METHODOLOGY

Chapter III

METHODOLOGY

- Variables
- Tools
- Sample
- Data Collection Procedure
- Scoring and Consolidation
- Procedure for Analysis of Data
METHODOLOGY

This chapter details the design of the study under the following heads:

3.1. VARIABLES
3.2. METHODOLOGY

3.1. VARIABLES

The present study is an attempt to identify certain personal and environmental variables which correlate best with Scholastic Motivation of secondary school pupils. The study is designed with Scholastic Motivation as dependent variable and a group of select personal and environmental variables as independent variables.

The details relating to the selection of variables are presented below.

3.1.1. SELECTION OF VARIABLES

The variables which showed some degree of relationship with Scholastic Motivation were identified and scrutinized. The various studies conducted abroad and in India in the field of Motivation were reviewed by the investigator.

Even though studies on Student Motivation and other factors were conducted largely, the investigator could not locate adequate studies on the influence of Intelligence, Self-Concept, Classroom Climate, Parental Involvement and Socio-Economic Status on Scholastic Motivation independently and in combination. The selection of any variable as an independent variable was based on the assumption that the variable would be related to motivation of pupils and could be used as a possible predictor of Scholastic Motivation. A detailed review of literature helped to locate the
major variables which correlate best with Scholastic Motivation. All variables identified are achievement related variables. The identified variables were classified for purpose of clarity and description. The classification is presented below.

(i) Personality variables

These include non-cognitive or affective variables like attitudes, interest, n-achievement, anxiety, adjustment, neuroticism, self-concept, curiosity, aspiration, disequilibrium, emotional conflict, persistence, hope of success and fear of failure, emotional anticipation, need for self efficiency etc.

The role of all these variables has been reported in research studies as factors correlated with Scholastic Motivation.

(ii) Aptitudinal Variables

These include cognitive variables like intelligence, special abilities like numerical ability, spacial ability, critical thinking, verbal reasoning, retentive memory, comprehension and interpretation, cognitive style, creativity, apathy etc. All these cognitive variables has been reported in research studies as factors correlated with academic motivation.

(iii) Social-Familial and Other Environmental Variables

This refers to parental education, profession and income, previous educational and social experience, locale, facilities available at home, structuring of home environment, parent-teacher communication etc. Here also there is adequate evidence of the role of these variables in deciding one's academic motivation.
(iv) Type of School Programme

This covers variables like teaching strategies adopted, learning effectiveness, evaluation procedure adopted, physical climate of the classroom, class satisfaction, teacher characteristics, democracy, friction, source of popularity, learning climate, use of audiovisual materials, size of the class, individual attention given to students, co-curricular activities, classroom atmosphere, cohesiveness, task difficulty and kind of task, competitiveness, task orientation, innovation, creative stimulation, cognitive encouragement, teacher talk and permissiveness.

(v) Approaches to Learning and Study Habits

Variables like study habits, learning style, method of work, review, use of reference materials, self-diagnosis, examination participations, regularity in studies, learning strategy and time etc. all come under this category.

3.1.1.1. Criteria Used for Selection of the Variables

After identifying a broad spectrum of factors, the investigator made a careful selection of the variables to be included for the study. The choice of the variables was made on the basis of the following major considerations.

(i) The factors selected should be related to the student achievement

(ii) The factors selected should specifically fall in to personal, environmental and socio-familial categories.

(iii) Factors selected should be highly related to motivation as shown in related studies.

(iv) The selected variables should lend themselves to objective and group measurement.
Standardised tests should as far as possible be available for most of the variables or the variables selected should be such that tests could be developed within a reasonable time.

On the basis of the above criteria the following independent variables were chosen, as detailed below.

3.1.1.2. Independent variables

Personal, environmental and social variables have been introduced as the independent variables of the study. Details of the select variables are as follows.

(i) Intelligence
(ii) Self-Concept
(iii) Classroom Climate
(iv) Parental Involvement
(v) Socio-Economic Status

3.1.1.3. Dependent variable

'Scholastic Motivation' is the dependent variable of the study.

3.2. METHODOLOGY

The methodology of the study has been described under the following major heads.

3.2.1. TOOLS USED FOR MEASUREMENT
3.2.2. SAMPLE USED FOR THE STUDY
3.2.3. DATA COLLECTION PROCEDURE
3.2.4. SCORING AND CONSOLIDATION OF DATA
3.2.5. PROCEDURE FOR ANALYSIS OF DATA
3.2.1. TOOLS USED FOR MEASUREMENT

For the present study, the independent variables were measured using standardised tools readily available. The dependent variable Scholastic Motivation was measured by a scale constructed by the investigator in consultation with the experts.

The following tools were used for collecting the needed data.

(i) **Standard Progressive Matrices Test**

It is a non-verbal intelligence test developed by Raven (1958). It consists of 5 sets of series including 12 items in each sets.

(ii) **Scale of Self-Concept**

Scale of Self-Concept was used to measure the concept of pupils about themselves. It was developed by Sumangala and Sujatha (1994). This scale consists of forty items in the form of statements.

(iii) **Scale of Classroom Climate**

Scale of Classroom Climate was used to measure the classroom climate of Secondary School Pupils. It was constructed and standardised by Usha and Sunitha (1997).

(iv) **Parental Involvement Inventory**

The Parental Involvement Inventory was used to measure the extent and nature of parental involvement in the overall development of the child. This test was developed and standardised by Usha and Kuruvilla (1999).
(v) General Data Sheet

The items in the General data sheet helped to collect information regarding the educational, occupational and income level of both father and mother and the total socio-economic status.

(vi) Scale of Scholastic Motivation

For the assessment of Scholastic Motivation, a scale was developed by the investigator. This multidimensional scale is modelled after the Cassidy and Lynn Achievement Motivation Questionnaire (1989).

Description of The Tools

A brief description of the various tools used for measuring the needed data for the study is presented in the following text.

3.2.1.1. Standard Progressive Matrices Test (1958)

Intelligence of the subjects was measured by administering the standard form of the Raven's Progressive Matrices Test. This is a non-verbal test and is intended to evaluate a person's ability to discern and utilise a logical relationship presented by non-verbal materials.

This test is made up of 5 sets or series, of diagrammatic puzzles exhibiting serial changes in two dimensions simultaneously. Each puzzle has a part missing, which the person taking the test has to find among the options provided.

The test consists of 60 problems divided into five sets (A, B, C, D and E) each made up of 12 problems. In each set the first problem is as nearly as possible self evident. The problems which follow were progressively more difficult.
The five sets provide five opportunities to grasp the method of thought required to solve the problems and five progressive assessments of a person's capacity for intellectual activity.

The first set, set A include rather simple problems. The correct answer figure can be selected from the six alternatives and the selected one will fit into the pattern, thus giving it a definite shape.

The answer figures to the problems in set 'B' are somewhat identical to the elements given in the pattern. In some problems the answer figure can also be derived as the mirror image of the element which is printed at the top position.

Set 'C' is designed to provide a reliable estimate of a person's capacity to think clearly when allowed to work steadily at his or her own speed.

In set 'D', to solve the problems in this section a high level of reasoning power is required. The items in this set distinguishes the immature person from the person of normal, or more than normal, intellectual ability. The test item follow a particular order and twisting to get the desired answer figure.

In set 'E' eight alternatives are given for each problem. All subjects, are given exactly the same series of problems in the same order and asked to work at their own speed, without interruption, from the beginning to the end of the test.

This test is standardised one and its validity and reliability have been established. The reliability coefficients as reported by Raven vary from the low 0.80 to the low 0.90. In a study conducted in Kerala by Nair; the reliability co-efficient was found to vary from 0.79 to 0.86 (by split-half method) and from 0.84 to 0.91 by test-retest method.
Validity of the test has studied in a variety of the usual ways. When Standford-Binet test was used as the criterion, correlation varied from 0.50 to 0.86. Most of the coefficients of the correlation with these two widely used criterion were 0.60 and 0.70.

Response sheet and the scoring key of the Standard Progressive Matrices are appended as Appendix IA and IB respectively.

3.2.1.2. Scale of Self-Concept

This tool is constructed and standardised by Sumangala and Sujatha (1994). This is in the form of a five point Likert Type Attitude Scale with 40 statements (23 positive and 17 negative).

The scale consists of six constructs of self-concept viz., Personal Self, Social Self, Family Self, Physical Self, Academic Self and Moral-Ethical Self. Each construct is described below for its details.

(i) **Personal Self**: Personal self refers to the person's construct/concept of himself with his own abilities and deficiencies and how he thinks others may look upon him. The experiences with others in the environment may provide a picture of himself as a person.

(ii) **Social Self**: Perception of an individual in relation to others and the role one maintains in the societal relations come under this category. It determines whether the person is social or not. The cumulative consequences of social learning are internalised in the self image and laid down in layers leading to the formulation of a particular personality.

(iii) **Family Self**: An important factor that contributes to self image is the personal interactions that take place in the family. The growing child unknowingly emulates the attitudes and behaviour of those few people
who are emotionally essential to him. If their words and behaviours teach him that he is competent and worthy it forms the centre core of his self image leading to the formulation of a healthy self concept. If he grows among criticism and rejection or if he cannot live up to the expectations of his parents he has little opportunity to develop a positive concept of himself.

(iv) Physical Self: Physical Self is an essential factor in the creation of self image. It refers to one's own body image. The child who has physical handicaps such as impaired vision or hearing or speech impediments under-estimate himself and develop feelings of inferiority and unworthiness.

(v) Academic Self: The child who can achieve academic success in school or who has qualities that make him acceptable to his peers develop a healthy self-concept strengthening his ego. Academic Self is the concept one has about his academic performance. A child who encounters failures and frustrations in school is unhappy and develops complexes leading to a negative self-concept.

(vi) Moral-Ethical Self: Moral-Ethical Self refers to the values, accomplishments and behaviours of others which the child has incorporated in his self. It differs from person to person. Each child gets his own version of values from the people whom he encounter with may be other children, teachers, heroes, fictional figures and athletes. These values are absorbed into his self system.

Scoring

A subject has to respond to each statement by choosing any one of the five alternatives, 'Very much like this', 'Like this', 'Uncertain', 'Not like this', 'Not at all like this'.

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For positive statements, the scoring scheme is 5, 4, 3, 2 and 1 for responses like 'Very much like this', 'Like this'; 'Uncertain'; 'Not like this'; and 'Not at all like this' respectively. The scoring is in the reverse order for negative statements.

Reliability and validity

The Reliability of the scale is 0.894 and Validity is 0.540 which shows the scale is highly reliable.

The Scale of Self-Concept (Malayalam version) and the response sheet are appended as Appendix IIA and IIB respectively.

3.2.1.3. Scale of Classroom Climate

Scale of Classroom Climate is used to measure the classroom climate of secondary school pupils. It was constructed and standardised by Usha and Sunitha (1997).

The scale consists of eight elements, viz., Physical climate, Class satisfaction, Positive teacher characteristics, Negative teacher characteristics, Democracy, Friction, Source of popularity and Learning climate.

(i) Physical Climate: It is the availability of adequate books, equipments, space and lighting.

(ii) Class Satisfaction: It is the extent of enjoyment of the class.

(iii) Positive teacher characteristics: Characteristics of teacher that are good for teaching-learning situation such as teacher involvement and teacher support are positive teacher characteristics.

(iv) Negative teacher characteristics: Characteristics of teacher that have negative influence upon the students, and in teaching learning situations.
(v) **Democracy:** It is the extent to which students share equality in decision making related to the class.

(vi) **Friction:** It is the amount of tension and quarrelling among students in the class.

(vii) **Source of popularity:** Extent to which the individual become popular among his class members. Popular students are better adjusted emotionally and have higher self-concept. They are general, outgoing, honest, fair, loyal and sincere.

(viii) **Learning climate:** It is the psychological and interpersonal atmosphere that exists in a classroom or, other educational setting, primarily influenced by teachers attitude and behaviour.

**Scoring**

The subject are required to rate each statement on a three-point scale corresponding to the answer, 'Agree'; 'Uncertain'; and 'Disagree' for statements 1 to 20 and 'Always'; 'Some times'; and 'Never' for statements 21 to 58. The scale consists of 58 items; both positive and negative with instructions to respond. The scoring is 3,2,1 for positive items and 1,2,3 for negative items. The validity of the scale is 0.789. The reliability value of test-retest is 0.901.

Scale of Classroom Climate (Malayalam Version) and the response sheet are appended as Appendix IIIA and IIIB respectively.

### 3.2.1.4. Parental Involvement Inventory

The Parental Involvement Inventory was developed and standardised by Usha and Kuruvilla (1999). This inventory is intended to assess the extent and nature of Parental Involvement in the overall development of the child.
This multidimensional inventory consists of ten components, viz., Emotional Support, Discipline, Health Care, Structuring Home Environment, Communication, Encouragement, Recreation, Expectations and Aspirations, Dealing Friends and Participation in School Activities.

(i) **Emotional Support**: It is the behaviour of parents towards the child that makes him feel comfortable and confirms in his mind that he is basically accepted and approved as a person.

(ii) **Discipline**: It denotes the parental behaviour involved in directing and guiding the behaviour of the child.

(iii) **Health care**: It denotes the extent to which parents are concerned with the health and physical well being of the child.

(iv) **Structuring Home Environment**: It denotes the parental behaviours associated with providing material and non-material learning facilities, a happy home environment, home tutoring, planning of family activities, assignment of responsibilities in the family etc.

(v) **Communication**: It denotes the parental behaviour of ensuring mutual interaction with the child.

(vi) **Encouragement**: It denotes the way parents motivate the child in an activity by way of providing verbal, non-verbal material or immaterial rewards.

(vii) **Recreation**: It denotes the parental activities of sharing their leisure time with children and having fun with them by way of engaging in any intellectual or non intellectual pleasurable activities.
(viii) **Expectations and Aspirations:** This denotes the ambitions and wishes that parents keep on about the future of their child especially with regard to his educational attainment and career prospects.

(ix) **Dealing Friends:** This denotes the parental behaviours associated with awareness about friendships of their children, the guidance parents provide in choice of friends, the way parents accept the child's friends and interact with them etc.

(x) **Participation in School Activities:** This stands for the extent to which parents take part in children's schooling by way of contacting teachers, participating in school activities like PTA, school days and supporting school by way of material, physical, intellectual or moral support.

**Scoring**

The inventory consists of 54 items of which 43 are positive and 11 are negative. Respondents have to mark any one of three alternatives, 'Often'; 'Sometimes'; or 'Rarely'. Parental Involvement Inventory measures both paternal involvement and maternal involvement, since the same items are used to assess both paternal and maternal involvements.

The scoring is 3-2-1 for the positive items and 1-2-3 for the negative items. The coefficient of validity was found to be 0.754 (N=50) and the reliability co-efficient was found to be 0.823.

The Parental Involvement Inventory (Malayalam version) and the response sheet are appended as Appendix IVA and IVB respectively.
3.2.1.5. General Data Sheet

General Data Sheet is divided into two sections. The first section elicits the general information about the subject regarding name of pupil, sex, age, caste and religion, number of elder siblings, number of younger siblings, locality of the school and name of the school. The second section is used to elicit information regarding level of education, occupation and income of parents.

The information collected through the first section of the General Data Sheet facilitated in classifying students - sex wise, rural/urban wise, type of management wise. The information gathered from the second section of the General Data Sheet was used to measure the educational level, occupational level and income level of father and mother. Mean of these two information was used to measure the Socio-economic status of the pupils.

Scoring Procedure

In deciding the Socio-Economic Status, the scoring procedure conventionally used by the previous researchers were used. The scoring scheme suggested for income was revised to catch up with the rising cost of living as income increases.

The General Data Sheet used in the present study measures three dimensions of socio-economic status viz., education, occupation, and income level of the family. Each variable in the scale has been divided into categories on the basis of the discussions held with the experts in the field and suggestions given by them. The details regarding the categories and the respective weightages are presented in Table below.
TABLE 3.1

Scoring Scheme of the General Data Sheet

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother's education level/Father's</td>
<td>1. Illiterate</td>
<td>5</td>
</tr>
<tr>
<td>educational level</td>
<td>2. Primary education</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3. Upper Primary Education</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>4. High School Education</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>5. Intermediate/TTC/PDC/etc</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>6. B.A/B.Com/B.Sc/Enng. Diploma etc.</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>7. M.A/M.Sc/M.Com/M.B.B.S./Enng. Degree, etc</td>
<td>35</td>
</tr>
<tr>
<td>Mother's Occupational level/Father's</td>
<td>1. Unemployed</td>
<td>5</td>
</tr>
<tr>
<td>Occupational level</td>
<td>2. Unskilled</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3. Semi skilled</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>4. Skilled</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>5. Semi-Professional</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>6. High-Professional</td>
<td>30</td>
</tr>
<tr>
<td>Mother's income level/Father's</td>
<td>1. Below Rs.1000</td>
<td>5</td>
</tr>
<tr>
<td>income level</td>
<td>2. Between Rs.1001/- to Rs.2000/-</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3. Between Rs.2001/- to Rs.3000/-</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>4. Between Rs.3001/- to 4000/-</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>5. Between Rs.4001/- to 5000/-</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>6. Above Rs.5000/-</td>
<td>30</td>
</tr>
</tbody>
</table>

The procedure of quantifying parental occupation level is described below.

**Parental Occupation level:** This has been classified into six categories. These are as follows.

(i) **Unemployed:** Those who have no work at all. The weightage assigned to this category is five.

(ii) **Unskilled:** Coolies, Ordinary labourers, Watchman, Peon, etc., from unskilled labourers. 10 points is assigned to this group.
(iii) **Semi-skilled:** Farmers, Small scale merchants, Library attenders, Police constables etc., belong to this category and they are assigned 15 points.

(iv) **Skilled:** Mechanics, Fitters, Electricians, Drivers, Photographers, Laboratory assistants, Carpenters, Document writers, Vakil clerks, Head constables, Village officers, and the like fall under this category and they are assigned 20 points.

(v) **Semi-Professional:** Chemists, Druggists, Qualified nurses, Teachers, Managers, Superintendent of offices, Minor businessmen, Contractors, Small land lords, Sub inspector of police, Sub registrars, Assistant educational officers, Block development officers, Officers of sub-district level, Public health workers etc. fall under this category and they are assigned 25 points.

(vi) **High-Professionals:** Ministers, Judges, Bank executives and officials, Doctors, Engineers, Lawyers, University teachers, Heads of research organisations, Heads of government departments, Secretaries of government, Big landlords, Business executives, etc., belong to this category and a 30 point score is allotted to this category.

Average of summated score for educational, occupational and income level of both the parents was taken as the score for socio-economic status of an individual. Summated score for mother's educational, occupational and income level, were taken for pupils whose father is either dead or has left the family. Summated score for father's educational, occupational and income level, were taken for pupils whose mother is either dead or has left the family.

The General Data Sheet (English version) is appended as Appendix V.
3.2.1.6. Scale of Scholastic Motivation

For the assessment of Scholastic Motivation, a scale was developed by the investigator. This is a multi-dimensional scale modelled after the Cassidy and Lynn Achievement Motivation Questionnaire (1989), which consists of seven factors namely Work ethic, Acquisitiveness, Dominance, Excellence, competitiveness, Status aspiration and Mastery. Some famous tests were also consulted. This include the Scale of Achievement Motivation of Pillai and Salimkumar (1993) and the Scale of Academic Motivation by Sasidharan (1993). Opinions from experts, researchers and the review of available literature also provided directions in the development of the scale.

Identification of Salient Dimensions

The first step in the development of Scale of Scholastic Motivation was the identification of a tentative list of the dimensions of Scholastic Motivation. As Scholastic Motivation is a global concept, several dimensions are inherent in it: Work ethic, Need for excellence, Self-esteem, Goal Orientation, Need for Mastery, Self-concept, Dominance, Social Concern, Competitiveness, Self-actualisation, Perseverance and Aspiration. Considering all these dimensions, 90 items were generated for the initial draft. These items were presented to subject experts and language experts for critical scrutiny. Some items were deleted, some were edited and modified. Hence a pool of 82 items (64 positive items and 18 negative items) are selected.

Construction of the Scale of Scholastic Motivation

In writing items particular attention was paid to ensure that each item is measuring only the dimensions represented by it. The items were subjected to expert scrutiny. Items which were ambiguous or double barrelled
were eliminated and from the dimensions selected, items were prepared and arranged.

Details of dimensions and an illustrative item from each dimension are given below.

(i) **Work ethic**: It incorporate the desire to study hard and is based on the reinforcement in the performance itself. As a motivational attribute it influences attitudes, values and behaviour.

e.g.: I like to avoid those lessons which I find difficult to study

(ii) **Need for excellence**: It is defined as competition with a standard of excellence. It is the reward obtained by making the best performance in studies.

e.g.: I prefer learning the difficult portions to the easy ones.

(iii) **Self-esteem**: If one's learning history is characterised by enjoyment, involvement and success his/her self-esteem tends to be high. A motivated student will be confident in his ability and will have positive feelings associated with one self.

e.g.: I feel that getting high marks is not a problem for me because I can concentrate well in my studies.

(iv) **Goal Orientation**: This factor consists of the ability to plan one's own goals and course of action. Goals should be clear precise and realistically high. Final goals may be divided into several flexible sub goals. Setting proper goals and striving for their attainment are central to the concept of scholastic motivation.

e.g.: I concentrate on my studies to achieve the top position in my class.
(v) **Need for Mastery**: It is the satisfaction obtained when succeeding in the study of difficult matters.

e.g.: I find pleasure in answering standard questions.

(vi) **Self-concept**: It consists of all the attitudes, abilities and assumptions that individual holds concerning himself or herself that act as a guide for behaviour.

e.g.: Even if an exam is conducted without any prior intimation, I can do well.

(vii) **Dominance**: It include the desire to lead or to take initiative or to become a dominant member of the group.

e.g.: I like to give direction in studies to my classmates and get things going accordingly.

(viii) **Competitiveness**: It is the satisfaction obtained while competing with others.

e.g.: Tough competition in learning inspires me.

(ix) **Self-actualisation**: It means to fulfil one's individual nature in all its aspects, being what one can do.

e.g.: Usually I get the marks that I expect.

(x) **Social Concern**: It includes respect for authority, influence of peer group, acceptance and respect, social responsibilities, recognition, common interest and goals, friendship, affiliation, interest in social problems etc.

e.g.: I believe that the standard of learning can be improved through peer learning activities.
(xii) **Perseverance:** Those who are high in perseverance will continue to work even though the conditions are not that positive, and even after receiving feedback of failure.

e.g.: I would spend more time in studying difficult lessons.

(xii) **Aspiration:** Scholastic motivation is linked with the quality of aspiration a student holds. If one's motivation is high, his/her aspiration tend to be realistically high and attainable.

e.g.: It is the internal inspiration for success that compels me to study.

From each dimension, items were selected and arranged. The draft scale thus consisted of 80 items of which 60 were positive and 20 were negative items. Respondents have to mark any one of the three alternatives, 'Always'; 'Sometimes'; and 'Never'.

The scoring is 3-2-1 for the positive items and 1-2-3 for the negative items. The draft scale in Malayalam is presented as Appendix VIA.

**Standardisation of the Scale**

The draft scale was administered on a sample of 400 students of standard IX randomly selected from ten schools of Malappuram and Kozhikode districts for field testing. Time taken to finish the test was noted. An average of 60 minutes was required to finish the test completely.

**Item Analysis**

Item analysis was done using the method suggested by Edwards (1969). The answer sheets of 400 students were scored. Incomplete answer sheets were rejected. 385 answer sheets were obtained for analysis. Fifteen answer sheets were randomly rejected so as to reduce the number to 370
which would facilitate computational procedures. The answer sheets were arranged in the descending order of scores so as to select the top and bottom 100 subjects (27 percent of the sample) who represented the high and low scholastic motivation groups respectively. Under each group, for each item, the number of subjects making response to 'Always', 'Sometimes' and 'Never' were found out and presented in the form of a frequency table.

Item analysis was done by finding out the t-value for each item. This was done by using the following formula.

\[
t = \frac{\bar{X}_{hi} - \bar{X}_{li}}{\sqrt{\frac{\sum (X_{hi} - \bar{X}_{hi})^2 + \sum (X_{li} - \bar{X}_{li})^2}{N(N-1)}}}
\]

In which \(\bar{X}_{hi}\) is the mean response score of a given statement for the high scholastic motivation group; \(\bar{X}_{li}\) is the mean response score on the same statement for the low scholastic motivation group and 'N' the number of subjects in high or low groups.

The t-values of the items of the draft scale of Scholastic Motivation are presented in Table 3.2.
### TABLE 3.2

Item analysis Details of Draft Scale of Scholastic Motivation

<table>
<thead>
<tr>
<th>Item No.</th>
<th>t-value</th>
<th>Item No.</th>
<th>t-value</th>
<th>Item No.</th>
<th>t-value</th>
<th>Item No.</th>
<th>t-value</th>
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<tr>
<td>1</td>
<td>2.68</td>
<td>21</td>
<td>1.25</td>
<td>41</td>
<td>*5.83</td>
<td>61</td>
<td>*9.91</td>
</tr>
<tr>
<td>2</td>
<td>*5.72</td>
<td>22</td>
<td>*7.37</td>
<td>42</td>
<td>0.17</td>
<td>62</td>
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</tr>
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<td>3</td>
<td>4.27</td>
<td>23</td>
<td>-0.09</td>
<td>43</td>
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<td>63</td>
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</tr>
<tr>
<td>4</td>
<td>*5.99</td>
<td>24</td>
<td>*5.27</td>
<td>44</td>
<td>*7.22</td>
<td>64</td>
<td>*8.58</td>
</tr>
<tr>
<td>5</td>
<td>*6.80</td>
<td>25</td>
<td>-0.95</td>
<td>45</td>
<td>*8.17</td>
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<td>-0.84</td>
</tr>
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<td>6</td>
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<td>3.38</td>
<td>46</td>
<td>1.63</td>
<td>66</td>
<td>*9.88</td>
</tr>
<tr>
<td>7</td>
<td>*5.36</td>
<td>27</td>
<td>*7.45</td>
<td>47</td>
<td>*7.01</td>
<td>67</td>
<td>4.15</td>
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<tr>
<td>8</td>
<td>*5.30</td>
<td>28</td>
<td>0.17</td>
<td>48</td>
<td>3.91</td>
<td>68</td>
<td>*8.04</td>
</tr>
<tr>
<td>9</td>
<td>3.17</td>
<td>29</td>
<td>*6.71</td>
<td>49</td>
<td>*6.21</td>
<td>69</td>
<td>*5.63</td>
</tr>
<tr>
<td>10</td>
<td>*6.90</td>
<td>30</td>
<td>*9.97</td>
<td>50</td>
<td>*6.87</td>
<td>70</td>
<td>4.49</td>
</tr>
<tr>
<td>11</td>
<td>*4.73</td>
<td>31</td>
<td>*9.27</td>
<td>51</td>
<td>3.39</td>
<td>71</td>
<td>1.20</td>
</tr>
<tr>
<td>12</td>
<td>*4.99</td>
<td>32</td>
<td>*7.61</td>
<td>52</td>
<td>*5.61</td>
<td>72</td>
<td>*6.33</td>
</tr>
<tr>
<td>13</td>
<td>*5.32</td>
<td>33</td>
<td>4.26</td>
<td>53</td>
<td>3.45</td>
<td>73</td>
<td>*6.36</td>
</tr>
<tr>
<td>14</td>
<td>*6.15</td>
<td>34</td>
<td>*6.48</td>
<td>54</td>
<td>3.65</td>
<td>74</td>
<td>*7.97</td>
</tr>
<tr>
<td>15</td>
<td>*7.97</td>
<td>35</td>
<td>3.02</td>
<td>55</td>
<td>*4.55</td>
<td>75</td>
<td>3.88</td>
</tr>
<tr>
<td>16</td>
<td>*7.35</td>
<td>36</td>
<td>*8.14</td>
<td>56</td>
<td>*4.50</td>
<td>76</td>
<td>2.48</td>
</tr>
<tr>
<td>17</td>
<td>*5.41</td>
<td>37</td>
<td>*4.92</td>
<td>57</td>
<td>4.48</td>
<td>77</td>
<td>*10.71</td>
</tr>
<tr>
<td>18</td>
<td>*7.30</td>
<td>38</td>
<td>*6.77</td>
<td>58</td>
<td>*4.79</td>
<td>78</td>
<td>*4.92</td>
</tr>
<tr>
<td>20</td>
<td>*5.26</td>
<td>40</td>
<td>1.62</td>
<td>60</td>
<td>1.90</td>
<td>80</td>
<td>4.10</td>
</tr>
</tbody>
</table>

*Items selected for final scale.

The investigator has planned to develop a fifty statement scale as the final tool. So the items were arranged in the decreasing order of the t-value and fifty items with high t-value were selected in the final scale. Thus the final scale consisted of 39 positive and 11 negative items.
Validity and Reliability

The construct validity of the scale was established by correlating scores of this scale with those of an available standardised tool, "Scale of Achievement Motivation" (Pillai & Salimkumar, 1993). The coefficient of validity was found to be 0.705 (N = 30).

The test-retest reliability of the scale was found to be 0.783.

The indices of validity and reliability coefficients show that the scale is a reasonably valid and reliable tool for assessing the scholastic motivation of secondary school pupils.

The Scale of Scholastic Motivation (Final) in Malayalam, its English version and the response sheet are presented as Appendix VIB, VIC and VID respectively.

3.2.2. SAMPLE USED FOR THE STUDY

The important aspects of the sample selection for the study are given below.

3.2.2.1. Population of the Study

Students of Secondary Schools of Kerala are the target population for the present investigation.

3.2.2.2. Size of the Sample

Regarding the size of the sample Krech and Crutch field (1968) pointed out that a sample of 500 would yield reasonably good results which would keep the error less than five percent. But in order to get sufficient number of cases for the subgroups for the different types of analysis, the sample size was fixed as 1000.
3.2.2.3. Sampling Technique

Stratified random sampling technique which has been widely recommended by Indian social science researchers was used for the selection of sample for the present study. This technique is applicable when the population is composed of subgroups or strata of different size, so that a representative sample must contain individuals drawn from each category or stratum in accordance with the size of the group. Stratification helps to avoid bias and ensures greater representation.

3.2.2.4. Rationale for the various strata considered

The most representative of the secondary school pupils could be obtained by considering the following aspects:

i) Sex of pupils
ii) Rural/Urban Schools
iii) Type of Management (Private/Government Schools).

The above mentioned aspects were considered to ensure adequate representation for the different strata. The decision regarding the proportionate representation for categories was made based on the statistics published by Director of Public Instruction, Government of Kerala. For classifying the schools, the estimated ratios (roughly taken) were as follows:

<table>
<thead>
<tr>
<th>Boys</th>
<th>Girls</th>
<th>Rural</th>
<th>Urban</th>
<th>Government</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1:1</td>
<td></td>
<td>2:1</td>
<td>2:3</td>
<td></td>
</tr>
</tbody>
</table>

Based on the ratio fixed as above, the tentative break-up of the sample was roughly estimated as shown below:
Boys - 500  Girls - 500
Rural - 670  Urban - 330
Government School - 400  Private Aided School - 600

The literacy rate of the state of Kerala is very high and the number of school going children in different parts of the state are almost same. Considering these aspects and for the economy of time and effort, for the collection of data, Kannur, Kozhikode, Malappuram, Palakkad and Thrissur districts were selected for the study. Assuming that the strength of pupils in standard IX will be approximately between 40 and 50, it was decided to select one class division of standard IX from each school. Therefore, it was decided to select twenty five schools for the collection of needed data.
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Schools</th>
<th>Type of School</th>
<th>No. of Boys</th>
<th>No. of Girls</th>
<th>Total No. of students</th>
<th>District</th>
<th>Location</th>
<th>Type of Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Govt. Brannan HSS, Thalssery</td>
<td>Mixed</td>
<td>30</td>
<td>8</td>
<td>38</td>
<td>Kannur</td>
<td>Urban</td>
<td>Govt.</td>
</tr>
<tr>
<td>2.</td>
<td>Govt. HSS. Vadakkumpad</td>
<td>Mixed</td>
<td>11</td>
<td>20</td>
<td>31</td>
<td>Kannur</td>
<td>Rural</td>
<td>Govt.</td>
</tr>
<tr>
<td>3.</td>
<td>Onian High School, Kotiyeri</td>
<td>Mixed</td>
<td>13</td>
<td>18</td>
<td>31</td>
<td>Kannur</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td>4.</td>
<td>VPO High School, Chokli</td>
<td>Mixed</td>
<td>15</td>
<td>17</td>
<td>32</td>
<td>Kannur</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td>5.</td>
<td>Govt. H.S. Azchavattam</td>
<td>Mixed</td>
<td>17</td>
<td>22</td>
<td>39</td>
<td>Kozhikode</td>
<td>Urban</td>
<td>Govt.</td>
</tr>
<tr>
<td>6.</td>
<td>MMVHSS, Kozhikode</td>
<td>Boys</td>
<td>50</td>
<td>-</td>
<td>50</td>
<td>Kozhikode</td>
<td>Urban</td>
<td>Private</td>
</tr>
<tr>
<td>7.</td>
<td>SRK Mission HSS, Kozhikode</td>
<td>Mixed</td>
<td>22</td>
<td>28</td>
<td>50</td>
<td>Kozhikode</td>
<td>Urban</td>
<td>Private</td>
</tr>
<tr>
<td>8.</td>
<td>Govt. GVHSS, Feroke</td>
<td>Mixed</td>
<td>17</td>
<td>24</td>
<td>41</td>
<td>Kozhikode</td>
<td>Rural</td>
<td>Govt.</td>
</tr>
<tr>
<td>9.</td>
<td>Govt. VHSS, Cheruvannur</td>
<td>Mixed</td>
<td>11</td>
<td>20</td>
<td>31</td>
<td>Kozhikode</td>
<td>Rural</td>
<td>Govt.</td>
</tr>
<tr>
<td>10.</td>
<td>SPB High School, Ramanattukara</td>
<td>Mixed</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>Kozhikode</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td>11.</td>
<td>Farooq High School, Feroke</td>
<td>Mixed</td>
<td>-</td>
<td>47</td>
<td>47</td>
<td>Kozhikode</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td>12.</td>
<td>Govt. VHSS, Tirur</td>
<td>Girls</td>
<td>-</td>
<td>42</td>
<td>42</td>
<td>Malappuram</td>
<td>Urban</td>
<td>Govt.</td>
</tr>
<tr>
<td>13.</td>
<td>MSP HSS, Malappuram</td>
<td>Mixed</td>
<td>22</td>
<td>12</td>
<td>34</td>
<td>Malappuram</td>
<td>Urban</td>
<td>Private</td>
</tr>
<tr>
<td>14.</td>
<td>Govt. VHSS, Paravanna</td>
<td>Mixed</td>
<td>18</td>
<td>27</td>
<td>45</td>
<td>Malappuram</td>
<td>Rural</td>
<td>Govt.</td>
</tr>
<tr>
<td>15.</td>
<td>Govt. HS Athavanad</td>
<td>Mixed</td>
<td>12</td>
<td>29</td>
<td>41</td>
<td>Malappuram</td>
<td>Rural</td>
<td>Govt.</td>
</tr>
<tr>
<td>16.</td>
<td>PKMM HSS, Edarikkode</td>
<td>Mixed</td>
<td>17</td>
<td>21</td>
<td>38</td>
<td>Malappuram</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td>17.</td>
<td>SMM HSS, Rayirikatramalam, Tanur</td>
<td>Mixed</td>
<td>21</td>
<td>19</td>
<td>40</td>
<td>Malappuram</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td>18.</td>
<td>CBHSS, Vallykunnu</td>
<td>Mixed</td>
<td>24</td>
<td>14</td>
<td>38</td>
<td>Malappuram</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td>19.</td>
<td>Govt. HSS Chathannur</td>
<td>Mixed</td>
<td>18</td>
<td>22</td>
<td>40</td>
<td>Palakkad</td>
<td>Rural</td>
<td>Govt.</td>
</tr>
<tr>
<td>20.</td>
<td>THS, Thrithala</td>
<td>Mixed</td>
<td>18</td>
<td>19</td>
<td>37</td>
<td>Palakkad</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td>21.</td>
<td>Peringode High School, Peringode</td>
<td>Mixed</td>
<td>22</td>
<td>14</td>
<td>36</td>
<td>Palakkad</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td>22.</td>
<td>MJD High School, Kunnamkulam</td>
<td>Mixed</td>
<td>20</td>
<td>18</td>
<td>38</td>
<td>Trissur</td>
<td>Urban</td>
<td>Private</td>
</tr>
<tr>
<td>23.</td>
<td>Govt. HSS, Erumappetty</td>
<td>Mixed</td>
<td>22</td>
<td>18</td>
<td>40</td>
<td>Trissur</td>
<td>Rural</td>
<td>Govt.</td>
</tr>
<tr>
<td>24.</td>
<td>TMV HSS, Perumpavu</td>
<td>Mixed</td>
<td>18</td>
<td>22</td>
<td>40</td>
<td>Trissur</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td>25.</td>
<td>SSM VHSS, Edakazhiyum</td>
<td>Mixed</td>
<td>19</td>
<td>20</td>
<td>39</td>
<td>Trissur</td>
<td>Rural</td>
<td>Private</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>457</strong></td>
<td><strong>521</strong></td>
<td><strong>978</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Final Testing

The investigator prepared the test booklets and answer sheets in the final form. For the present study 6 tests had to be administered in all.

3.2.3. DATA COLLECTION PROCEDURE

The programme for testing was arranged after visiting the selected schools. The investigator met the heads of the schools and the class teachers and had discussion with them and a schedule was fixed for testing. Two consecutive days were fixed for each school. A large sized classroom was specially arranged so that the pupils can take the tests conveniently. In the case of mixed schools (co-educational school), mixed class division was included in the sample.

In administering the tools, the conditions prescribed in the tests were strictly followed. The investigator personally administered the tools to all pupils. Necessary oral instructions were given as to how to mark the response in the response sheet provided. An interval of 5 to 10 minutes was allowed in between two tests.

Uniform procedures were observed in administering the tests in different schools. The following steps were invariably followed for administering each test.

(i) Distribution of the test booklets to subject together with printed instruction regarding the test.

(ii) Explaining the general directions in the booklet.

(iii) Distribution of answer sheets with instruction for filling them up.

(iv) Making the students familiar with the answer sheets, mode of entering responses etc.
(v) Clearing the doubts of subjects, giving instructions regarding time limit, methods of dealing with eventualities etc.

(vi) Strict adherence to the time limit in the case of scholastic motivation test, directions not to write in the booklets, etc.

(vii) Giving intervals between testing

(viii) Collecting back the test booklets and the answer sheets.

The administration of the test commenced in November 2003 and was completed by the end of January 2004. A sample of 978 pupils was collected through actual testing.

3.2.4. SCORING AND CONSOLIDATION OF DATA

Scoring of the answer sheets was done according to the directions given in the respective test manuals. Scores of the dependent and independent variables, with other relevant data regarding particulars of each pupil was obtained. Incomplete data had to be discarded. Finally, cases that were complete in all respects (with respect to all the variables and entries) were chosen for the final analysis. This left the investigator with 970 subjects.

The scores of these subjects for different tests and other data relating to them, were tabulated on consolidated data sheets. The total sample was classified according to the pre designed categories, Boys/Girls, Rural/Urban and Government/Private with codes used for abbreviating the entries. Each subject was assigned a new serial number against which the data corresponding to the individuals were entered in separate columns. Data entered contained scores on the various tests and other descriptive data such as sex, locale, type of school, and SES of parents or guardians etc.
converted into suitable codes. The data was entered in such a way that they would be used for computer data processing.

Break up of the final sample are presented in the Table 3.4.

TABLE 3.4

Breaking up of Final Sample

<table>
<thead>
<tr>
<th>Total No. 970</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural (N=679)</td>
</tr>
<tr>
<td>Urban (N=291)</td>
</tr>
<tr>
<td>Govt. Aided (N=269)</td>
</tr>
<tr>
<td>Govt. Aided (N=119)</td>
</tr>
<tr>
<td>Boys (N=109)</td>
</tr>
<tr>
<td>Girls (N=160)</td>
</tr>
<tr>
<td>Boys (N=47)</td>
</tr>
<tr>
<td>Girls (N=72)</td>
</tr>
<tr>
<td>Boys (N=187)</td>
</tr>
<tr>
<td>Girls (N=223)</td>
</tr>
<tr>
<td>Boys (N=114)</td>
</tr>
<tr>
<td>Girls (N=58)</td>
</tr>
</tbody>
</table>

The analysis has been based on the data relating to the above 970 subjects.

3.2.5. PROCEDURE FOR ANALYSIS OF DATA

The objectives of the study and the specific hypothesis to be tested dictated use of the following techniques for analysis. The entire statistical
processing were done using statistical package of social sciences (SPSS) with
the computer.

The procedure for analysis of data is described under the following
heads:

3.2.5.1 Classification Techniques
3.2.5.2 Statistical Techniques

3.2.5.1. Classification Techniques

(i) Classification of the Dependent Variable

The total sample ($N = 970$) was divided into three groups based on
scores of 'Scholastic Motivation' as 'High-Scholastic Motivation group'
(HSM), 'Average-Scholastic Motivation group' (ASM) and 'Low-Scholastic
Motivation group' (LSM). The conventional procedure of using 'σ' distance
from mean for dividing the total sample was used on the assumption that
'Scholastic Motivation' scores follow normal distribution. Subjects who
scored ($M + σ$) and above were considered as 'High-Scholastic Motivation'
group (HSM). The subjects who scored ($M - σ$) and below were considered as
'Low-Scholastic Motivation' group (LSM). 'Average-Scholastic Motivation'
group (ASM) were those who scored between ($M + σ$) and ($M - σ$). The mean
Scholastic Motivation score and standard deviation was found to be 116.613
and 12.003 for the Total Sample.

(ii) Classification of the Independent Variable

The total sample ($N=970$) was divided into three groups based on the
scores of each of the independent variable as 'High-Intelligence Group' (HIG),
'Average-Intelligence Group' (AIG) and 'Low-Intelligence Group' (LIG) and
Self-Concept as 'High-Self-Concept' group (HSC), 'Average-Self-Concept'
group (ASC) and 'Low-Self-Concept' group (LSC). Classroom Climate was
divided into 'High-Classroom Climate' group (HCC), 'Average-Classroom Climate' group (ACC) and 'Low-Classroom Climate' group (LCC) and Parental Involvement was divided into 'High-Parental Involvement' group (HPI), 'Average-Parental Involvement' group (API) and 'Low-Parental Involvement' group (LPI). The Socio-Economic Status was divided into 'High-Socio-Economic Status' group (HSES), 'Average-Socio-Economic Status' group (ASES) and 'Low-Socio-Economic Status' group (LSES).

The conventional procedure of using 'σ' distance from mean was used for dividing the total sample into different classes.

The mean scores and the standard deviations of independent variables are given below.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence</td>
<td>32.834</td>
<td>9.958</td>
</tr>
<tr>
<td>Self-Concept</td>
<td>139.544</td>
<td>15.667</td>
</tr>
<tr>
<td>Classroom Climate</td>
<td>143.039</td>
<td>13.507</td>
</tr>
<tr>
<td>Parental Involvement</td>
<td>125.405</td>
<td>13.508</td>
</tr>
<tr>
<td>Socio-Economic Status</td>
<td>70.943</td>
<td>22.315</td>
</tr>
</tbody>
</table>

3.2.5.2. Statistical Techniques

The main statistical procedures employed in this study are given below.

(i) Preliminary Analysis

For the preliminary analysis of the test scores, statistical indices like Mean, Median, Mode, Standard Deviation, Skewness, Kurtosis, etc. were computed separately for the total sample and the sub-samples based on sex, locale and type of management.
(ii) **Test of Significance of Mean Difference for Large Independent Samples (Guilford, 1966)**

The comparison of High-, Average-, and Low- Motivated pupils with respect to the select independent variables was done with the help of tests of significance of difference between means. This techniques was also used to compare boys and girls, rural-urban and Government-Aided groups in the select variables as preliminary analysis. The difference in the mean scores was tested for significance by finding out the critical ratios. The results were interpreted using two tailed test of significance for appropriate degrees of freedom.

(iii) **Pearson's Product Moment Coefficient of Correlation**

This was used to estimate the degree of association between the dependent variable (Scholastic Motivation) and each one of the independent variables (five independent variables) for the whole sample and the relevant sub-samples.

The obtained 'r' has been interpreted using the following techniques.

When X and Y are two continuous interval variables, then

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

To interpret each 'r' the used statistical techniques are,

**Test of Significance of the Correlation by Fisher's t-test**

This is done by checking whether the 't' value obtained by the formula

\[ t = r \sqrt{\frac{N-2}{1-r^2}} \]
The 0.95 confidence interval of \( r \)

0.95 confidence interval of \( r \) was estimated using the formulae

\[
(r \pm 1.96 \text{SE}_r)
\]

in which \( \text{SE}_r \) is the standard error of \( r \).

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

\( r \) being the obtained coefficient of correlation

Verbal descriptions (Garrett, 1979)

- \( r \) from 0.00 to \( \pm 0.20 \) indifferent or negligible
- \( r \) from \( \pm 0.20 \) to \( \pm 0.40 \) low or slight relation.
- \( r \) from \( \pm 0.40 \) to \( \pm 0.70 \) substantial or marked relationship.
- \( r \) from \( \pm 0.70 \) to 1.00 high to very high relationship.

(iv) Stepwise Regression Analysis (ANOVA approach)

Stepwise Regression analysis is a statistical procedure used for analysing the collective and separate contributions of two or more Independent Variables to the variation of a Dependent Variable. It can be used to check whether certain variables are caused or preceded by others to derive a functional relationships between the two sets.

This statistical technique helps to predict a Criterion or Dependent Variable from a set of Predictor or Independent Variables (Tacq, 1997). The Predictor Variables are entered one by one to find out the influence of each variable in predicting the Criterion Variable. First, the Predictor Variable having the highest correlation with the Criterion Variable is entered and then
calculate the measures like \( t \), \( R \), \( R^2 \), adjusted \( R^2 \), Partial Regression Coefficients \( B \), the Intercept \( B_0 \), Beta weights and significance of 't' etc.

Using the \( F \) value obtained, it is possible to check whether the regressor (predictor variable entered) is significant or not. If the \( F \)-value exceeds the tabled value of \( F \) for a particular level of significance for appropriate degree of freedom, the regressor is significant. The investigator can then prepare the equation to the regression line using these quantities.

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

The general regression equation for any number of variables is given as follows:

\[
Y = B_0 + B_1 x_1 + B_2 x_2 + B_3 x_3 + \ldots + B_K x_K
\]

- \( Y \) - Dependent Variable
- \( X \) - Independent Variable
- \( Y^1 \) - \( B_0 + B_1 x_1 + B_2 x_2 + B_3 x_3 + \ldots + B_K x_K \)
- \( B_0 \) - The slope (intercept), the value of \( Y \) when \( x_1 \) is equal to zero
- \( B_1 \) - Regression coefficient for the Independent Variable \( x_1 \) - The change in \( Y \) per unit increase in \( x_1 \)
- \( x_1 \) - First Predictor Variable
- \( B_2 x_2 \) - Coefficient and variable for the second Predictor Variable \( x_2 \)
- \( B_k x_k \) - Coefficient and variable for the 'K' th Predictor Variable - \( x_k \)
To look for a function $Y_1 = B_0 + X_1B_1 + X_2B_2 \ldots X_KB_K$. Which represents the linear relationship between $X_1$ and $Y$ better than among other equations.

(v) One-way Analysis of Variance (Best and Khan, 1992)

Analysis of variance is an effective way to determine whether the means of more than two samples are too different to attribute the sampling error. The procedure of One-way ANOVA is through the following stepwise calculations.

Step 1: Total sum of squares, $SSt = \Sigma X^2 - (\Sigma X)^2 / N$

Step 2: Between groups sum of squares,

$SS_b = (\Sigma X_1)^2 / n_1 + (\Sigma X_2)^2 / n_2 + \ldots - (\Sigma X)^2 / N$

Step 3: Within groups sum of squares, $SS_w = SSt - SS_b$

Step 4: Mean square between, $MS_b / df_b$ and

Mean square within, $MS_w = SS_w / df_w$

Step 5: F-ratio, $F = MS_b / MS_w$

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

(vi) Scheffe's Test of Multiple Comparison (Ferguson, 1976)

The procedure of Scheffe's test for multiple comparison which is often used as a follow up of ANOVA test is as follows:
Step 1: Calculate F-ratio between the pairs of means by using the within group variance estimate.

Step 2: Consult a table of F and obtain the value of F required for significance at 0.05 or 0.01 level for df$_1$ = k-1 and df$_2$ = N-k.

Step 3: Calculate F' where F' = (k-1) F

Step 4: Compare the values of F and F'.

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

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