a) Horticulturist
 - b) Farm Mechanic
 - c) Sanitary Inspector
 - d) Drug Inspector
6. The system of medicine which not included in the Indian system of medicine is
 - a) Siddha
 - b) Allopathy
 - c) Ayurveda
 - d) Naturopathy

-
7. Who among the following is not a specialist professional in medicine?
- a) A cardiologist
 - b) An ophthalmologist
 - c) A pediatrician
 - d) A general Physician
8. Physiotherapy is a subject which
- a) trains professionals in the rehabilitation of physically and mentally impaired persons
 - b) covers training in the use of exercises, related equipments and procedures like Electrotherapy, Magneto Therapy and massage
 - c) provides specialization in the treatment of disorders related to ear and nose
 - d) involves the replacement of missing parts of the body with artificial structures
9. The professional area which deals with the detection of diseases is called
- a) Psychiatry
 - b) Pathology
 - c) Anesthesiology
 - d) Neurology
10. Necessary prerequisite to write entrance examination in the medical and agriculture areas is
- a) 10+2 in science group with 50% marks and separate 50% in biology
 - b) 10+2 first class in science group
 - c) S.S.L.C with 60% marks in biology
 - d) 10+2 with 60% marks in humanities group
11. Duration of an MBBS course in an Indian University is
- a) 4 years
 - b) 6 years
 - c) 5 years
 - d) 5½ years

12. The minimum qualification to be appointed a professor in Medical College in India is
- An MBBS degree
 - An MD/MS/post-graduate specialization in various areas of medicine
 - BAMS
 - BHMS
13. The specialist who diagnoses and treats children's diseases is called by the name
- Ophthalmologist
 - Gastroenterologist
 - Pediatrician
 - Dermatologist
14. The qualification to be recognized as a specialist medical professional who specializes in the treatment of female reproductive diseases is
- MBBS+MD
 - MBBS+MS in Gastroenterology
 - MBBS+MS in Obstetrics+Gynecology
 - MBBS+MD in Pediatrics
15. An anesthesiologist is one who has specialized in
- Skin diseases
 - Diseases related to the heart and the circulatory system
 - Providing help in the surgical process related to the heart and the circulatory system
 - Providing help in assisting surgical process which make the patient immune to the pain of surgery
16. Duration of a post graduate specialization in different areas of medicine leading to M.D/M.S is
- 4 years
 - 3 years
 - 2½ years
 - 2 years

17. Total tuition fee to be paid for an MBBS course in a Government Medical College in Kerala as per present rules is
- Rs.40,000/ per head
 - Rs.36,000/ per head
 - Rs.45,000/ per head
 - Rs.52,000/ per head
18. A major national institution which offers an MBBS course through an All India Entrance Test is
- The CUSAT
 - The AIIMS
 - The ICAR
 - The NIT
19. An indispensable component of modern medical education is
- Training in Health Science
 - Clinical Practice
 - Laboratory Practice
 - Training under a Senior Doctor
20. Duration of a B.Sc. Nursing Course is
- 3 ½ years
 - 4 years
 - 4 ½ years
 - 2 ½ years
21. Eligibility for admission to B.Sc Nursing in India is
- 10+2 in science subject with 50% marks and separate 50% in biology
 - 10+2 first class in science group
 - 10+2 with 60% marks in biology, physics and chemistry.
 - 10+2 with 60% marks in humanities group.
22. The institution which conducts a course in Military Nursing (General Nursing and Midwifery) in Kerala is
- I.N.H.S Sanjivini, Kochi.
 - Government. School of Nursing, General Hospital, Ernakulam.
 - College of Nursing, Medical college, Thiruvananthapuram.
 - Government. School of Nursing, Thrissur.

23. Sree Chithira Thirunal Institute of Medical Science and Technology is located at
- Kollam
 - Thiruvananthapuram
 - Kottayam
 - Alapuzha
24. Which of the following is a degree in Ayurveda?
- BAMS
 - BHMS
 - BVMS
 - BNYS
25. The duration of Ayurveda degree course in Indian universities is
- 6 years
 - 4 years
 - 5 years
 - 5½ years
26. Which one of the following universities in Kerala offers P.G. course in Ayurveda?
- University of Calicut
 - University of Kerala
 - University of Kannur
 - University of Cochin
27. The Indian title for a P.G. degree in Ayurveda is
- Ayurvedacharya
 - Ayurveda Vachaspathy
 - Ayurveda Vaidyakalanidhi
 - Ayurveda Siromani
28. Which of the following medical education courses demand a sound Knowledge of Sanskrit?
- Ayurveda
 - Homeopathy
 - Siddha
 - Unani

29. Eligibility for the first degree course in Ayurveda in Kerala is
- 10+2 in science group with 50% marks and separate 50% in biology
 - 10+2 first class in science group
 - S.S.L.C with 60% marks in biology
 - 10+2 with 60% marks in humanities group
30. Minimum qualification for the post of Lecturer in a College of Ayurveda offering a first degree in the subject is
- Graduation in Ayurveda
 - P.G. Degree in Ayurveda
 - Graduation in Modern Medicine
 - Ph.D in Ayurveda
31. The duration for obtaining a P.G. Degree in Homeopathy after 10+2 is
- 5½ years
 - 8½ years
 - 10½ years
 - 3 years
32. The only university in Kerala which offers a Post graduate course in Homeopathy is
- Kerala University
 - Cochin University of Science and Technology
 - Calicut University
 - Mahatma Gandhi University
33. Duration of a BHMS degree in Kerala is
- 4 years
 - 5½ years
 - 5 years
 - 4½ years
34. Which medical professional in Kerala is entitled to receive a higher entry salary in Kerala Government Service
- Homeopathy
 - Allopathy
 - Ayurveda
 - Equal salary for all

35. The first degree conferred at the end of a course in Unani system of medicine is
- BNYS
 - MUMS
 - BHMS
 - Bams
36. Unani medicine was developed into an elaborate therapeutic system by
- Indian medical specialists
 - Tibetan medical specialists
 - Arabs
 - Germans
37. The state nearest to Kerala where a degree in Unani medicine is available in
- Maharastra
 - Tamil Nadu
 - Andhra Pradesh
 - Uttarpradesh
38. Eligibility for graduation in Unani Medicine is
- S.S.L.C
 - 10+2/ equivalent in Science or Arts
 - 10+2/ equivalent in Mathematics
 - B.Sc in Zoology
39. The medical system which combines diet control, physical exercise, some animal based and herbal drugs is
- Siddha
 - Unani
 - Naturopathy
 - Homeopathy

40. The district of Kerala where the Santhigiri Siddha College, Koliacode, is located in
- Thiruvananthapuram
 - Thrissur
 - Palakkad
 - Pathanamthitta
41. Duration of a first degree course in Siddha medicine is
- 4½ years
 - 5½ years
 - 5 years
 - 6 years
42. Eligibility for admission to the MD degree in Siddha is
- BVMS
 - BNYS
 - BHMS
 - BSMS
43. The district of Kerala which has three medical colleges is
- Alapuzha
 - Calicut
 - Thrissur
 - Palakkad
44. The number of colleges in India imparting education in Naturopathy is
- 4
 - 3
 - 6
 - 5
45. The starting salary scale of a junior doctor under Kerala Government is
- 6675-10550
 - 7500-12000
 - 5200-8200
 - 6000-10000

46. The pay scale of a Professor in a Government Medical College in Kerala is
- 15350-19000
 - 14200-18600
 - 12000-18000
 - 16400-22400
47. All India Institute of Medical Sciences is at
- Chennai
 - New Delhi
 - Mumbai
 - Kolkatta
48. The basic qualification of admission to a master's degree in transcription and data management is
- 10+2 with science optionals
 - 10+2 with science optionals with 60% marks
 - Graduation in any subjects
 - Graduation in any subject with 50% marks
49. Medical transcription stands for
- Recording and preparing books on the basis of explanations given by doctors from foreign countries about diseases, diagnosis and treatment.
 - Recording and translating information relating to modern medicine produced drug manufacturing companies.
 - Recording and translating information relating to paramedical services produced in foreign countries.
 - Preparation of medical records regarding the diagnosis, treatment and prevention of mental disorders from doctor's case history.
50. Minimum qualification for entry into a course in blood bank technology is
- 10+2 with science optionals with 50% mark
 - BSc degree in zoology/physiology
 - BSc degree in Chemistry
 - Diploma in Social Work.

SECTION II

51. The Kerala Agricultural University is situated at
- Vellayani, Thiruvananthapuram
 - Vellanikara, Thrissur
 - Pookkotte, Wynad
 - Panangad, Ernakulam
52. The institution which promotes science and technology programmes in agricultural research and training is
- I.I.F.M
 - I.C.A.R
 - F.A.O
 - M.P.E.D.A
53. The branch of science not included in agriculture is
- Aquaculture
 - Sericulture
 - Soil Science
 - Health Science
54. The college which provides a B.Tech degree in Dairy Technology is
- College of Agriculture
 - College of Dairy Science and Technology
 - College of Fisheries
 - College of Forestry
55. Which one of the following subjects is required as an entry qualification for admission to an agriculture college?
- Horticulture
 - Sericulture
 - Biochemistry
 - Chemistry
56. Agricultural Engineering deals with
- the manufacturing of equipments used for agriculture
 - the use of mechines for cultivation
 - the conservation and protection of the natural environment
 - the processing and packaging of agricultural products

57. Entry to the B.Tech programme in Dairy Technology is through an entrance test in
- Biology, physics and chemistry of +2 level
 - Physics, chemistry and mathematics of +2 level
 - Botany, physics and chemistry of +2 level
 - Mathematics, physics and biology of +2 level
58. The number of Veterinary Colleges in Kerala is
- 3
 - 4
 - 2
 - 5
59. The first degree in Veterinary Science is
- B.H.Sc
 - B.V.Sc
 - B.A.Sc
 - B.F.Sc
60. Which one of the following profession is not related to fisheries
- Harvest Manager
 - Fisheries Inspector
 - Hatchery Manager
 - Food Technologist
61. The area where a home science graduate can find employment is
- marine industrial units
 - health resorts
 - food exporting companies
 - fish processing
62. The eligibility for admission to a post-graduate course in Food Science Technology is
- degree in Chemistry/Microbiology
 - degree in Environmental science
 - degree in Physics/Mathematics
 - degree in Agriculture/Horticulture

63. The College of Fisheries in Kerala is situated at
- Pookkotte, Wynad
 - Neendakara, Kollam
 - Panangad, Ernakulam
 - Nattika, Thrissur
64. The school of Marine Sciences in Kerala is affiliated to the
- Calicut University
 - Kerala University
 - M.G University
 - CUSAT
65. The subject area which deals with the study of fish, crabs, prawns and geological and mineral wealth of the ocean is
- Environmental studies
 - Marine studies
 - Food Technology
 - Microbiology
66. The civil service examination used for selecting top experts for forest service is called
- The I.A.S
 - The I.P.S
 - The I.F.S
 - The I.E.S
67. The physical eligibility for selection to graduate courses in forestry is
- height 170cm and chest between 82.84cm
 - height 163cm and chest between 79.84cm
 - height 160cm and chest between 75.78cm
 - height 158 cm and chest between 78.80cm
68. The course which offers specialisation in Wood Science and Technology is
- MSc in Agricultural Science
 - MSc in Bio Technology
 - MSc in Forestry
 - MSc in Horticulture

69. A horticulturist is one who
- markets seeds and fertilisers
 - sets up green houses
 - assists in the manufacture of wood-based products
 - helps to develop flower gardens
70. Horticulture is a faculty of the Agricultural Universities which deals with
- Aquaculture
 - Sericulture
 - Tissue culture
 - Agriculture
71. An area of work where athletic skills are most useful is that of a
- Dairy Technologist
 - Forester
 - Fisheries Inspector
 - Mining Engineer
72. Sericulture is the scientific area which deals with the production of
- Jute Products
 - Polyester Products
 - Woollen Products
 - Silk Products
73. Eligibility for graduation in Co-operation and Banking with specialization in agriculture is
- +2 with science optionals
 - +2 with mathematics as optional
 - +2 with Commerce optional
 - pass in '+2', on the basis of marks
74. The Course in Farm Power and Machinery is offered in Kerala in
- College of Agriculture, Vellayani
 - College of Horticulture, Vellanikkara
 - Kelappaji College of Agricultural Engineering & Technology, Thavannor
 - College of Forestry, Vellanikkara

75. The district where the Agriculture University of Kerala is located
- Thiruvananthapuram
 - Thrissur
 - Palakkad
 - Ernakulam
76. The First degree in Aquaculture is offered at the
- College of Dairy Science and Technology
 - College of Horticulture
 - College of Fisheries
 - College of Forestry
77. Eligibility for MSc in Agricultural Economics is
- BSc in Horticulture
 - BSc in Fisheries Science
 - BSc in Agricultural Banking
 - BSc in Agriculture
78. The number of affiliated colleges under the Kerala Agricultural University is
- 8
 - 6
 - 10
 - 15
79. The specialized jobs in the irrigation and in soil departments of government are open to
- a specialist in agriculture
 - an agricultural engineer
 - a horticulturist
 - a graduate in forestry.
80. The starting salary of an agricultural officer in the Kerala state is
- Rs.8000
 - between Rs.9000 and 10000
 - below Rs.8000
 - above Rs.10000

81. The basic qualification for commencing a graduate study of veterinary science is
- a) +2/equivalent with specialisation in Physics, Chemistry and Biology with a minimum 50% marks
 - b) +2 with Mathematics and Sciences
 - c) +2 in Science subjects including Mathematics
 - d) +2 in Science with 50% marks in Zoology and Botony
82. The duration of the first degree course in Veterinary Science is
- a) 4 years
 - b) 5 years
 - c) 5½ years
 - d) 4½ years
83. The basic qualification to become a Professor in a Veterinary College in India is
- a) M.V.Sc
 - b) B.V.Sc+A.H
 - c) B.V.Sc+Professional experience for 3 years
 - d) M.Sc in Dairy Technology
84. The number of Veterinary and Animal Science Colleges in Kerala is
- a) 4
 - b) 2
 - c) 3
 - d) 5
85. A post graduate degree holder in Veterinary Science and Animal Husbandry is most qualified for service in
- a) agricultural plantations
 - b) dairy farms
 - c) milk processing industries
 - d) fertilizer companies
86. Which one of the following is a specialisation area for a master's degree programme in Veterinary Science
- a) Food and Beverages
 - b) Food and Fodder Technology
 - c) Food and Nutrition
 - d) Wild Life Science

87. The organization which conducts the national entrance examination for admission to agriculture and allied fields is the
- JIPMER
 - AIIMS
 - ICAR
 - JEE
88. The job for which a person with training in forestry is most suited is that of a
- Horticulturist
 - Ranger
 - Zoo keeper
 - Livestock Assistant
89. An appropriate employment for a food technologist is in
- marine industrial units
 - poultry and dairy farms
 - estates and plantations
 - social forestry
90. One of the specialisation areas for MSc Home Science degree is
- Health management
 - Social work
 - Child development
 - Home management
91. College of Forestry in Vellanikkara, Kerala, offers a post graduate programme in
- Rural Marketing Management
 - Farm Power and Machinery
 - Tree Physiology and Breeding
 - Soil Science
92. Which one of the following is not taught as part of Food Technology
- Preservation Science
 - Hygiene and Sanitation
 - Packaging of Foodstuffs
 - Hospital Management

93. The basic qualification for admission to a 4-year degree course in Food Technology is
- Pass in the +2 examination
 - Pass in +2 examination in the science group
 - Pass in the +2 level examination with 60% marks in mathematics
 - Pass in the +2 level examination with any group of subjects
94. Which one of the following posts is most appropriate for a dairy farm?
- Hatchery Manager
 - Food Technologist
 - Harvest Manager
 - Horticulturist
95. MSc course in Nutrition in Kerala is offered at
- College of Agriculture, Vellayani
 - College of Horticulture, Vellanikkara
 - College of Agriculture, Padannakkad
 - College of Dairy Science and Technology, Mannuthy
96. Basic qualification for admission to MSc in Nutrition is
- BSc in Home Science
 - BSc in Agriculture
 - BSc in Fishery Science
 - BSc in Horticulture
97. The post of a nutritionist is usually created for a
- Hospital
 - Poultry Farm
 - Agricultural Farm
 - Dairy Farm
98. The salary scale of a junior veterinary doctor in Kerala is
- 5000-10000
 - 6600-8800
 - 6675-10550
 - 7775-11550

99. The duration for a first degree course in agriculture is
- 3½ years
 - 4 years
 - 4½ years
 - 5 years
100. The only university which offers a post graduate course in Marine Biology in Kerala is
- University of Calicut
 - The CUSAT
 - The Mahatma Gandhi University
 - Kerala Agricultural Universtiy

SECTION-III

101. The basic qualification to write the entrance examination for admission to a first degree course in engineering is
- Pass in the +2 examination/equivalent with first class for Mathematics, Physics and Chemistry taken together
 - Pass in the +2 examination with 50% marks in Mathematics and 50% in aggregate for Mathematics, Physics and Chemistry.
 - Pass in the +2 examination with 60% marks in Mathematics and 50% in aggregate for Mathematics, Physics and Chemistry
 - Graduation in any of the above three subjects
102. C.U.S.A.T is located in the district of
- Kottayam
 - Thrissur
 - Ernakulam
 - Malappuram
103. The fullform of R.E.C is
- Regional Engineering Centre
 - Regional Economic Centre
 - Regional Engineering College
 - Regional Education College

104. The national level entrance examination for admission in I.I.Ts in India is called the
- GATE
 - JEE
 - CAT
 - TOFEL
105. The Duration of a Bachelor's Degree in Engineering in Indian Universities is
- 3 years
 - 5 years
 - 4 years
 - 4½ years
106. The autonomous institution for higher studies in engineering in Kerala is located in
- Calicut
 - Cochin
 - Kottayam
 - Kannur
107. The branches of engineering which involves the design and production of tools, machines, engines etc is called
- Industrial Engineering
 - Mechanical Engineering
 - Instrumentation Engineering
 - Production Engineering
108. A Chemical Engineer is one who is engaged in controlling the technology of connected with
- Chemical experiments are conducted
 - Chemicals are manufactured
 - Metals are processed
 - Fuels are produced
109. The engineer who designs and supervises the construction activities of buildings, roads and bridges is called a
- Mechanical Engineer
 - Production Engineer
 - Chemical Engineer
 - Civil Engineer

110. The branch of engineering which involves the design and development of machinery related to ships is called
- Instrumentation Engineering
 - Marine Engineering
 - Industrial Engineering
 - Mechanical Engineering
111. The college which offers a course in Biomedical engineering in Kerala is
- Met's School of Engineering, Mala
 - Sahrudaya College of Science and Technology, Kodakara
 - Rajagiri School of Engineering and Technology, Kakkanad
 - Adi Sankara Institute of Engineering and Technology, Kalady.
112. The university which offers a course in environmental engineering in Kerala is
- Kerala
 - Kannur
 - CUSAT
 - Kerala Agricultural University
113. Design and production of missiles, space ships and related equipments is done by
- An Automobile Engineer
 - A Mechanical Engineer
 - A Chemical Engineer
 - An Aeronautical Engineer
114. Power generation and transmission is taught mainly in courses provided in
- Computer Engineering
 - Industrial Engineering
 - Electrical and Electronic Engineering
 - Hydraulic Engineering
115. The minimum eligibility for admission to a B. Arch course in an Indian University is
- A pass in +2 with minimum aggregate of 50% marks with mathematics as one of the subjects
 - A pass in +2 with 60% marks in Mathematics and 50% marks in the aggregate in Physics and Chemistry
 - A pass in +2 with science subjects
 - A pass in +2 with 60% marks in Mathematics

116. The National Institute of Technology in Kerala is located at
- Thrissur
 - Calicut
 - Thiruvananthapuram
 - Ernakulam
117. Which one of the following examination is to be passed for admission to the National Institutes of Technology in the country?
- JEE
 - AIEEE
 - GATE
 - CAT
118. The number of I.I.Ts in India is
- 5
 - 7
 - 10
 - 9
119. Specialized technology connected with the extrication of oil and natural gas is called
- Mining Engineering
 - Petroleum Engineering
 - Oil Technology
 - Gas Engineering
120. Electronics and Telecommunication graduates who pass an All India Engineering Service Examination qualify for employment in the
- Indian Railway Service of Engineers
 - Indian Railway Service of Signal Engineers
 - The Central Engineering Service
 - All India Engineering Service
121. An India-Swiss collaboration venture, for promoting technical training and education in India was started at the
- I.I.T
 - N.I.T
 - N.T.T.F
 - M.T.I

122. The Nettur Technical Training Foundation in Kerala is located in
- Pookkotte
 - Thalassery
 - Panangad
 - Mannuthy
123. N.T.T.F was developed as the basis of an
- Indo-German Collaboration
 - Indo-Russian Collaboration
 - Indo-Swiss Collaboration
 - Indo-Japanese Collaboration
124. Admission to N.T.T.F is on the basis of one of the following
- AIEEE
 - JEE
 - All India Entrance Test.
 - General Certificate of Education Examination
125. The All India Entrance Test for admission to M.Tech/M.Sc course in the I.I.T's is called the
- JEE
 - GATE
 - AIEEE
 - CAT
126. The basic qualification to be appointed a Professor in an Engineering College in India is
- B.Tech
 - M.Tech
 - B.E
 - B.Arch
127. The salary scale of a professor in an engineering college in India is
- 16400-22400
 - 15400-20400
 - 12800-18600
 - 13350-16750

128. The starting salary scale of a Junior Engineer in Kerala is
- a) 13350-16750
 - b) 16400-22400
 - c) 6675-10550
 - d) 7500-11000
129. The basic qualification for admission to a B.Tech course in Aeronautical/Aero Space Engineering is
- a) +2 pass with high marks in science subjects
 - b) +2 pass with 60% marks in mathematics
 - c) +2 pass with high marks in science subjects and a pass in the JEE
 - d) +2 pass with 50% marks in mathematics and 50% aggregate in physics and chemistry.
130. Which portion of the seats in an N.I.T is reserved for students of the state in which the college is located
- a) 45%
 - b) 60%
 - c) 50%
 - d) 55%
131. The tuition fee fixed for B.Tech course in Government Engineering Colleges of Kerala is
- a) Rs. 15000
 - b) Rs. 25000
 - c) Rs. 36000
 - d) Rs. 50000
132. The duration of a B.Tech Course in Aeronautical/Aerospace Engineering in India is
- a) $3\frac{1}{2}$ years
 - b) 4 years
 - c) 5 years
 - d) $4\frac{1}{2}$ years

133. One of the organization where an aeronautical engineer can find a job is in
- a) A firm, manufacturing machines
 - b) The I.S.R.O
 - c) A steel factory
 - d) A firm which manufactures petrol engines
134. A University in Kerala which offers courses in Plastic Engineering is
- a) Calicut University
 - b) Kannur University
 - c) CUSAT
 - d) Kerala University
135. An institution which offers an M.Tech programme in Biomedical Engineering in south India is the
- a) NIT Calicut, Calicut
 - b) Manipal Institute of Technology, Manipal
 - c) N.T.T.F, Talassery
 - d) CUSAT, Cochin
136. Basic qualification for admission to a post graduate course in Fashion Technology is
- a) Diploma in Textile Technology
 - b) BSc in Computer Science
 - c) B.Tech in Information Technology
 - d) Graduation in Fine Arts
137. The minimum qualification for admission to the Post-graduate Diploma of the National Institute of Industrial Engineering is
- a) graduation with first class in any branch of engineering or technology or its equivalent
 - b) graduation in Industrial Engineering
 - c) 70% marks for the first degree in Instrumentation Engineering
 - d) 60% marks for the first degree in Mechanical Engineering degree

138. Birla Institute of Science and Technology is situated in
- Maharashtra
 - Delhi
 - Rajasthan
 - Uttar Pradesh
139. An important private institution of higher education and research in the country is
- The National Institute of Industrial Engineering
 - The Birla Institute of Technology and Science
 - The Bhabha Atomic Research Centre
 - The Indian Institute of Science
140. A prestigious institution for advanced research in science and technology which started during the early decades of 20th century in India associated with Dr. C.V. Raman is
- The Birla Institute of Technology and Science
 - The Indian Institute of Science
 - The HarCourt Butler Technological Institute
 - The Madras Institute of Technology
141. The Engineering College in Kerala which offers a graduate course in Applied Electronics is the
- Model Engineering College, Thrikkakkara
 - Vimal Jyothi Engineering College, Chemperi
 - Amal Jyothi College of Engineering, Kottayam
 - Rajagiri School of Engineering & Technology, Kakkanad
142. The college which offers an Architectural Engineering Course in Kerala is
- University College of Engineering, Thiruvananthapuram
 - The TKM College of Engineering, Kollam
 - The Govt. Engineering College, Kozhikode
 - The Sree Chithira Thirunal College of Engineering, Pappanamcode.

-
143. Polymer Engineering course in Kerala is offered in
- Adi Sankara Institute of Engineering and Technology, Kalady
 - University College of Engineering, Thodupuzha
 - Government Engineering College, Idukki
 - Government Rajiv Gandhi Institute of Technology, Kottayam
144. Which branch of engineering is not directly related to building construction?
- Nano Technology
 - Electronic Engineering
 - Civil Engineering
 - Construction Engineering
145. The district in Kerala with just one engineering college is
- Ernakulam
 - Kollam
 - Wynad
 - Pathanamthitta
146. The professionals who can forecast and deal with environmental hazards are called
- Forest Conservators
 - Marine Life Experts
 - Environmental Engineers
 - Conservation Experts
147. The Engineering College in Kerala which has a Department of Environmental Studies is the
- Government Engineering College, Idukki
 - Government Engineering College, Thrissur
 - Government Engineering College, Thiruvananthapuram
 - NSS College of Engineering, Palakkad.
148. Indian Institute of Information Technology in Kerala is located at
- Thrissur
 - Ernakulam
 - Thiruvananthapuram
 - Kozhikode

-
149. The duration of the B.E/B.Tech in computer Science/Information Technology is
- a) $3\frac{1}{2}$ years
 - b) 4 years
 - c) 3 years
 - d) $4\frac{1}{2}$ years
150. The basic qualification for admission to a B.Tech degree in Information Technology/Computer Science is
- a) +2 in science subjects with 50% marks in the aggregate
 - b) +2 with mathematics and science
 - c) +2 mathematics with 50% marks and science with 50% marks in the aggregate
 - d) +2 pass in any science group

APPENDIX-II

ITEM ANALYSIS OF DATA FOR
VOCATIONAL INFORMATION INVENTORY

Item Analysis of data for Vocational Information Inventory

Item No.	H	L	Difficulty Index	Discriminating Power	Action
1	95	81	0.88	0.14	REJECT
2	98	65	0.82	0.33	REJECT
3	55	37	0.46	0.18	REJECT
4	93	46	0.7	0.47	ACCEPT
5	80	29	0.55	0.51	ACCEPT
6	65	25	0.45	0.4	ACCEPT
7	94	47	0.71	0.47	ACCEPT
8	78	28	0.53	0.53	ACCEPT
9	76	23	0.5	0.5	ACCEPT
10	94	62	0.78	0.32	REJECT
11	17	10	0.14	0.07	REJECT
12	82	41	0.62	0.41	ACCEPT
13	82	41	0.62	0.41	ACCEPT
14	100	50	0.75	0.5	ACCEPT
15	90	39	0.65	0.51	ACCEPT
16	35	24	0.3	0.11	REJECT
17	20	27	0.24	-0.07	REJECT
18	87	20	0.54	0.67	ACCEPT
19	21	30	0.26	-0.09	REJECT
20	45	34	0.4	0.11	REJECT
21	65	30	0.48	0.35	ACCEPT
22	71	25	0.48	0.46	ACCEPT

23	91	53	0.72	0.38	ACCEPT
24	86	42	0.64	0.44	ACCEPT
25	12	13	0.13	-0.01	REJECT
26	38	24	0.31	0.14	REJECT
27	23	21	0.22	0.02	REJECT
28	72	27	0.5	0.45	ACCEPT
29	75	34	0.55	0.41	ACCEPT
30	46	26	0.36	0.2	REJECT
31	68	25	0.46	0.43	ACCEPT
32	34	41	0.38	-0.07	REJECT
33	18	18	0.18	0	REJECT
34	45	23	0.34	0.22	REJECT
35	32	25	0.29	0.07	REJECT
36	34	17	0.26	0.17	REJECT
37	41	32	0.37	0.09	REJECT
38	55	27	0.41	0.28	REJECT
39	28	22	0.25	0.06	REJECT
40	25	27	0.26	-0.02	REJECT
41	19	12	0.16	0.07	REJECT
42	47	22	0.35	0.25	REJECT
43	71	33	0.52	0.38	ACCEPT
44	12	18	0.15	-0.06	REJECT
45	19	18	0.19	0.01	REJECT
46	27	18	0.23	0.09	REJECT
47	69	30	0.5	0.39	ACCEPT
48	22	37	0.3	-0.15	REJECT

49	31	16	0.24	0.15	REJECT
50	36	18	0.27	0.18	REJECT
51	79	30	0.55	0.49	ACCEPT
52	62	34	0.48	0.28	REJECT
53	90	34	0.62	0.56	ACCEPT
54	91	25	0.58	0.66	ACCEPT
55	95	35	0.65	0.6	ACCEPT
56	34	18	0.26	0.16	REJECT
57	19	18	0.19	0.01	REJECT
58	28	20	0.24	0.08	REJECT
59	75	36	0.56	0.39	ACCEPT
60	27	21	0.24	0.06	REJECT
60	27	21	0.24	0.06	REJECT
61	56	30	0.43	0.26	REJECT
62	32	17	0.25	0.15	REJECT
63	33	25	0.29	0.08	REJECT
64	66	30	0.48	0.36	ACCEPT
65	97	28	0.63	0.69	ACCEPT
66	86	39	0.63	0.47	ACCEPT
67	40	27	0.34	0.13	REJECT
68	84	25	0.55	0.59	ACCEPT
69	51	21	0.36	0.3	REJECT
70	57	20	0.39	0.37	ACCEPT
71	77	28	0.53	0.49	ACCEPT
72	86	23	0.55	0.63	ACCEPT
73	9	22	0.16	-0.13	REJECT

74	66	27	0.47	0.39	ACCEPT
75	79	29	0.54	0.5	ACCEPT
76	74	25	0.5	0.49	ACCEPT
77	41	22	0.32	0.19	REJECT
78	13	21	0.17	-0.08	REJECT
79	27	21	0.24	0.06	REJECT
80	32	24	0.28	0.08	REJECT
81	44	18	0.31	0.26	REJECT
82	12	26	0.19	-0.14	REJECT
83	51	24	0.38	0.27	REJECT
84	34	23	0.29	0.11	REJECT
85	83	30	0.57	0.53	ACCEPT
86	23	23	0.23	0	REJECT
87	72	37	0.54	0.35	ACCEPT
88	79	34	0.57	0.45	ACCEPT
89	57	27	0.42	0.3	REJECT
90	18	23	0.21	-0.05	REJECT
91	49	27	0.38	0.22	REJECT
92	73	28	0.51	0.45	ACCEPT
93	76	16	0.46	0.6	ACCEPT
94	50	28	0.39	0.22	REJECT
95	19	18	0.19	0.01	REJECT
96	63	28	0.45	0.35	ACCEPT
97	18	22	0.2	-0.04	REJECT
98	30	25	0.28	0.05	REJECT
99	30	24	0.27	0.06	REJECT

100	69	15	0.42	0.54	ACCEPT
101	79	24	0.52	0.55	ACCEPT
102	80	34	0.57	0.46	ACCEPT
103	86	34	0.6	0.52	ACCEPT
104	64	22	0.43	0.42	ACCEPT
105	64	27	0.46	0.37	ACCEPT
106	66	28	0.47	0.38	ACCEPT
107	44	28	0.36	0.16	REJECT
108	82	25	0.54	0.57	ACCEPT
109	86	39	0.63	0.47	ACCEPT
110	70	21	0.46	0.49	ACCEPT
111	34	21	0.27	0.31	REJECT
112	37	29	0.33	0.08	REJECT
113	84	21	0.53	0.63	ACCEPT
114	81	31	0.56	0.5	ACCEPT
115	29	20	0.25	0.09	REJECT
116	65	23	0.44	0.42	ACCEPT
117	34	18	0.26	0.16	REJECT
118	37	25	0.31	0.12	REJECT
119	55	26	0.41	0.29	REJECT
120	55	30	0.43	0.25	REJECT
121	47	25	0.36	0.22	REJECT
122	35	28	0.32	0.07	REJECT
123	61	29	0.45	0.32	REJECT
124	14	22	0.18	- 0.08	REJECT
125	49	29	0.39	0.2	REJECT

126	68	26	0.47	0.42	ACCEPT
127	34	22	0.28	0.12	REJECT
128	64	25	0.45	0.39	ACCEPT
129	41	25	0.33	0.16	REJECT
130	17	33	0.25	-0.16	REJECT
131	56	21	0.39	0.35	ACCEPT
132	43	23	0.33	0.2	REJECT
133	95	32	0.64	0.63	ACCEPT
134	33	37	0.35	-0.04	REJECT
135	40	19	0.3	0.21	REJECT
136	7	15	0.11	-0.08	REJECT
137	20	21	0.21	-0.01	REJECT
138	17	24	0.21	-0.07	REJECT
139	33	20	0.27	0.13	REJECT
140	46	30	0.38	0.16	REJECT
141	56	28	0.42	0.28	REJECT
142	26	16	0.21	0.1	REJECT
143	22	28	0.25	-0.06	REJECT
144	56	26	0.41	0.3	REJECT
145	62	26	0.44	0.36	ACCEPT
146	47	33	0.4	0.14	REJECT
147	23	25	0.24	-0.02	REJECT
148	33	28	0.31	0.05	REJECT
149	41	28	0.35	0.13	REJECT
150	58	22	0.4	0.36	ACCEPT

Total No. of accepted items

60

H = No. of correct answers in the high group
L = No. of correct answers in the low group

APPENDIX - III

UNIVERSITY OF CALICUT

2004

VOCATIONAL INFORMATION INVENTORY

FINAL

Vocational Information Inventory

Time: 96 minutes

Dear Student,

I have undertaken a research study on “vocational information” of Higher Secondary students of Kerala. The following is an inventory which will help me to make a scientific study of this variable. I request you to co-operate with me in this study by frankly indicating your choices against each statement as directed:

For each of the statements given below, four alternative answers are given. Read the questions carefully and select the answer which you consider as the most appropriate. Mark the Correct answer in the box provided. Do not write anything in the question book-let. Kindly answer all the questions within the given time.

Example:

Question: A surgeon is one who

- a) Operates upon human beings
- b) Diagnoses and treats human mental diseases and disorders
- c) Treats diseases
- d) Treats the disorders related to the intestine.

The answer is **(a)**.

The answer sheet has four squares, each standing for a choice you have to make. Enter an ‘x’ mark in the appropriate cell. Start answering questions 1 to 48 as soon as the examiner says “start” and stop when he says “stop”.

1. The basic qualification required of a person who wants to start a medical store
 - (a) B.Sc
 - (b) MBBS
 - (c) D.Pharm
 - (d) None of these
2. The Kerala Agriculture University is situated at
 - (a) Vellayani, Thiruvananthapuram
 - (b) Vellanikkara, Thrissur
 - (c) Pookkotte, Wynad
 - (d) Panangad, Ernakulam
3. The basic qualification to write the entrance examination for admission to a first degree course in engineering is
 - (a) Pass in the +2 examination/ equivalent with first class for Mathematics, Physics and Chemistry, taken together.
 - (b) Pass in the +2 examination with 50% marks in Mathematics and 50% in aggregate for Mathematics, Physics and Chemistry
 - (c) Pass in the +2 examination with 60% marks in Mathematics and 50% in aggregate for Mathematics, Physics and Chemistry
 - (d) Graduation in any of the above three subject
4. The system of medicine which, not included in the Indian system of medicine is
 - (a) Siddha
 - (b) Allopathy
 - (c) Ayurveda
 - (d) Naturopathy
5. The branch of science, not included in agriculture is
 - (a) Aquaculture
 - (b) Sericulture
 - (c) Soil science
 - (d) Health science
6. C.U.S.A.T is located in the district of
 - (a) Kottayam
 - (b) Thrissur
 - (c) Ernakulam
 - (d) Malappuram

7. Physiotherapy is a subject which
 - (a) Trains professionals in the rehabilitation of the physically and mentally impaired persons
 - (b) Covers training in the use of exercises, related equipments, and procedures like electrotherapy, magneto therapy and massage.
 - (c) Provides specialization in the treatment of disorders related to ear and nose
 - (d) Involves the replacement of missing parts of the body with artificial structures
8. The college which provides a B. Tech degree in Dairy Technology is
 - (a) College of Agriculture
 - (b) College of Dairy Science and Technology
 - (c) College of Fisheries
 - (d) College of Forestry
9. The full form of R.E.C. is
 - (a) Regional Engineering Centre
 - (b) Regional Economic Centre
 - (c) Regional Engineering College
 - (d) Regional Education College
10. The professional area which deals with the detection of diseases is called
 - (a) Psychiatry
 - (b) Pathology
 - (c) Anesthesiology
 - (d) Neurology
11. The first degree in Veterinary Science is
 - (a) B. H. Sc
 - (b) B. V. Sc
 - (c) B. A. Sc
 - (d) B. F. Sc
12. The duration of a Bachelor's Degree in Engineering in Indian Universities is
 - (a) 3 years
 - (b) 5 years
 - (c) 4 years
 - (d) 4 ½ years

-
13. The minimum qualification to be appointed a professor in a Medical College in India is
- (a) An MBBS degree
 - (b) An MD/Ms/Post-graduate specialization in various areas of medicine
 - (c) BAMS
 - (d) BHMS
14. The school of Marine Sciences in Kerala is affiliated to the
- (a) Calicut University
 - (b) Kerala University
 - (c) M.G University
 - (d) CUSAT
15. The Engineer who designs and supervises the construction activities of buildings, roads and bridges is called a
- (a) Mechanical Engineer
 - (b) Production Engineer
 - (c) Chemical Engineer
 - (d) Civil Engineer
16. The specialist who diagnoses and treats children's diseases is called by the name
- (a) An ophthalmologist
 - (b) A gastroenterologist
 - (c) A pediatrician
 - (d) A dermatologist
17. The civil service examination used for selecting the top experts for forest service is called
- (a) The I.A.S
 - (b) The I.P.S
 - (c) The I.F.S
 - (d) The I.E.S
18. The branch of engineering, which involves the design and development of machinery related to ships is called
- (a) Instrumentation Engineering
 - (b) Marine Engineering
 - (c) Industrial Engineering
 - (d) Mechanical Engineering

-
19. An anesthesiologist is one who has specialized in
- (a) Skin diseases
 - (b) Diseases related to the heart and circulatory system
 - (c) Providing help in the surgical process related to the heart and the circulatory system
 - (d) Providing help in assisting surgical process which make the patient immune to the pain of surgery
20. Horticulture is a faculty of the Agricultural Universities which deals with
- (a) Aquaculture
 - (b) Sericulture
 - (c) Tissue culture
 - (d) Agriculture
21. Design and production of missiles, space ships and related equipments is done by
- (a) An Automobile Engineers
 - (b) A Mechanical Engineers
 - (c) A Chemical Engineers
 - (d) An Aeronautical Engineers
22. A major national institution, which offers an MBBS course through an All India Entrance Test is
- (a) The CUSAT
 - (b) The AIIMS
 - (c) The ICAR
 - (d) The NIT
23. An area of work where athletic skills are most useful is that of a
- (a) Dairy Technologist
 - (b) Forester
 - (c) Fisheries Inspector
 - (d) Mining Engineer
24. Power generation and transmission is taught mainly in courses provided in
- (a) Computer Engineering
 - (b) Industrial Engineering
 - (c) Electrical and Electronics Engineering
 - (d) Hydraulic Engineering

25. Eligibility for admission to B. Sc Nursing in India is
- (a) 10+2 in science subjects with 50% marks and separate 50% in biology
 - (b) 10+2 first class in science group
 - (c) 10+2 with 60% marks in biology, physics and chemistry
 - (d) 10+2 with 60% marks in humanities group
26. Sericulture is the scientific area which deals with the production of
- (a) Jute products
 - (b) Polyester products
 - (c) Woollen products
 - (d) Silk products
27. The basic qualification to be appointed a professor in an Engineering College in India is
- (a) B. Tech
 - (b) M. Tech
 - (c) B.E
 - (d) B. Arch
28. The Institution, which conducts Military Nursing (General Nursing and Midwifery) in Kerala is
- (a) I.N.H.S. Sanjivini, Kochi
 - (b) Government School of Nursing, General Hospital, Ernakulam
 - (c) College of Nursing, Medical College, Thiruvananthapuram
 - (d) Government School of Nursing, Thrissur
29. The Course in Farm Power and Machinery is offered in Kerala in
- (a) College of Agriculture, Vellayani
 - (b) College of Horticulture, Vellanikkara
 - (c) Kellappaji College of Agriculture Engineering & Technology, Thavannoor
 - (d) College of Forestry, Vellanikkara
30. The starting salary scale of a Junior Engineer in Kerala is
- (a) 13350-16750
 - (b) 16400-22400
 - (c) 6675-10550
 - (d) 7500-11000

-
31. Which of the following is a degree in Ayurveda?
- (a) BAMS
 - (b) BHMS
 - (c) BVMS
 - (d) BNYS
32. The first degree in Aquaculture is offered at the
- (a) College of Dairy Science and Technology
 - (b) College of Horticulture
 - (c) College of Fisheries
 - (d) College of Forestry
33. The tuition fee fixed for B.Tech course in Government Engineering Colleges of Kerala is
- (a) Rs.15000
 - (b) Rs.25000
 - (c) Rs.36000
 - (d) Rs.50000
34. Which of the following medical education courses demand a sound knowledge of Sanskrit?
- (a) Ayurveda
 - (b) Homeopathy
 - (c) Sidha
 - (d) Unani
35. A Post graduate degree holder in Veterinary Science and Animal Husbandry is most qualified for service in
- (a) agricultural plantations
 - (b) diary farms
 - (c) milk processing industries
 - (d) fertilizer companies
36. One of the organization where an aeronautical engineer can find a job is in
- (a) A Firm manufacturing machine
 - (b) The I.S.R.O
 - (c) A steel factory
 - (d) A firm which manufactures petrol engines

37. Eligibility for the first degree course in Ayurveda in Kerala is
- (a) 10+2 in science group with 50% marks and separate 50% in biology
 - (b) 10+2 first class in science group
 - (c) S.S.L.C with 60% marks in biology
 - (d) 10+2 with 60% marks in humanities group
38. The organization, which conducts the national entrance examination for admission to agriculture and allied fields is the
- (a) JIPMER
 - (b) AIIMS
 - (c) ICAR
 - (d) JEE
39. The district in Kerala with just one engineering college is
- (a) Ernakulam
 - (b) Kollam
 - (c) Wynad
 - (d) Pathanamthitta
40. The duration for obtaining a P.G. Degree in Homeopathy after 10+2 is
- (a) 5 ½ years
 - (b) 8 ½ years
 - (c) 10 ½ years.
 - (d) 3 Years
41. The job, for which a person with training in forestry is most suited is that of a
- (a) Horticulturist
 - (b) Ranger
 - (c) Zoo keeper
 - (d) Live stock Assistant
42. The basic qualification for admission to B. Tech degree in Information Technology/Computer Science is
- (a) +2 in science subjects with 50% marks in the aggregate
 - (b) +2 with mathematics and science
 - (c) +2 mathematics with 50% marks and science with 50% marks in the aggregate
 - (d) +2 pass in any scienc group

43. The district in Kerala has three Medical Colleges
- (a) Alappyzha
 - (b) Calicut
 - (c) Thrissur
 - (d) Palakkad
44. Basic qualification for admission to M. Sc in Nutrition
- (a) B. Sc in Home Science
 - (b) B. Sc in Agriculture
 - (c) B. Sc in Fishery Science
 - (d) B. Sc in Horticulture
45. The National Institute of Technology in Kerala is at
- (a) Thrissur
 - (b) Calicut
 - (c) Thiruvananthapuram
 - (d) Ernakulam
46. All India Institute of Medical Sciences is at
- (a) Chennai
 - (b) New Delhi
 - (c) Mumbai
 - (d) Kolkatha
47. The university, which offers post graduate programme in
- (a) University of Calicut
 - (b) The CUSAT
 - (c) Mahatma Gandhi University
 - (d) Kerala Agricultural University
48. The National level entrance examination for I.I. Ts in India is called the
- (a) GATE
 - (b) JEE
 - (c) CAT
 - (d) TOFEL

APPENDIX - IV

THE VOCATIONAL INFORMATION INVENTORY RESPONSE SHEET

Name..... Date.....

Age.....

Sex.....

Standard.....

School.....

1		9		17		25		33		41	
2		10		18		26		34		42	
3		11		19		27		35		43	
4		12		20		28		36		44	
5		13		21		29		37		45	
6		14		22		30		38		46	
7		15		23		31		39		47	
8		16		24		32		40		48	

APPENDIX - V
THE VOCATIONAL INFORMATION INVENTORY
SCORING KEY

1	c	9	c	17	c	25	a	33	c	41	b
2	b	10	b	18	b	26	d	34	a	42	c
3	b	11	b	19	d	27	b	35	b	43	c
4	b	12	c	20	d	28	a	36	b	44	a
5	d	13	b	21	d	29	c	37	a	45	b
6	c	14	d	22	b	30	c	38	c	46	b
7	b	15	d	23	b	31	a	39	c	47	b
8	b	16	c	24	c	32	c	40	b	48	b
TOTAL											

APPENDIX VI

Kerala University Group Test of
Intelligence for Adults

(REVISED VERSION)

By

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&

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UNIVERSITY OF KERALA
DEPARTMENT OF EDUCATION

TRIVANDRUM

1978

**KERALA UNIVERSITY GROUP TEST
OF INTELLIGENCE FOR ADULTS**

This test is designed to measure your general mental ability. There are four different sub test in this test. There are twenty problems in each sub test.

General Directions:

The test will have to be administered under conditions prescribed relating to time for completing the test and other conditions prescribed for obtaining correct scores, which will be prescribed by the examiner. No exceptions will be permitted.

The mode of finding out the correct answer is indicated in the test. If a correction is to be made, enter a square around the wrong entry(ies) & give the final entry in the appropriate circle.

Note: This test book-let has to be used by hundreds of others besides you. So handle the book-let very carefully. Do not write or mark on the booklet or spoil it in any way. Be sure you understand the practice problems given towards the beginning of each sub test before you start answering. Start answering only when you are asked to start and stop answering when you are asked to stop. Answer the problems as quickly and as accurately as you can. If you have difficulty with one problem do not spend too much time on it. Omit it and proceed to the next problem. Mark your answers *only* in the answer sheet given and *not* on the test.

[Turn the page only when you are asked to]

SUBTEST I

Each items in this subtest contains three words connected with each other in a specific manner. A fourth word is missing in the items. The first two words are related to each other in a particular way. Find out the relation between the first two words. Apply this relation to the third word and find out missing fourth word. Four answers are given. Only one of the words stands for the correct answer. Put an 'x' mark in the circle below the letter indicating the correct answer. Examine the following problems.

Specimen items

- (a) (b) (c) (d)

(I). Blood: Red :: Sky: — [(a) Cloud; (b) Blue; (c) Air; (d) Sun]

The relation between the first two words is colour. Use this to find out the object which has the same colour as the sky. This will help you to find out the missing fourth word to be filled up. The missing word in this case here to be blue. Hence blue is the correct answer, enter an 'x' mark in the circle.

Proceed to do this for all the questions from 1 to 20.

- (a) (b) (c) (d)

(II). Dog: Animal :: Crow:— [(a) Fly; (b) Black; (c) wings; (d) Bird]

Applying the principle used for item (I), we may identify the correct answer for item (II). You can easily find that 'Bird' is correct answer. The correct answer is (d). Hence enter this under 'd'. The given 20 problems can be answered in the same way. Start answering once the teacher says 'start' and stop when the teacher says 'stop'. Turn to the reverse side of the answer sheet to see how the correct answers to this sub tests are to be entered.

Proceed to answer items 1 to 20 as soon as the teacher says "start".

[Turn the page only when you are asked to]

Bank : Library :: Medicine: _____	[(a) Doctor (b) Hospital (c) Treatment (d) Disease]
Cat : Kitten :: Dog: _____	[(a) Child (b) Lamb (c) Calf (d) Puppy]
Lion : Roar :: Dog: _____	[(a) Bite (b) Bark (c) Tail (d) animal]
Blacksmith : Iron :: Carpenter: _____	[(a) Wood (b) Nail (c) Hammer (d) Furniture]
Police : Thief :: Doctor: _____	[(a) Money (b) Medicine (c) Police Station (d) Patient]
Finger : Hand :: Toe: _____	[(a) Shoe (b) Heel (c) Foot (d) Knee]
Chair : Sitting :: Bicycle: _____	[(a) Riding (b) Running (c) Travelling (d) Seat]
Ice : Water :: Water: _____	[(a) River (b) Cold (c) Thirst (d) Steam]
Snake : Bite :: Knife: _____	[(a) Cut (b) Iron (c) Sharp (d) Blade]
Worm : Frog :: Crawl: _____	[(a) Snake (b) Ground (c) Animal (d) Bird]
Book : Author :: Statue: _____	[(a) Model (b) Sculptor (c) Man (d) Marble]
Women : Baby :: Cow: _____	[(a) Grass (b) Child (c) Calf (d) Ox]
Electric fan : Electric current :: Engine:—	[(a) Smoke (b) Motion (c) Fuel (d) Wheel]
Kingdom : King :: Republic: _____	[(a) Democracy (b) Province (c) Governor (d) President]
Reading : King :: Learning: _____	[(a) Book (b) Greatness (c) scholar (d) School]
Bird : Feather :: Fish: _____	[(a) Scale (b) Tail (c) Break (d) Mouth]
Big : Small :: Hope: _____	[(a) Faith (b) Despair (c) Glory (d) Sorrow]
Confusion : Order :: War: _____	[(a) Guns (b) Army (c) Peace (d) Thunder]
Affection : Friend :: Hatred: _____	[(a) Happiness (b) Quarrel (c) Foe (d) Flight]
Fire : Heat :: Flower : _____	[(a) Plant (b) Fragrance (c) Petal (d) Leaf]

[Turn the page only when you are asked to]

SUBTEST II

Each item of this test consists of five words. Four of these words can be grouped together using a certain principle while one cannot be included in the group. You have to find out the word which does not belong to the group. Put an 'x' mark in the circle below the letter indicating the correct answer. The following illustrative problems (I and II) would help you to understand the method of solving problems under this subtest:

(a) (b) (c) (d) (e)

I. (a) Lion; (b) Cow; (c) Cat; (d) Dog; (e) Crow

The first four words can be grouped together because they are all the names of animals. The last word (Crow) does not belong with the rest since it is the name of a bird. Hence (e) is the correct answer. The circle below 'e' has to be marked with an 'x' in the specimen answer sheet. Examine the next problem given below.

(a) (b) (c) (d) (e)

II. (a) Spring; (b) Winter; (c) Rain; (d) Autumn (e) Summer

You may see that 'Rain' is the word which does not belong to the group. Hence this is the correct answer. The circle under 'e' is therefore marked with an 'x' to indicate your choice. The given 20 problems can be answered in the same manner. Turn to the reverse side of the answer sheet to see how the correct answers to this sub test are to be entered for illustrative items (I) and (II).

Proceed to answer item 1 to 20 when the teacher says "start"

[Turn the page only when you are asked to]

-
1. (a) Iron b. Nail c. Copper d. Brass e. Silver
 2. a. Radio b. Thermometer c. Tape Recorder d. Gramophone e. Loud Speaker
 3. a. Big b. Small c. Sweet d. Hot e. Cold
 4. a. Triangle b. Square c. Quadrilateral d. Circle e. Rectangle
 5. a. Almost b. Perhaps c. Probably d. Possibly e. Never
 6. a. Worm b. Lizard c. Snake d. Rat e. Crow
 7. a. Jug b. Plate c. Coffee d. Cup e. Dish
 8. a. Button b. Toe c. Finger d. Head e. Arm
 9. a. Tiger b. Cow c. Lion d. Dog e. Bear
 10. a. Mug b. Jar c. Bucket d. Basket e. Pot
 11. a. Rope b. Stick c. Chain d. String e. Wire
 12. a. Mars b. Moon c. Venus d. Mercury e. Jupiter
 13. a. Happiness b. Sorrow c. Affection d. Quickness e. Hatred
 14. a. Hindi b. Malayalam c. Telugu d. Punjabi e. English
 15. a. Tapioca b. Sugarcane c. Beetroot d. Groundnut e. Carrot
 16. a. Butterfly b. Moth c. Owl d. Aeroplane e. Eagle
 17. a. Oak b. Teak c. Lotus d. Tamarind e. Olive
 18. a. Loincon b. Kennedy c. Rajendra prasad d. Nazar e. Jawaharlal Nehru
 19. a. Animal b. Bird c. Mammal d. Elephant e. Insect
 20. a. Microscope b. Spectacle c. Telescope d. Binoculars e. Television

SUBTEST III

A set of numbers are given in this sub test. One number in the test is missing. All the numbers in a problem are connected to each other according to a certain law. Examine the given numbers in a problem and find out the law which they follow. Using this you have to guess the missing number in the set, which can be found out using the same principle. Select the correct answer from the given four answers. Put an 'x' mark in the circle below the letter indicating the correct answer. Examine the following problems.

(I). 1, 4, 7,, 13, 16.

Answers: [(a) 11; (b) 10; (c) 9; (d) 12]

You may notice that every number in the set can be found out by adding three to the previous number in the set. Hence the missing number in this item can be found by adding three to the previous term viz. 7. Hence the correct answer is 10. The circle below 'b' is therefore marked with an 'x' to show that this is the correct answer.

(II). $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \text{---}$

Answers: [(a) $\frac{5}{6}$; (b) $\frac{6}{7}$; (c) $\frac{5}{4}$; (d) $\frac{1}{2}$]

You can see that 'a' is the correct answer. The circle under 'a' is marked in the specimen answer sheet to show that this is the correct answer. Turn to the reverse side of the answer sheet to see how the correct answers to this sub test are to be entered, illustrative example given as (I) and (II).

1. 4, 7, 5, 8, 6, — [(a) 9 (b) 3 (c) 4 (d) 7]
2. 3, 5, 8, 12, —, 23 [(a) 17 (b) 20 (c) 16 (d) 19]
3. $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{8}$, —, $\frac{9}{32}$ [(a) $\frac{6}{11}$ (b) $\frac{7}{12}$ (c) $\frac{8}{15}$ (d) $\frac{7}{16}$]
4. $\frac{1}{3}$, $\frac{3}{6}$, $\frac{4}{12}$, $\frac{8}{24}$, — [(a) $\frac{16}{48}$ (b) $\frac{16}{32}$ (c) $\frac{12}{48}$ (d) $\frac{12}{36}$]
5. 18, 21, 25, 30, 36, — [(a) 39 (b) 40 (c) 43 (d) 44]
6. 12, 17, 13, 19, 14, — [(a) 10 (b) 9 (c) 16 (d) 21]
7. $1\frac{2}{3}$, $2\frac{3}{4}$, —, $4\frac{5}{6}$, $5\frac{6}{7}$ [(a) $3\frac{2}{4}$ (b) $2\frac{3}{5}$ (c) $3\frac{5}{5}$ (d) $4\frac{3}{4}$]
8. $\frac{1}{6}$, $\frac{2}{5}$, $\frac{3}{4}$, —, $\frac{5}{2}$ [(a) $\frac{2}{4}$ (b) $\frac{2}{3}$ (c) $\frac{4}{2}$ (d) $\frac{4}{3}$]
9. 65, 63, 60, 56, 51, — [(a) 44 (b) 45 (c) 46 (d) 47]
10. 12500, 2500, —, 100, 20, 4, [(a) 500 (b) 250 (c) 200 (d) 50]
11. 5, 3, 6, 4, 7, — [(a) 10 (b) 9 (c) 8 (d) 5]
12. 21, 17, 20, 16, 19, — [(a) 15 (b) 18 (c) 22 (d) 23]
13. 5, 6, 8, 11, —, 20, [(a) 14 (b) 15 (c) 16 (d) 17]
14. 55, 53, 50, 46, 41, — [(a) 37 (b) 33 (c) 36 (d) 35]
15. 0, 2, 6, 12, —, 30 [(a) 18 (b) 19 (c) 20 (d) 24]
16. 3, 7, 15, 31, —, 127 [(a) 63 (b) 96 (c) 35 (d) 123]
17. 81, 27, 9, 3, 1, — [(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{6}$ (d) 0]
18. 68, 66, 62, 54, 38, — [(a) 32 (b) 16 (c) 12 (d) 6]
19. 147, 74, 158, 85, 169, — [(a) 96 (b) 69 (c) 61 (d) 16]
20. 38, 11, 33, 6, 28, — [(a) 23 (b) 22 (c) 3 (d) 1]

[Turn the page only when you are asked to]

SUBTEST IV

In this test there are nine cells arranged in three rows (and three columns). Eight of these cells are filled with letters of the English alphabet. The bottom right-hand cell is empty. You have to find out the letter or letters which will complete the design. Put an 'x' mark in the circle below the letter indicating the correct answer. You can do this by examining the pattern of letters in the first two rows and apply the same relation to find out the group of letters which is to be substituted in the empty cell. The following two examples will illustrate how you have to do this.

(I).

A	A	A
B	B	B
C	C	

 Answers: (a) B; (b) D; (c) A; (d) C

We know that the first row is formed by letter 'A' in each cell. This is true of the second row which is formed by letter 'B'. The letter which appeared in the third row (first two cells) is 'C'. The empty cell has to be completed with 'C' if the principle adopted in the first rows is to be adopted for completing the third row. Hence the correct answer (C) in this case is indicated as (d) in the four answers given. The correct answer is shown by an 'x' mark under. Letters in the first two rows are the same. Using this relation for the third row the empty cell can be completed by letter 'c'. So the correct answer is 'c'. This has been marked in the specimen answer sheet. Now proceed to the next problem.

(II).

C	B	A
F	E	D
I	H	

 Answers: (a) G (b) C (c) A (d) F

Here 'G' is the correct answer. The circle under 'a' is therefore marked in the answer sheet.

Proceed to answer item 1 to 20 when the teacher says "start"

G	F	E
J	I	H
M	L	

(1)

ABC	CB	A
EFG	GF	E
IJK	KJ	

(6)

AC	AB	BC
DF	DE	EF
GI	GH	

(11)

CP	AQ	BR
BQ	CR	AP
AR	BP	

(16)

1. G; (b) I; (c) N; (d) K (a) F; (b) J; (c) I; (d) K (a) HI; (b) DF; (c) AB; (d) GI (a) AP; (b) CQ; (c) CA; (d) BR

AB	BC	CD
BC	CD	DE
CD	DE	

(2)

E	GH	F
I	KL	J
M	OP	

(7)

AC	BD	CE
DF	EG	FH
GI	HJ	

(12)

PQP	PQ	QR
OPO	OP	PQ
NON	NO	

(17)

2. EF; (b) GH; (c) FE (d) AB (a) I; (b) M; (c) N; (d) E (a) IJ; (b) GH; (c) IK; (d) JL (a) QR; (b) OP; (c) PQP; (d) PQ

A	E	I
D	H	L
G	K	

(3)

HG	JI	LK
NM	PO	RQ
TS	VU	

(8)

PB	QC	RD
RD	SE	TF
TF	UG	

(13)

D	F	H
F	H	J
H	J	

(18)

3. O; (b) B; (c) A; (d) D (a) XW; (b) VR; (c) SX; (d) XO (a) VH; (b) PB; (c) SE; (d) RD (a) D; (b) J; (c) G; (d) L

B	F	J
E	I	M
H	L	

(4)

C	A	B
F	D	E
I	G	

(9)

K	M	O
P	R	T
U	W	

(14)

AA	AA	AA
AA	A	A
AA	AA	AA
A	A	AA
AA	AA	
A	AA	

(19)

4. J; (b) H; (c) F; (d) P (a) F; (b) B; (c) C; (d) H (a) O; (b) Y; (c) S; (d) X (a) AA; (b) AA; (c) AA; (d) AA
A A AA A

E	EE	FG
H	HH	IJ
K	KK	

(5)

CDE	D	EC
FGH	G	HF
IJK	J	

(10)

QP	QO	QN
PO	PN	PM
ON	OM	

(15)

P	N	L
M	K	I
J	H	

(20)

5. JK; (b) LN; (c) LM; (d) MM (a) KI; (b) CDE; (c) FG; (d) LK (a) PO; (b) OL; (c) QP; (d) ON (a) G; (b) E; (c) O; (d) F

APPENDIX VII
KERALA UNIVERSITY GROUP TEST OF INTELLIGENCE FOR ADULTS
RESPONSE SHEET

SUB TEST 1					SUB TEST 2					SUB TEST 3					SUB TEST 4					
Item	a	b	c	d	Item	a	b	c	d	e	Item	a	b	c	d	Item	a	b	c	d
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	11	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	11	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	11	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	12	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	12	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	12	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	15	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	15	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	15	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	20	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	20	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	20	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX VIII

KERALA UNIVERSITY GROUP TEST OF INTELLIGENCE FOR ADULTS

SCORING KEY

SUBTEST I		SUBTEST II		SUBTEST III		SUBTEST IV	
1.	b	1.	b	1.	a	1.	d
2.	d	2.	b	2.	a	2.	a
3.	b	3.	c	3.	d	3.	a
4.	a	4.	d	4.	a	4.	d
5.	d	5.	e	5.	c	5.	c
6.	c	6.	e	6.	d	6.	c
7.	a	7.	c	7.	c	7.	c
8.	d	8.	a	8.	c	8.	a
9.	a	9.	b	9.	b	9.	d
10.	a	10.	d	10.	a	10.	a
11.	b	11.	b	11.	d	11.	a
12.	c	12.	b	12.	a	12.	c
13.	c	13.	d	13.	b	13.	a
14.	d	14.	e	14.	d	14.	b
15.	c	15.	b	15.	c	15.	b
16.	a	16.	d	16.	a	16.	b
17.	b	17.	c	17.	b	17.	b
18.	c	18.	e	18.	d	18.	d
19.	c	19.	d	19.	a	19.	a
20.	b	20.	e	20.	d	20.	d

