METHODOLOGY
METHODOLOGY

The method adopted for the study is described in this chapter. The nature of the problem and the kind of data necessary for its solution determine the method to be adopted in a study. Since the topic under investigation is 'A critical study of the work experience programme in secondary schools of Kerala', the method adopted for the study is Normative survey. This type of research usually describes and interprets what exists at present. 'They are concerned with conditions or relationships that exist, practices that prevail, beliefs, points of view or attitudes that are held, processes that are going on, effects that are being felt or trends that are developing.'

Objectives of the study

The important objectives are:

(1) to study how the work experience programme is organized in secondary schools of Kerala and the difficulties experienced in its organisation,

(2) to study the details regarding the working of the work experience programme and the difficulties experienced

in its working,

(3) to study the advantages the pupils get if they participate in the programme and the difficulties they have in participating in the programme,

(4) to study the general nature of the attitude of secondary school pupils towards the work experience programme,

(5) to compare the attitude scores of various subgroups of secondary school pupils classified on the basis of (a) sex (b) area of residence (c) management of schools (d) standard (e) age (f) achievement (g) socio-economic status and (h) community,

(6) to study the general nature of the attitude of secondary school teachers towards the work experience programme,

(7) to compare the attitude scores of various subgroups of secondary school teachers classified on the basis of (a) sex (b) area of residence and (c) management of schools,

(8) to study the general nature of the attitude of parents towards the work experience programme,

(9) to compare the attitude scores of subgroups of parents classified on the basis of (a) sex and (b) area of residence,
(10) to study the interest in the work experience programme of secondary school pupils,
(11) to compare the interest scores of various sub-groups of secondary school pupils classified on the basis of (a) sex (b) area of residence (c) management of schools (d) standard (e) achievement (f) socio-economic status and (g) community, and
(12) to find out the improvements needed for the proper functioning of the work experience programme in secondary schools of Kerala.

Tools used

There are various devices for collecting the data required for the study of any problem. But each tool is particularly appropriate for collecting certain type of data. So the selection of appropriate tools is of vital importance in any research work. The following tools were found suitable for collecting the data required for the study.

I. Questionnaire for
   (1) Heads of secondary schools and
   (2) Pupils in secondary schools

II. Attitude Scale for
   (1) Secondary school pupils
   (2) Secondary school teachers and
   (3) Parents of secondary school pupils; and
III. An interest inventory for secondary school pupils for studying their interest in the work experience programme.

Interview and observation were also used to supplement the data collected through the above tools.

Preparation of the tools

I. Questionnaire

In general the word 'questionnaire' refers to a device for securing answers to questions by using a form which the respondent fills in himself. It is a systematic compilation of questions that are submitted to a sampling of population from which information is desired. It is perhaps the most natural method of obtaining information from an individual, but the answers will be influenced by his willingness to tell the truth, his interpretation of the questions, and the accuracy and extent of his knowledge. It is often referred to as the lazy man's way of gaining information but it has unique advantages over other kinds of tools in collecting both quantitative and qualitative information. It affords wider coverage than any other technique and also reaches persons who are difficult to contact. This greater coverage leads to greater validity in the results. It is economical both with

respect to money and effort. A questionnaire allows
greater uniformity in the manner in which the questions
are posed, and this ensures greater comparability in the
answers. It also permits more considered answers. It is
the most convenient and effective way of collecting in-
formation from the respondent within a limited time.
These qualities of a questionnaire motivated the investi-
gator to select it as one of the major tools.

Preparation of the questionnaire

Since the validity of the answers obtained from a
questionnaire is in direct proportion to the quality of
the questionnaire itself, it is essential that the ques-
tionnaire should be made as good as possible. The prepa-
ration of a questionnaire is not an easy task. A good ques-
tionnaire requires as much thought and care in construction
as a good test. The important principles for constructing
a questionnaire were studied in detail before constructing
the questionnaire. Taking into consideration all the li-
mitations of a questionnaire every effort was made to per-
fekt the tool so as to gather reliable data.

The important points given for questionnaire de-
velopment in the Encyclopedia of Modern Education are:

(1) The technique should be used only when there is
no other feasible means of securing the required information,
(2) every question should be carefully checked for significance and lack of ambiguity.

(3) technical terms which may be variously interpreted should be adequately defined.

(4) long, involved questions should be avoided,

(5) 'leading questions' which suggest or otherwise hint at the expected or favoured answer should be scrupulously examined and either removed or reworded,

(6) 'cross checking questions' may be worth including in order to check on the consistency of the response,

(7) the mechanical features should provide a pleasing format with adequate space for the answers,

(8) the response or entries required on the form should be of as simple types as possible,

(9) the replies should be in a form capable of necessary statistical analysis,

(10) the questionnaire should be as short as possible, since excessive time required to answer questions leads to careless responses, omission of items and fewer returns, and

(11) questionnaire should be subjected to one or more preliminary trials with representative samplings of the individuals for whom the questions are designed in order to detect limitations that might otherwise be overlooked.

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Since the objective of this investigation was to study the work experience programme in secondary schools of Kerala it was decided to gather information from those who are actively involved in the programme. Their opinion about the different aspects of the problem was considered very important. Hence it was decided to prepare two questionnaires - one for heads of secondary schools and another for pupils studying in secondary schools of Kerala.

I. Questionnaire for heads of Secondary Schools

In order to find out the relevant aspects of the problem the investigator met some experts in the work experience programme, heads of secondary schools, secondary school teachers and educational administrators and discussed with them about the programme in secondary schools. Attempts were made to elicit all the information that would help the investigator to prepare a questionnaire. Keeping in mind all the above points, a draft questionnaire consisting of 52 items was prepared. Then it was given to experts in the field for criticisms and suggestions. After making necessary modifications, a dozen copies of the questionnaire were made ready for administration. They were distributed to heads of secondary schools and the papers were collected back and analysed in detail. After making the necessary modifications the final questionnaire
consisting of 47 items was prepared. Thus 250 copies of the questionnaire were made ready for administration. Clear and specific instructions were given about how to answer the questionnaire. A copy of the questionnaire prepared is given as Appendix I.

Description of the questionnaire

This questionnaire consists of three parts viz., Part I, Part II and Part III.

Part I - Personal data

There were four items in this section. They were included to study the name of the respondent, sex and type of school in which he/she is working as headmaster/headmistress.

Part II(a) - Organization

This part consisted of 10 items. Those items were intended to study about the organisation of the work experience programme. The year in which work experience programme was organized, nature of the programme, the standards for which it is made compulsory, the periods allotted for it, its organisational pattern, details regarding its syllabus, its place in the school curriculum, number of teachers handling it, evaluation of the programme, files or records kept for it and the difficulties experienced in organising the work experience programme were studied through the items in this section.
Part II (b) - Working

Items in this section were intended to study the details regarding the working of the work experience programme. Hence the items 11-15 were included to study the activities done under the work experience programme, the criteria for selecting the activities, the person who is selecting the activities, the place where the activities are conducted and the difficulties in conducting the activities.

The purpose of including the next item was to study the time allotted for work experience and the suitable time and minimum time required for the work experience programme.

The items 17-21 were included to study the facilities available in schools for conducting the work experience programme, if the facilities are not adequate, the method adopted for managing the situation and the urgently needed facilities, if any.

The method adopted for using local resources for work experience and the difficulties experienced in it, were studied through the item 22.

The next two items were included to study the details regarding the fund for the work experience programme and the items of expenditure of the programme.

The item 25 was included with a view to find out whether there is any assistance given for conducting the programme and if yes, the source and the nature of assistance.
The aim of including the item 26 was to find out whether there is enough publications in the school library on work experience programme. Number of teachers in a school trained in the work experience programme and adequacy of their training were studied through the item 27.

The item 28 was included to find out whether there is any criteria for selecting students for specific items of work experience and if so the criteria adopted for selecting students.

The nature of work assigned and attention given to pupils were studied through the items 29 and 30.

Details regarding pupils' interest in the work experience programme, and the methods adopted for handling those students who are not interested in the work experience programme were studied through the item 31.

The item 32 was included to find out the opinion of the respondents about introducing examination for work experience. The criteria for grading pupils were studied through the item 33.

The items 34-36 were included to study the opinion of Headmasters/Headmistress regarding teacher's interest in and attitude towards the programme and their co-operation in the work experience programme.

Quality of goods produced, the sources through which the products are sold and items for which the money is
utilized were studied through the item 37.

Details regarding the evaluation of the programme, sending of reports and evaluation of pupils were studied through the items 38-40.

Co-ordination of the programme with other subjects, pupils' awareness of the importance of work in the learning process and the working of earn while learn programme in the school were studied through the items 41-43.

The opinion of the respondents regarding making the programme an integral part of education, was sought through the item 44.

The item 45 was included, to find out how the work experience programme affects the learning of other subjects in the curriculum.

The purpose of including item No.46 was to study the changes seen among the pupils as a result of the introduction of the work experience programme.

The last item was an open question to elicit from the respondents suggestions for conducting the programme in a better way.

(2) Questionnaire for secondary school pupils

This questionnaire was intended to supplement the information gathered through the questionnaire given to heads of schools. Necessary data regarding pupils' socio-economic
status was also collected through this questionnaire. This questionnaire was prepared after discussions with heads of secondary schools, pupils in secondary schools and some experts in the work experience programme. These discussions helped the investigator to select suitable items for the questionnaire.

In order to collect data necessary for studying the socio-economic status of pupils, available scales in the field were studied in detail. Since education, occupation and income were found to be the major components of socio-economic status it was decided to collect necessary data regarding these components also through this questionnaire. Thus a questionnaire consisting of 15 items was prepared to study the personal data of secondary school pupils, their socio-economic conditions and the advantages they get if they participate in the programme, and the difficulties they have in participating in the work experience activities. Thus a dozen copies of the questionnaire were prepared and distributed to pupils studying in the secondary schools of Kerala to find out the suitability of the items. Then they were collected back and analysed in detail. After making necessary modifications the final questionnaire was prepared. Then 550 copies of the questionnaire were made ready for administration. The questionnaire prepared in Malayalam and its English version are given as Appendix II (a) and (b) respectively.
Description of the questionnaire

This questionnaire consisted of 12 items. The items 1 to 5 in this questionnaire were intended to collect the personal data of pupils such as name, age, sex, standard in which he/she is studying, community and type of school in which he/she is studying. The item 6 was included to study the socio-economic status of pupils. Pupils' participation in the work experience programme, if they do not participate in it, the reasons for it, their opinion regarding the necessity of the programme, the advantages they get if they participate in the programme were studied through the remaining items.

II. Attitude Scale

The term 'attitude' has been defined in the Encyclopedia of Educational Research as 'a psychological construct or latent variable inferred from observable responses.'

It is an 'emotional reaction, either favourable or unfavourable toward some object or class of objects, material or conceptual in nature.'


5. Rivlin, op.cit., p.68.
It is 'specific mental disposition toward an incoming or arising experience, whereby that experience is modified, or, a condition of readiness for a certain type of activity.'

In the words of Edwards 'attitude is a degree of positive or negative affect associated with some psychological object.'

Remmers defines attitude as 'an effectively toned idea or group of ideas pre-disposing the organism to action with reference to specific attitude objects.'

According to Krech, Crutchfield and Ballachy, an attitude is 'an enduring system of positive or negative evaluations, emotional feelings and pro or con action tendencies with respect to a social object.'

According to Marsell, 'attitudes predispose a person to react and feel in certain way about some specific issue or problem.'

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Attitude, according to Thurstone and Chave, is "the sum total of a man's inclinations, feelings, prejudice or bias, pre-conceived notions, ideas, fears, threats and convictions about any specific object." 11

Since suitable tools were not available to study the attitude of secondary school pupils, parents of secondary school pupils, and secondary school teachers towards work experience programme, the investigator had to prepare suitable tools. Interview, questionnaire, check-list and such other tools are useful in the study of attitude but since an attitude scale is considered as the best tool for the study of attitude, it was decided to construct an attitude scale of the 'likert type' to study the attitude of secondary school pupils towards the work experience programme.

An attitude scale according to New Comb is 'like a yardstick in that it is used to assign a numerical value to an object in terms of units defined in known ways of a certain dimension.' 12

According to Soloman, an attitude scale is 'a standard question to which the members of a group respond by selecting one of a number of standard answers graded

according to degree of favourableness."  

The principal advantage of Likert's method, obviously, is that it makes unnecessary the use of a group of judges to arrange statements into categories representing degrees of favourableness or unfavourableness. It is more reliable too.  

A well constructed attitude scale consists of a number of items that have been carefully edited and selected in accordance with certain criteria. A statement may be defined as 'anything that is said about a psychological object.'

Criteria used for editing statements

Wang, Thurstone and Chave, Likert, Bird, Edwards and Kilpatrick have suggested some informal criteria for editing attitude statements. They are given below:

1. Avoid statements that refer to the past rather than to the present.
2. Avoid statements that are factual or capable of being interpreted as factual.
3. Avoid statements that may be interpreted in more than one way.

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(4) Avoid statements that are irrelevant to the psychological object under consideration.

(5) Avoid statements that are likely to be endorsed by almost every one or by almost no one.

(6) Select statements that are believed to cover the entire range of the affective scale of interest.

(7) Keep the language of the statements simple, clear, and direct.

(8) Statements should be short, rarely exceeding 20 words.

(9) Each statement should contain only one complete thought.

(10) Statements containing universals such as all, always, none and never often introduce ambiguity and should be avoided.

(11) Words such as only, just, merely and others of similar nature should be used with care and moderation in writing statements.

(12) Whenever possible, statements should be in the form of simple sentences rather than in the form of compound or complex sentences.

(13) Avoid the use of words that may not be understood by those who are to be given the complete scale.

(14) Avoid the use of double negatives.
1. Attitude Scale for Secondary School Pupils

Preparation of the preliminary attitude scale

For preparing the preliminary attitude scale, at first a large number of statements concerning the topic were prepared. Following sources were used for writing suitable statements:

(1) Review of available literature related to the topic

(2) Interview with experts in the field

(3) Discussion with pupils

Thus a list of forty-five statements was prepared. Statements which are found to be ambiguous, lengthy, double paralleled and of difficult vocabulary were eliminated. Statements which could be endorsed by people of opposing attitude, statements of facts, irrelevant ones, very extreme ones which cannot be unanimously accepted or rejected were also eliminated. Then it was given to experts for criticisms and suggestions. Finally 31 statements were selected for the pilot test. The number of positive and negative statements were almost equal in this pilot test. Even though some of the irrelevant and ambiguous statements were eliminated by the above procedures it was not possible to eliminate all such statements. So a preliminary try out was found essential. Thus 150 copies of the draft test were
made ready for administration. The preliminary attitude scale prepared in Malayalam and its English version are given as Appendix III.

Administration of the pilot test, item analysis, and preparation of the final scale

Population and Sample: The population for the administration of attitude scale consists of secondary school pupils in Kerala. Since Trivandrum district represents all different types of schools found in Kerala, it was decided to select the sample for pilot study from this district. Thus a sample of 150 pupils studying in secondary schools in Trivandrum District was selected for the pilot study by following the stratified sampling procedure.

Administration

The pilot test prepared was administered to a sample of 120 pupils studying in secondary schools in the Trivandrum District. The aim of this pilot test was to select suitable items for the final attitude scale. It was administered during the first and second week of October 1977. The investigator personally administered the attitude scales to the pupils after making the necessary arrangements for the administration of the test. The importance of the test
was made clear to them and then they were requested to respond to each item in terms of their own agreement or disagreement by putting a tick mark (√) in any one of the five columns marked as 'strongly agree', 'agree', 'undecided', 'disagree', and 'strongly disagree'. They were also requested not to omit any item. Sufficient time was given to complete all the items. Out of the 120 papers, 100 papers were selected for analysis.

**Scoring**

'Arbitrary weighting method' was used for scoring the attitude scale. The favourable items in the attitude scale were scored by giving scores 5, 4, 3, 2, 1 for the responses 'strongly agree', 'agree', 'undecided', 'disagree', and 'strongly disagree' respectively. For scoring the unfavourable items the scoring system was reversed i.e., they were scored by giving scores 1, 2, 3, 4, 5 for the responses 'strongly agree', 'agree', 'undecided', 'disagree', and 'strongly disagree' respectively. The highest possible score was $31 \times 5 = 155$ and the lowest possible score was $31 \times 1 = 31$. The scores obtained for each item were summed to get the attitude scores of an individual.

**Item Analysis**

'Item analysis refers to the application of statistical techniques to assess the two characteristics of items,
their difficulty and the extent to which they are correlated with other measures.\textsuperscript{17}

It is any of the many processes by which one can find which items differentiate and which items do not differentiate between the contrasting criterion groups.\textsuperscript{18}

'As a basis of rejecting statements in the method of summated ratings, use is made of some form of item analysis.'\textsuperscript{19}

Item analysis is done here to find out to what extent each item discriminates between high scoring and low scoring subjects. It is the procedure by which the suitability of an item for inclusion in the final test is assessed.

The discriminating power of an item, is the degree to which the single item separates the superior from the inferior individuals in the trait or group of traits being measured.\textsuperscript{20} It refers to the ability of an item to discriminate between high group and low group. Different methods can be applied to calculate the discriminating power of an item.


\textsuperscript{19} Edwards, \textit{op. cit.}, p. 152.

According to Kelley the use of the upper and lower 27 per cent offers the best compromise between the two variables which can affect the reliability of the results. These two variables are the number of cases and the scalar distance between the two groups. These variables are inversely related. As we increase the number of cases, the scalar distance contracts. And as we increase the scalar distance, the number of cases diminishes. Kelley suggests that the point of maximum reliability is achieved when we dichotomize at 27 per cent. He has pointed out that these two groups are the most serviceable for use in item analysis. Hence this method was followed in the process of item analysis in the present test. The total score obtained for each pupil was found by summing the scores obtained for different items. The hundred papers were then arranged in the order of magnitude of the total scores. From this the highest 27 per cent and the lowest 27 per cent of the papers were taken out for analysis. Then for each item in the attitude scale the scores for the high scoring and low scoring groups were recorded separately. The scores obtained for each item in the two groups, were used for calculating the discriminating power of each item. Usually items with a high discriminating power are chosen for the final attitude scale. The discriminating power was calculated by using the formula.

\[ t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{(X_H - \bar{X}_H)^2 + (X_L - \bar{X}_L)^2}{n(n-1)}}} \]

where \( t = 't' \) value or critical ratio

- \( \bar{X}_H \): the mean score on the given item for the high group
- \( \bar{X}_L \): the mean score on the same item for the low group
- \( X_H \): the score for a given individual item in the high group
- \( X_L \): the score for a given individual item in the low group
- \( n \): number of subjects in the criterion group

Preparation of the final attitude scale

The value of 't' is a measure of the extent to which a given statement differentiates between the high and low groups. 'As a crude and approximate rule of thumb, we may regard any 't' value equal to or greater than 1.75 as indicating that the average response of the high and low groups to a statement differs significantly, provided we have 25 or more subjects in the high group and also in the low group.'\(^\text{23}\) In the method of summed ratings what is desired is a list of 20-25 statements that will differentiate between high and low groups. These statements are selected on the basis of their 't' values. Therefore after finding the 't' values for each item they were grouped into

\(^{23}\) Ibid.
two categories, one consisting of positive statements and the other negative statements. Then the 13 statements having the highest 't' values were selected from each category for the final attitude scale. These statements were arranged in random order in the final scale. Simple and clear instructions were prepared and given in the attitude scale itself. Then 550 copies of the attitude scale were prepared. The attitude scale prepared, its English version and the item analysis data are given as Appendix IV (a), (b) and (c) respectively.

2. Attitude scale for teachers

An attitude scale of the Likert-type was prepared for studying the attitude of secondary school teachers' towards the work experience programme.

Preparation of the Preliminary attitude scale for teachers

A large number of statements related to the topic was prepared as a first step for preparing the scale. For preparing suitable statements for the draft test, available literature related to the topic was studied in detail and also conducted interviews with experts and experienced teachers in this field. Thus a list of 53 statements was prepared. Then it was given to experts for criticisms and suggestions and after that the best 29 statements were selected for the pilot test. The positive and negative statements were almost equal in number in this test. They were
arranged in random order and necessary instructions were
given in simple and clear language. Then 150 copies of
the attitude scale were made ready for administration.
The preliminary attitude scale prepared in Malayalam and
its English version are given as Appendix V (a) and (b).

Administration of the Pilot test, item analysis and prepa-
ration of the final scale

Population and sample

The population for the administration of this atti-
tude scale consists of teachers working in secondary schools
in Kerala. Therefore the pilot test prepared was administ-
ered to a sample of 150 teachers selected by the stratified
sampling procedure from the secondary schools in Trivandrum
District. Teachers working in different types of schools
and of both sexes were included in the sample selected.

Administration

The investigator visited the schools selected, con-
tacted the teachers and explained to them the purpose of
the study. Then the attitude scales were distributed. It
was given during the first and second week of October 1977.
Clear and complete instructions were given in the facing
sheet of the attitude scale itself. Sufficient time was
given to them to fill up all the items. After giving suffi-
cient time, the investigator contacted the teachers again
to collect the attitude scales distributed. In spite of
repeated visits only 112 teachers returned the attitude
scales duly filled up. Of these 100 returns were used for analysis.

Scoring

The returned answer papers were scored according to the method followed in scoring the pupils' attitude scale.

Item analysis

Item analysis was done to find out to what extent each item discriminated between high scoring and low scoring subjects. For item analysis the hundred papers were arranged in the order of magnitude of scores from the highest to the lowest. Then the highest 27 per cent and the lowest 27 per cent of papers were taken out for analysis. Then the discriminating power of each item was calculated according to the method described earlier for the pupils' attitude scale.

Preparation of the final attitude scale

After calculating the 't' values the statements were grouped into two categories, one consisting of positive statements and the other negative statements. Then for the final attitude scale items having the highest 't' values were selected from each category. Thus 13 positive statements and 13 negative statements were selected. These statements were then arranged in random order in the final attitude scale. Thus 350 copies of the attitude scale were
prepared for final administration. The final attitude scale prepared and its English version and the item analysis data are given as Appendix VI (a), (b) and (c) respectively.

(3) Attitude Scale for parents

Construction of the preliminary attitude scale

An attitude scale of the Likert-type was constructed to study the attitude of parents towards the work experience programme. In addition to the literature related to the topic, interviews conducted with parents helped the investigator a lot in selecting suitable items for the parent's attitude scale. Sufficient care was taken to include items from all the necessary areas. Thus an attitude scale consisting of 50 statements was prepared. Then it was given to experts in the field, for criticisms and suggestions. Some of the items were eliminated according to their suggestions and finally 30 statements were selected for the pilot test. Positive and negative statements were almost equal in number in the pilot test. They were arranged in random order in the pilot test. Instructions were given in simple and clear language. After item analysis, the final attitude scale was prepared. Thus 150 copies of the attitude scale were made ready for administration. The preliminary attitude scale thus prepared and its English version are given as Appendix VII (a) and (b).
Administration of the pilot test, item analysis and preparation of the final scale

Population and sample

The population selected for the administration of this attitude scale consists of the parents of pupils studying in secondary schools in Kerala. A sample of 150 parents selected by the stratified sampling procedure from the Trivandrum District was used for the pilot study. Parents of both sexes and rural-urban locality were included in the sample.

Administration

The investigator personally contacted some of the parents and distributed the attitude scales during the first and second week of October 1977. Besides this, the investigator visited the schools selected for the administration of the other tools and distributed the attitude scales through the pupils to their parents. On the whole it was distributed to 150 parents. Clear and precise instructions were given in the facing sheet itself for answering the items in the scale. After making repeated visits the investigator got back only 109 attitude scales. Of these 100 were used for analysis.

Scoring

The returned answer papers were scored according to the method followed in scoring the pupils' attitude scale.
Item analysis

Item analysis was done according to the method used for the pupils' attitude scale. After finding the 't' value of each item, they were grouped into two categories, one consisting of positive items and the other negative items.

Preparation of the final attitude scale

Fourteen statements having the highest 't' values were selected from each group for the final attitude scale. Thus the final attitude scale consists of 14 positive (favourable) statements and 14 (unfavourable) negative statements. These statements were arranged in random order in the final attitude scale. Instructions were given in clear and simple language. Thus 300 copies of the attitude scale were prepared for final administration. The final attitude scale prepared, its English version and the item analysis data are given as Appendix VIII (a), (b) and (c) respectively.

III. Interest Inventory for pupils

The term 'interest' has been defined as a 'subjective-objective attitude, concern, or condition involving a percept or an idea in attention and a combination of intellectual and feeling consciousness, may be temporary or permanent; based on native curiosity, conditioned by experience.'

It is 'the conscious feeling of concernment in an object, regarded especially as a stimulant and guide to the arousement and direction of attention something further is necessary to that lively interaction of mind and object which we call a state of attention and this is interest.'

'An interest inventory is an organized method of listening or inventorying a person's likes and dislikes (his interests).'

According to Garrett, an interest inventory 'is essentially a self report or survey covering a person's own interests, values, preferences and feelings over a wide range of activities.'

Even though there are well known interest inventories like Strong's Vocational Interest Blank, Kuder Preference Record and such other tools they are not applicable to this study because this investigation intends to study the interest of secondary school pupils in the work experience programme. Since suitable tools were not available for this purpose, the investigator prepared an interest inventory of the Kuder Preference Record type after studying the different interest inventories. In the

25. Funk, _op. cit._, p. 1279.
Kuder Preference Record every item consists of three different activities, of which one relates to the topic under study and the other two relate to some other related or unrelated fields. An example related to the topic under study is given below. I like to participate in

A Science club activities  
B Work experience activities  
C Mathematics club activities

In the above example, the item 'B' clearly indicates one's interest in work experience while the others do not.

Selection of items for the draft test

Before preparing the draft test, the literature related to the topic was studied in detail. The interviews conducted with headmasters, teachers and pupils of selected schools also helped the investigator a lot in selecting suitable items for interest inventory. During the interview every attempt was made to elicit data necessary for the preparation of the interest inventory. Studies conducted in areas related to the present topic was also analysed in detail to incorporate suitable items in the interest inventory. Thus a draft inventory consisting of 39 items was prepared. Only those activities which are common among secondary school pupils were included in the inventory. Alternatives for each item were selected very
carefully. Out of the three alternatives one clearly indicates one's interest in work experience programme while the others do not. Items were worded in clear and simple language and the method of answering was made clear with a sample item. The draft inventory prepared was given to experts in the field for getting their suggestions for improvement. After making the necessary corrections 120 copies of the draft inventory were made ready for administration. The preliminary interest inventory prepared in Malayalam and its English version are given as Appendix IX (a) and (b).

Administration of the draft interest inventory

Population and Sample

The population for the administration of the interest inventory consists of pupils studying in secondary schools in Kerala. Therefore the draft inventory prepared was administered to a sample of 120 pupils studying in secondary schools in Trivandrum District selected by the stratified sampling procedure.

Administration

The investigator visited the schools selected for the study and made necessary arrangements for the test. It was administered during the first and second weeks of October 1977. The aim of this pilot test was to select suitable items for the final interest inventory. After
explaining the purpose of the study and the method of answering the investigator distributed the interest inventory to the pupils. Clear and complete instructions were given in the facing sheet of the inventory itself. With the help of a sample item the method of answering was made clear to them. Sufficient time was given to answer all the items. After giving sufficient time the investigator collected back the papers.

**Scoring**

The returned answer papers were scored by giving a score of 'one' point for every item answered in favour of work experience programme and 'zero' for all the other ones. The scores were totalled to get the interest score of an individual.

**Item analysis**

Hundred papers were used for item analysis. After scoring, the answer sheets were arranged in the order of magnitude of scores. Then the highest 27 per cent and the lowest 27 per cent of papers were used for item analysis. Difficulty index and discriminating power were calculated for each item by applying the formula:

\[
\text{Difficulty Index (D.I.)} = \frac{U + L}{N}
\]

and

\[
\text{Discriminating Power (D.P.)} = \frac{U - L}{N}
\]
where 'U' = the number of pupils passing the item in the upper group
'L' = the number of pupils passing the item in the lower group
'N' = the total number of pupils in both the groups

Preparation of the final interest inventory

Items having discriminating power .20 and above and difficulty index between .20 and .67 were selected for the final interest inventory. The final interest inventory consisting of 36 items was thus prepared. Instructions were given in simple and clear language and the method of answering was made clear to the students with the help of a sample item. In addition to this, separate answer sheets were also prepared for writing answers. Thus 120 copies of the interest inventory and 550 copies of the answer sheets were prepared. The final interest inventory prepared in Malayalam, its English version and the answer sheet prepared are given as Appendix X (a), (b) and (c) respectively.

Administration of the tools

1. Questionnaire for heads of Secondary schools

Sample

Since the study is a critical study of the work experience programme in secondary schools of Kerala, it was decided to select schools from various parts of Kerala. In view of the fact that differences in the details of the programme might be related to the locality and type of school it was decided to include in the sample, schools in rural and urban areas and different types of schools such
as Government and Private schools, Boys, Girls and Mixed schools and schools having male and female as heads. Thus a sample of 250 schools was selected from the secondary schools of Kerala by the stratified sampling procedure for the final study. Details regarding the sample selected for the administration of the questionnaire for heads of secondary schools are given in Table 1.

**TABLE I**  
**SAMPLE SELECTED FOR THE ADMINISTRATION OF THE QUESTIONNAIRE FOR HEADS OF SECONDARY SCHOOLS**

<table>
<thead>
<tr>
<th>Type of School</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>107</td>
</tr>
<tr>
<td>Private</td>
<td>143</td>
</tr>
<tr>
<td>Rural</td>
<td>146</td>
</tr>
<tr>
<td>Urban</td>
<td>104</td>
</tr>
<tr>
<td>Boys</td>
<td>20</td>
</tr>
<tr>
<td>Girls</td>
<td>23</td>
</tr>
<tr>
<td>Mixed</td>
<td>207</td>
</tr>
</tbody>
</table>

**Administration**

One hundred and eighty five copies of the questionnaire prepared for the heads of secondary schools were mailed to the heads of the selected schools. It was administered during the first and second week of October 1978. The need and importance of the study were made clear in the facing sheet of the questionnaire itself. Sufficient time was given to them to fill up the questionnaire and
they were requested to return the questionnaire duly filled at their earliest convenience. Self-addressed envelopes were also enclosed along with the questionnaires for the return of the filled up questionnaires. All the heads of schools who had not returned the questionnaires within a month were again requested with reminders to send them immediately. The investigator personally administered the remaining questionnaires to the heads of schools. As a result of repeated visits and reminders sent, 138 questionnaires were got back. Some of them were incomplete ones. After eliminating such incomplete questionnaires, only 120 questionnaires were found suitable for the study. Of this 57 questionnaires were from government schools, 63 from private schools, 45 from schools in urban areas, 75 from schools in rural areas, 14 from boys schools, 19 from girls schools and 87 from mixed schools.

(2) Questionnaire for pupils in Secondary Schools

Sample

A sample of 550 pupils, studying in secondary schools in Trivandrum District selected by the stratified sampling procedure was used for the administration of the pupils' questionnaire. Since the different types of schools found in Kerala are found in Trivandrum District also in sufficient number it was decided to select the sample from Trivandrum District. In view of the fact that the
responses of the pupils may differ according to the factors like the sex of pupils, the standard in which they study and the locality and type of schools, pupils belonging to these different categories were included in the sample selected. Details of the sample are given in Table II.

**TABLE II  SAMPLE SELECTED FOR THE ADMINISTRATION OF PUPILS' QUESTIONNAIRE**

<table>
<thead>
<tr>
<th>Boys</th>
<th>Girls</th>
<th>Rural</th>
<th>Urban</th>
<th>Government</th>
<th>Private</th>
<th>Standard VIII</th>
<th>Standard IX</th>
</tr>
</thead>
<tbody>
<tr>
<td>271</td>
<td>279</td>
<td>275</td>
<td>275</td>
<td>273</td>
<td>277</td>
<td>274</td>
<td>276</td>
</tr>
<tr>
<td>Total</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
<td>550</td>
</tr>
</tbody>
</table>

**Administration**

The investigator first contacted the school authorities and made necessary arrangements for the administration of the test. The investigator administered the test personally to the selected sample during the first and second week of October 1978 with the co-operation of school authorities. After explaining the purpose of the test and the method of answering, the questionnaires were distributed. Sufficient time was given to complete all the items. Then the questionnaires were collected back. Uniform procedures were adopted in all the schools selected. Some of
the questionnaires returned were incomplete ones. After eliminating the incomplete ones there were only 520 questionnaires found suitable for the study.

**Scoring**

Weightages were given to the three components of socio-economic status according to the method suggested by K.S. Pillai. The weightages to the different categories according to K.S. Pillai are given below:

**TABLE III  TABLE SHOWING THE WEIGHTAGES TO THE ITEMS IN THE SCALE**

<table>
<thead>
<tr>
<th>Education</th>
<th>wt.</th>
<th>Occupation</th>
<th>wt.</th>
<th>Income per month</th>
<th>wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master's degree, Professional degree and above</td>
<td>10</td>
<td>Professional</td>
<td>10</td>
<td>Above 1000</td>
<td>10</td>
</tr>
<tr>
<td>Bachelor's degree</td>
<td>8</td>
<td>Semi-Professional</td>
<td>8</td>
<td>751-1000</td>
<td>8</td>
</tr>
<tr>
<td>Pre-Degree/Pre-University</td>
<td>5</td>
<td>Skilled workers</td>
<td>7</td>
<td>501-750</td>
<td>6</td>
</tr>
<tr>
<td>S.S.L.C.</td>
<td>4</td>
<td>Semi-skilled workers</td>
<td>4</td>
<td>301-500</td>
<td>4</td>
</tr>
<tr>
<td>Upto Standard VII</td>
<td>2</td>
<td>Unskilled workers, labourers</td>
<td>2</td>
<td>101-300</td>
<td>2</td>
</tr>
<tr>
<td>Literate</td>
<td>1</td>
<td>Unemployed</td>
<td>0</td>
<td>100 and above</td>
<td>1</td>
</tr>
<tr>
<td>Illiterate</td>
<td>0</td>
<td></td>
<td></td>
<td>below</td>
<td></td>
</tr>
</tbody>
</table>

According to this method, if in a family the educational level, occupation or income of elder brother's or sisters is above that of either of the parents a weightage of one point in each case is given provided he/she is unmarried and if staying with the family even after marriage. A maximum score of 2 points in each case is also fixed so that the highest score possible would be 36. The scores of the three components were thus calculated and added to get a composite socio-economic status score of an individual.

Based on the socio-economic status scores obtained pupils were divided into three categories as shown below:

TABLE IV  CLASSIFICATION OF SOCIAL CLASS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upper class</td>
<td>above 25 points</td>
</tr>
<tr>
<td>2</td>
<td>Middle class</td>
<td>10-25</td>
</tr>
<tr>
<td>3</td>
<td>Lower class</td>
<td>Below 10</td>
</tr>
</tbody>
</table>

The socio-economic status scores obtained were tabulated and the number of pupils in each category was found out.
TABLE V

CLASSIFICATION OF PUPILS INTO VARIOUS CLASSES

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category</th>
<th>Number of Pupils</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upper class</td>
<td>98</td>
</tr>
<tr>
<td>2</td>
<td>Between 10-25</td>
<td>212</td>
</tr>
<tr>
<td>3</td>
<td>Below 10</td>
<td>210</td>
</tr>
</tbody>
</table>

(3) Attitude Scale for pupils

Sample

The attitude scale prepared for pupils was administered to the same sample to whom the pupils' questionnaires were administered.

Administration

The attitude scale prepared for pupils was administered along with the questionnaire for pupils. After explaining the purpose of the scale and the method of answering, the attitude scales were distributed to the pupils. Sufficient time was given to complete all the items. Here also the same procedure was followed in all the schools for the administration of the attitude scales. The investigator got back 544 attitude scales filled up. Of these a few could not be used, as they were not properly filled up. After eliminating such incomplete ones there were only 520 attitude scales suitable for the study.
Scoring

Scoring was done according to the method followed in the pilot test.

(4) **Attitude Scale for teachers**

**Sample**

Three hundred and forty two teachers working in secondary schools in Trivandrum District were selected by the stratified sampling procedure for the study. In view of the fact that differences in the attitude of teachers might be related to sex of teachers, locality and management of schools, it was decided to include in the sample teachers belonging to both sexes and teachers working in different types of schools. Since teachers working in Trivandrum District can adequately represent the teachers working in the secondary schools of Kerala, it was decided to select the sample from Trivandrum District. Details regarding the sample selected are given in Table VI.

**TABLE VI** SAMPLE SELECTED FOR THE ADMINISTRATION OF THE ATTITUDE SCALE FOR TEACHERS

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Rural</th>
<th>Urban</th>
<th>Govt.</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Teachers</td>
<td>168</td>
<td>174</td>
<td>169</td>
<td>173</td>
<td>174</td>
<td>168</td>
</tr>
<tr>
<td>Total</td>
<td>342</td>
<td>342</td>
<td>342</td>
<td>342</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Administration

The investigator personally visited some of the schools selected for the study met the teachers there and explained to them the purpose of the study. The need and importance of the study and the method of answering was made clear in the facing sheet of the attitude scale itself. Then the attitude scales were distributed to them in person. Some of the attitude scales were distributed to the teachers through friends. Altogether 342 copies of attitude scale were distributed among teachers. In spite of repeated visits and requests with reminders only 302 attitude scales were got back. Of these twenty could not be used as they were not properly filled up. Thus there were only 282 attitude scales suitable for the study.

Scoring

The attitude scales for teachers were scored according to the method followed in the pilot test.

(5) Attitude scale for parents

Sample

The sample selected for the administration of this attitude scale consists of 282 parents of secondary school pupils in Trivandrum District. Parents of pupils studying in government and private schools and parents living in urban and rural
areas were included in the sample selected. The details regarding the sample selected for the administration of the parents' attitude scale are given in Table VII.

TABLE VII  SAMPLE SELECTED FOR THE ADMINISTRATION OF THE PARENTS' ATTITUDE SCALE

<table>
<thead>
<tr>
<th></th>
<th>Rural</th>
<th>Urban</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of parents selected</td>
<td>143</td>
<td>139</td>
<td>138</td>
<td>144</td>
</tr>
<tr>
<td>Total</td>
<td>282</td>
<td>282</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Administration

Most of the parents' attitude scales were administered through the pupils to whom the other tools were administered. The investigator also personally met some of the parents and distributed the attitude scales. The investigator had to visit the schools a number of times to collect back all the filled up attitude scales. Even then, it was not possible to get back all the attitude scales duly filled up. The investigator was able to collect only 260 out of 282 attitude scales distributed. As 18 attitude scales were found incomplete only 242 were found suitable for the study.

Scoring

Scoring was done according to the method followed in the pilot test.
(6) **Interest Inventory**

**Sample**

The interest inventory was administered to the same pupils to whom the pupils' questionnaires were administered.

**Administration**

The pupils were properly motivated before the administration of the test. Then the method of answering the inventory was made clear to the pupils with the help of a sample item. After that, the interest inventories were distributed to the pupils. Answer sheets were also provided along with the inventory. They were directed not to mark in any part of the booklet but only on the answer sheet provided. Sufficient time was given so as to enable the students to complete all the items. The same procedure was followed in all the schools for the administration of the interest inventory. Some of the answer sheets obtained were incomplete ones. After eliminating such incomplete ones, there were only 510 answer sheets suitable for the study.

**Scoring**

It was decided to give a score 'one' to every item answered in favour of work experience and 'zero' for the other responses. Then the scores for the different items were totalled to get the total interest score of an individual.
Interview and observation

'Interview as research tool is in the sense an oral type of questionnaire or schedule whereby the subject supplies needed information in a face to face relationship.'

29

In addition to the above tools, interviews were also conducted to gather valid and reliable information. It was also used to supplement the data collected through the other sources. Interviews were conducted with work experience experts, heads of institutions, and the teachers and pupils involved in the programme.

Observation is considered as the most direct method of collecting data, since it attempts to derive the data directly rather than through the reports of the individuals involved. So the investigator visited some selected schools to see the work experience programme in action and to collect first hand information from there. The schools visited were Cotton Hill Girls High School, Trivandrum, S.M.V. High School, Trivandrum, Government High School, Aryanad, Girls High School, Manacaud, L.M.S. High School, Parassala and Government High School, Vellanad.

Measurement of Achievement

In the schools of Kerala, examinations are conducted at the end of every term. Thus there are three examinations

in a year. The students have to write six subjects in these examinations. For the purpose of this study the investigator visited the schools selected for the study and collected the marks of the three class examinations of the pupils to whom the tools were administered. Then for each subject the average mark obtained for the three class examinations was calculated and the total score of an individual for the six subjects was taken as the achievement score of that individual. These scores were then converted into 'T' scores using the formula,

\[ T = 50 + 10 \left( \frac{X - \bar{X}}{S} \right) \]

where \( T \) = a T score
\( X \) = the score of a given subject
\( \bar{X} \) = the arithmetic mean of the distribution
\( S \) = the standard deviation of the distribution of scores.

Reliability and Validity

'The two essential characteristics of a sound test are its reliability and validity'.\(^{31}\)

Reliability

In a word reliability means consistency. 'The reliability of a measure is commonly defined as the degree

---

31. Freeman, op.cit., p.66.
to which it measures consistently or accurately whatever it does measure. ³²

According to Anastasi, reliability refers to 'the consistency of scores obtained by the same individuals on different occasions or with different sets/equivalent items.' ³³

According to Remmers and Gage, 'reliability is the accuracy with which a test measures whatever it does measure.' ³⁴ A reliable test measures something accurately.

There are different methods for determining the reliability of measuring instruments. These are the test-retest method, the alternative or parallel form method, the split-half technique and the method of rational equivalence. But in this study the split half method is used to determine the reliability of the attitude scale and the interest inventory prepared.

**Reliability of the attitude scales**

A random sample of 100 answer papers selected from the pupils' attitude scale was used for studying the reliability of the pupils attitude scale. The scores obtained

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for the odd and even items in the attitude scale were calculated separately. Then the coefficient of correlation between the two sets of scores was calculated by using the formula,

\[ r = \frac{\frac{x' y'}{N} - \frac{C_x C_y}{\sigma_x \sigma_y}}{35} \]

where
- \( C_x \) = correction in units of interval for \( x \) variable
- \( C_y \) = correction in units of interval for \( y \) variable
- \( \sigma_x \) = Standard deviation of \( x \) variable
- \( \sigma_y \) = Standard deviation of \( y \) variable
- \( N \) = Sample size

After finding the reliability coefficient of half the test, the reliability coefficient of the whole test was computed by using the formula,

\[ r_{11} = \frac{2r + \frac{1}{2} \frac{1}{r_1}}{1 + \frac{1}{2} \frac{1}{r_1}} \]

where
- \( r_{11} \) = reliability coefficient of whole test
- \( r \frac{1}{2} \frac{1}{11} \) = reliability coefficient of half test

Similarly the reliability coefficient of the teacher's and parent's attitude scales were calculated and the results obtained are given in Table VIII.

36. Ibid., p.339.
TABLE VIII

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Attitude Scale</th>
<th>Reliability coefficient obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pupils' Attitude Scale</td>
<td>.92</td>
</tr>
<tr>
<td>2</td>
<td>Teacher's Attitude Scale</td>
<td>.90</td>
</tr>
<tr>
<td>3</td>
<td>Parents' Attitude Scale</td>
<td>.94</td>
</tr>
</tbody>
</table>

From the table it is clear that all the attitude scales prepared have high reliability.

Reliability of the interest inventory

A random sample of 100 papers was used for calculating the reliability coefficient of the interest inventory. The odd versus even technique corrected by the Spearman-Brown Prophecy formula was used for calculating the coefficient of reliability. The value obtained is .95. This shows that the interest inventory prepared has high reliability.

Validity

Validity implies truthfulness. It refers to the extent to which a test or other technique measures what it purports or intends to measure.
The 'validity of an evaluation device is the degree to which it measures what it is intended to measure.'\textsuperscript{37}

'The validity of a test may be defined as 'the accuracy with which it measures that which it is intended to measure, or as the degree to which it approaches infallibility in measuring what it purports to measure.'\textsuperscript{38}

According to Garrett 'the validity of a test, or of any measuring instrument, depends upon the fidelity with which it measures what it purports to measure.'\textsuperscript{39}

**Validity of Attitude scales**

Evidence regarding the validity of the Attitude scales prepared lies in the procedures adopted for developing the test. All the attitude scales were developed very carefully following the principles of attitude scale construction. Details regarding the preparation of the attitude scales are given earlier in this chapter.

The validity of the pupils attitude scale was also studied using teacher rating as the external criterion. Here maximum care was taken to get as reliable rating as possible from the teachers. The investigator requested

\textsuperscript{37} Remmers and Gage, \textit{op.cit.},p.122.


\textsuperscript{39} Garrett, \textit{op.cit.},p.354.
the teachers in one of the schools selected for the study, to observe their pupils closely to study their attitude towards the work experience programme and to rate the pupils on a five-point scale. (Very poor, below average, average, above average, very good). These ratings were then converted into scores and studied the relationship between the ratings given by the teachers and the attitude scores of the pupils using product moment method. The value of 'r' obtained is .86. This also reveals that the attitude scale has sufficient validity.

Validity of the interest inventory

The procedure adopted for collecting and selecting the items for the interest inventory provides ample evidence regarding the validity of the inventory prepared.

The validity of the interest inventory was also studied using teacher rating as the external criterion. Here care was taken to get the data as reliable as possible from the teachers. The teachers, in one of the schools selected, were asked to observe the pupils closely, to study their interest in work experience activities and to rate the pupils on a five point scale. The ratings given by the teachers were then converted into scores and then by the product moment method the relationship between the teacher ratings and the interest scores of the pupils was studied and the value of 'r' obtained is .81. This shows that the tool prepared has sufficient validity.
Statistical techniques used for analysis

The data collected were grouped into five sections:

They were:

I Analysis of the data collected through questionnaires administered to
   (A) heads of secondary schools,
   (B) pupils in secondary schools.

II Analysis of pupils' attitude scores

III Analysis of teachers' attitude scores

IV Analysis of parents' attitude scores

V Analysis of pupils' interest scores.

Simple statistical techniques were selected to analyse the data under each section. The techniques and formulae selected for computation under each section are given below:

I (A) Analysis of the data collected through questionnaires administered to heads of secondary schools

The percentages of the responses of the heads of schools were computed for the total sample. The difference between the percentages under different sub groups, namely (i) government and private schools (ii) rural and urban schools and (iii) male and female heads was tested for significance by finding out the critical ratio using the formula,
C.R. = \frac{(P_1 - P_2) - 0}{\sigma_{P_1 - P_2}} \quad (40)

where \(\sigma_{P_1 - P_2} = \sqrt{\frac{\sigma^2}{P_1} + \frac{\sigma^2}{P_2}}\)

where \(P = \frac{N_1 P_1 + N_2 P_2}{N_1 + N_2}\)

\(Q = 1 - P\)

\(N = \text{Size of the sample.}\)

To find out the relationship between the management of schools, locality of schools and sex of heads of schools the phi-coefficient was calculated using the formula,

\[\phi = \frac{B C - A D}{\sqrt{(A+B)(C+D)(B+D)(A+C)}}\] \quad (41)

where \(A, B, C\) and \(D\) represent frequencies in the four-fold table. The phi-coefficient was tested for significance by converting it into chi-square using the relationship,

\[x^2 = N \phi^2\] \quad (42)

and referring to TABLE E \quad (43)

For certain responses of heads of schools the rank was determined by finding out the average weightage.

\[\text{References:}\]

42. Garrett, op.cit., p.391.
43. Ibid., p.462.
I B Analysis of the data collected through questionnaires administered to pupils in secondary schools

The responses of pupils were analysed by computing the following statistical measure.

The responses of pupils were given numerical weightage wherever necessary and the ranks were determined by finding out the average weightage.

II Analysis of pupils' attitude scores

The pupils' attitude scores were analysed by calculating the undermentioned statistical measures.

(a) Arithmetic Mean

\[ AM = X_o + i \frac{\sum fx'}{N} \]  \hspace{1cm} (44)

where 
- \( X_o \) = Assumed arithmetic mean
- \( i \) = Size of the class interval
- \( N \) = Total number of observation
- \( f \) = frequency
- \( \sum \) = sum of
- \( x' \) = deviation (in terms of class interval) of the mid points from the assumed arithmetic mean.

\[ SE_m = \frac{\sigma}{\sqrt{N}} \]  \hspace{1cm} (45)

where \( \sigma \) = the standard deviation of the population
- \( N \) = Number of cases in the sample


45. Garrett, op.cit., p.185.
(b) **Median**

\[
\text{Mdn} = l + \left( \frac{N}{2} - F \right) \frac{i}{fm} \tag{46}
\]

where

- \( l \) = lower limit of the class interval upon which the median lies
- \( \frac{N}{2} \) = one half of the total number of scores
- \( F \) = sum of the scores on all intervals below \( l \)
- \( fm \) = frequency (number of scores)
- \( i \) = length of class interval

\[
\text{Mdn} = \frac{1.253 \sigma}{\sqrt{N}} \tag{47}
\]

where

- \( N \) = Sample size
- \( \sigma \) = standard deviation

(c) **Standard deviation**

\[
\text{SD} = i \sqrt{ \frac{\sum fx^2}{N} - \left( \frac{\sum fx'}{N} \right)^2 } \tag{48}
\]

where

- \( i \) = size of class interval
- \( x' \) = deviation from the origin of coded values
- \( N \) = Number of measurements
- \( f \) = frequency

\[
\text{SE} = \frac{.71 \sigma}{\sqrt{N}} \tag{49}
\]

where

- \( \sigma \) = standard deviation
- \( N \) = sample size

---

46. Ibid., p.32.
47. Ibid., p.195.
(d) **Skewness**

\[ Sk = 3 \left( \frac{\text{mean} - \text{median}}{\sigma} \right) \]  

(50)

The pupils were classified into the following sub-groups.

1. **Modal Age Group and Above and Below Modal Age Group**

   The modal ages of pupils in Standards VIII and IX are 13+ and 14+ respectively. The pupils under study were then classified into pupils in the Modal Age group and the Pupils Above and Below the Modal Age group. There are 331 pupils in the modal age group and 189 pupils in the above and below the modal age group.

2. **High Achievers and Low Achievers**

   This classification was done on the basis of the pupils' average class marks of the three class examinations. The achievement scores were grouped into a frequency table and the values of \( Q_1 \) and \( Q_3 \) were calculated. They were \( Q_1 = 23 \) and \( Q_3 = 47 \). Those who got marks above \( Q_3 \) were considered as high achievers and those who got marks below \( Q_1 \) were considered as low achievers. There are 123 high achievers and 128 low achievers in this study.

3. **High Socio-economic Status Group and Low Socio-economic Status Group**

   The basis for this classification was the socio-economic status (SES) scores given to the three main components such as parents' education, occupation and income.

---

(d) **Skewness**

\[ Sk = 3 \left( \frac{\text{mean} - \text{median}}{\sigma} \right) \quad (50) \]

The pupils were classified into the following sub-groups.

1. **Modal Age Group and Above and Below Modal Age Group**

The modal ages of pupils in Standards VIII and IX are 13+ and 14+ respectively. The pupils under study were then classified into pupils in the Modal Age group and the Pupils Above and Below the Modal Age group. There are 331 pupils in the modal age group and 189 pupils in the above and below the modal age group.

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This classification was done on the basis of the pupils' average class marks of the three class examinations. The achievement scores were grouped into a frequency table and the values of \( Q_1 \) and \( Q_3 \) were calculated. They were \( Q_1 = 23 \) and \( Q_3 = 47 \). Those who got marks above \( Q_3 \) were considered as high achievers and those who got marks below \( Q_1 \) were considered as low achievers. There are 123 high achievers and 128 low achievers in this study.

3. **High Socio-economic Status Group and Low Socio-economic Status Group**

The basis for this classification was the socio-economic status (SES) scores given to the three main components such as parents' education, occupation and income.

---

50. Ibid., p.100.
Pupils who got SES scores above 25 were classified under high SES group and those who got score below 10 were classified as pupils in the low SES group. There are 89 pupils in high SES group and 210 pupils in low SES group in this study.

(4) **Forward community and Backward community**

In Kerala it appears that there is cultural and attitudinal difference in people according to the communities to which they belong. Hence the classification of pupils into forward community and backward community. Since there are several communities in Kerala, the official list published by the government was used as document for the classification of pupils into these two categories of communities.

(5) Boys and girls
(6) Government and private school pupils
(7) Rural and urban school pupils
(8) Pupils in Standard VIII and Standard IX.

The attitude of pupils under the above eight subgroups was compared by testing the difference between the mean attitude scores for significance, by calculating the critical ratio using the formula,
C.R. = \frac{M_1 - M_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}} \quad (51)

where

\begin{align*}
M_1 &= \text{mean of the first sample} \\
M_2 &= \text{mean of the second sample} \\
S_1 &= \text{standard deviation of the first sample} \\
S_2 &= \text{standard deviation of the second sample} \\
N_1 &= \text{Number of cases in first sample} \\
N_2 &= \text{Number of cases in second sample}.
\end{align*}

III Analysis of Teachers' Attitude Scores

The teachers' attitude scores were analysed by calculating (i) Arithmetic mean (ii) Median (iii) Standard deviation and (iv) Skewness of the scores.

The attitude of teachers towards work experience under the following sub groups was compared by testing the difference between the mean scores for significance (i) Male and female teachers (ii) Government and private school teachers and (iii) Rural and urban school teachers.

IV Analysis of Parents' Attitude Scores

The parents' attitude scores were analysed by computing the statistical measures such as Arithmetic mean,

Median, Standard deviation and Skewness of the scores.

The attitude of parents towards work experience under the following sub groups was compared by testing their mean scores for significance (i) Male and female (ii) Rural and urban.

V Analysis of Pupils' Interest Scores

The pupils' interest scores under the following sub-group was compared by testing their mean interest scores for significance (i) Boys and girls (ii) Government and private school pupils (iii) rural and urban school pupils (iv) pupils in Standard VIII and Standard IX (v) High achievers and low achievers (vi) pupils belonging to high SES and low SES (vii) pupils belonging to forward community and backward community.