CHAPTER III
RESEARCH DESIGN

3.1 Introduction

Research is a systematic attempt to obtain answers to meaningful questions about phenomena or events through the application of scientific procedures. Research is considered to be formal, systematic and intensive process of carrying out a scientific method of analysis. It is directed towards discovery and development of an organized body of knowledge. (Best, J and Kahn W, Research in Education, VII\textsuperscript{th} ed., pg.21). Thus, Research is an organized endeavor, which requires proper planning. Planning systematizes the research work thereby eliminating aimless intellectual wandering. The research plan is a map for research. It provides outline of the entire research process and demonstrates researchers’ intellectual vision and aspirations.

3.2 Research design and its need

Research design is an important step in research. It makes possible smooth execution of research activity. It is the logical and systematic plan which directs the research. It constitutes the blueprint for the collection, measurement, and analysis of data (Philps B. Social Research Strategy and Tactics, 2\textsuperscript{nd} edition pg. 93). It is a tentative plan which undergoes changes, as situation demand, when the study progresses, new aspects, new conditions and new relationships come to light and insight into the study deepens. Research design makes the research well-organized by yielding maximum information with minimum expenses of effort, time and money. A good research design includes following components;

- Methodology of the study
- Sampling design
- Tools of the study
- Data analysis technique
3.3 Methodology of the Research

In order to carry out research in systematic and scientific way researcher needs to decide the methodology of the study. It consists of organized procedures adapted right from the initial identification of the problem to its final conclusion. The researches are of three types namely;

i. Historical

ii. Descriptive

iii. Experimental

Historical Research examines past events and concerning evidences in order to understand the past, currently status of phenomena and anticipate the upcoming events to some extent. Descriptive researches help to understand the existing situations. It means that information concerning the current status of the phenomena is obtained with respect to variables of a study. Experimental researches focus on the question what will happen to dependent variable if the independent variable is changed.

3.4 Methodology of the present study

The present study is of descriptive type as it intends to describe the present status of secondary school students’ Perception of Learning Environment (PLE), Basic Science Process skills (BAPS), Scientific Literacy (SL) and Scientific Attitude (SA).

The researcher was interested in finding out relationship between these variables. Therefore co relational type of method has been used. The co relational study tries to find out the pattern of relationship that exists among the sub groups of sample in relation to chosen variables. It measures the relationship among the existing variables. The measurement of relationship between the variables gives idea about effect of one variable on other. This effect of one variable on other is calculated and predicted by using Partial correlation and Multiple Regression analysis.

In order to study the variables mentioned earlier, the data has been collected from students. The population and sampling techniques are described further.
3.5 Sampling Design

Sampling design is an outline drawn for the purpose of selection of a sample. It is plan prior to data collection. It is also known as sampling plan. Due to economic and time constraints; it is not feasible to study each unit of population. Therefore, proportionately small group of unit is selected. It is called as sample. In educational studies, sample consists of a fixed number of chosen individuals. These chosen individuals which are considered as a sample represents the total population. The systematic process of selecting a limited number of units, for the study is called Sampling. A carefully, planned sample saves time, money and efforts of the researcher.

3.5.1 Population of the study

A population is any group of individuals that have one or more characteristics in common that are of interest to the researcher (Best & Khan, pg 13). It refers to a collection of a specific group of human beings or non-human entities such as objects, educational institutions, and geographical areas taken into consideration for a study.

For the present study, the population consisted of secondary school students studying in standard ninth of Navi Mumbai. These schools are affiliated to Maharashtra state board and are having English as a medium of instruction. Though this population is finite, due to limitation of time and other resources, the sample of individuals from the total population have been selected, which could represent the total population. The sample has been selected by researcher very carefully by applying specific sampling technique.

3.5.2 Sampling Technique

There are various techniques used by the researchers in order to select the required sample. Sampling Technique is broadly classified into probability sampling and non-probability sampling.

3.5.2.1 Probability Sampling

Probability sampling is based on the theory of probability. In this type of sampling; each unit has equal number of chances of being selected. The results obtained by using probability sampling can be generalized for the entire population. It is mainly of following types:
a. Simple random sampling
b. Systematic sampling
c. Stratified Sampling
d. Cluster sampling
e. Multistage sampling

3.5.2.1.1 Simple random sampling

In this type of sampling, each member of the population has an equal chance of being selected. The sample is selected from sampling frame using lottery method or the table of random numbers or tossing a coin.

3.5.2.1.2 Systematic Sampling

This method is a modified form of simple random sampling. It involves selecting subjects from the population list in a systematic rather than a random fashion. For example, if from a population of 5000, a researcher wants a sample of 500 then every tenth person could be selected.

3.5.2.1.3 Stratified Sampling

When the population is divided into different strata on the basis of some characteristics and the sample selection is done by selecting proportionate percentage of a sample from each stratum, then it is known as stratified random sampling. For example, the population is divided into different stratum like male and female/different districts/graduates from different courses or subjects.

3.5.2.1.4 Cluster Sampling

In cluster sampling naturally occurring group of individuals are chosen. This method is used when it is more feasible or convenient to select groups of individuals than to select individuals from a defined population. This situation occurs when it is either impractical or impossible to obtain a list of all members of the accessible population.
3.5.2.1.5 Multistage sampling

In Multistage sampling, the sample selection is carried out in many stages. The Multi-stage sampling is used when large demographical areas are involved in the study. In each stage, efforts are made to obtain more specific intentional sample. Thus, samples are subdivided into smaller, more targeted groupings for the purposes of surveying.

3.5.2.2 Non probability sampling

In non- probability sampling technique, the sample is selected at the discretion of the researcher. It caters more to the convenience of researcher. There are different methods of non probability sampling. Such as

a. Quota sampling

b. Incidental sampling

c. Purposive sampling

3.5.2.2.1 Quota sampling

In this type of sampling technique, researcher selects fixed quota of individuals out of a specific subgroup. That is, units are selected into a sample on the basis of pre-specified characteristics so that the total sample has the same distribution of characteristics assumed to exist in the population being studied. (http://sociology.about.com/od/Types-of-Samples/a/Quota-Sample.htm)

3.5.2.2.2 Incidental Sampling

Sometimes it is also called as accidental or convenient sampling. The readily available units are selected for the study. The main weakness of the technique is the units selected do not represent truly the larger population.

3.5.2.2.3 Purposive Sampling

A purposive sample is chosen on the basis of the knowledge of a population and the purpose of the study. The subjects are selected because of certain characteristic required for the study.
3.5.3 Sampling Techniques for the present study

In the present study, a two stage sampling technique has been used. In the first stage, schools were selected and at the second stage students were selected. At the first stage of sampling initially the map of Navi Mumbai was studied to find out the geographical area of Navi Mumbai. The three talukas included in Navi Mumbai are Panvel, Uran and Thane, which are thought to be considered. During this stage, the researcher collected the list of the schools located in Navi Mumbai from office of Madhyamic Shikshkan Board, Maharashtra. From the list, the English medium schools located in the three talukas were separately listed.

It is observed that the Thane Taluka has different nodes namely; CBD, Nerul, Vashi, Airoli, Ghansoli and Koparkhairane. Panvel taluka has Kharghar, Kamothe, New Panvel and Old Panvel nodes. Uran taluka does not have determined nodes. It is found that Uran has 7 English Medium Schools, Panvel has 16 schools and Thane has 47 schools. So as to target required sample 5 Schools from Panvel, 3 schools from Uran and 14 schools from Thane are selected proportionately. Thus it can be said that stratified random sampling technique has been used.

From the list, the schools are selected randomly hence the random sampling technique has been also used to select schools.

At the second stage the students are selected. From the selected schools students from one division of standard ninth were selected. While selecting the division random sampling has been used, as the researcher has taken a division which was given by the school authorities.

The data has been collected by the researcher from all the students present in the class on the day of data collection. Therefore the students were selected by the cluster sampling technique.

3.5.3.1 Sample: its size and nature

The sample selected for the present study is of 1065 students from three talukas of Navi Mumbai. The following table indicates taluka wise and gender wise distribution of the sample.
Table 3.1 indicates the sample selected from different talukas. From Uran taluka there are 107 boys and 68 girls selected which makes total sample size for Uran taluka 175. From Panvel taluka 186 boys and 162 girls are selected. Total sample size for Panvel taluka is 348. From Thane taluka 300 boys and 242 girls are selected. So, total sample size for Thane is 542 students. Thus, the total sample consists of 1065 students out of which 593 are boys and 472 are girls.

3.6 Tools of the Research

Data collection is an important step in every research. In educational researches, different devices are used as per requirement of the study. Information gathered through these devices is used to draw the conclusion. It also helps to measure the variables included in study. They are of different kinds. (Koul L., (1996) Methodology of Educational Research, Pg. 126)

i. Psychological test

ii. Inquiry forms

iii. Observation schedule

iv. Interview schedule

v. Socio metric techniques
The tool selection by the researcher depends on the aims and objectives of the study along with the consideration of the respondents characteristics. The tools must be valid and reliable.

3.6.1. Validity

If a tool measures what it intends to measure, it can be termed as valid. There are three types of validity namely;

i. Construct validity

ii. Criterion related validity

iii. Concurrent validity

i. Construct validity

Construct is a trait of ability, temperament, or attitude which is hypothesized to explain certain aspects of behavior. It is thus concerned not only with the test itself, but also with the theory which it seeks to explain, or to account for the results which are obtained when the test is used. (Koul L. 1996 pg.129)

ii. Criterion related validity

It is a broad term which is of two types;

a) Predictive validity: it refers to the usefulness of a test in predicting some upcoming performance.

b) Concurrent validity: Concurrent validity refers to the usefulness of a test in closely relating to other measures, such as academic scores. Criterion related validity is expressed in terms of coefficient of correlation between test scores and some measures of future performance or with scores on another test of known validity.

iii. Content validity

Refers to extent to which an assessment or measurement tool taps the adequate coverage of various aspects under study. It is achieved by ensuring that the content of test covers subject matter in issue. It is concerned with coverage and representativeness rather than patterns of response or score.
3.6.2 Reliability of the tools

Reliability is the consistency with which a tool measures what it measures (Garrett, 1979). Reliability can be established by following methods

i. Inter-Rater or Inter-Observer Reliability

ii. Test-Retest Reliability

iii. Parallel-Forms Reliability

iv. Internal Consistency Reliability

(http://www.socialresearchmethods.net/kb/reltypes.php)

For the present study, the reliability of the tools has been established by using test retest reliability and internal consistency Reliability test. Details of the tools used in study are discussed further.

3.6.3 Tools used for the present study

For the present study, the researcher has used following tools;

1. Personal data sheet

2. Perceived Learning Environment scale (PLES)

3. Test of Basic Science Process skill (BAPS)

4. Test of Scientific Literacy (SL)

5. Situational test of Scientific Attitude (SA)

3.6.3.1 The personal data sheet

The personal datasheet includes the personal information regarding the respondent such as name, gender, and name of the school. The personal data sheet is given in Appendix A.

3.6.3.2 Perceived Learning Environment Scale (PLES)

This tool is prepared by the researcher. It is a four point Rating scale. The rating scale is a type of tool which attempts to measure the quality judgment or opinion with its degree. In order to study the students’ perception about learning environment a rating
scale is prepared. The following dimensions have been considered for perceived learning environment scale (PLES) with always, frequently, sometimes and never as rating points.

i. Teacher preparedness

ii. Communication of Learning Objectives

iii. Learning opportunities

iv. Learning Resources

v. Laboratory Work

vi. Feedback

vii. Motivation

viii. Classroom Arrangement

After pooling items from 69 initially prepared items related to each dimension the validity of the tool is determined.

3.6.3.2.1 Validity of the PLES

In order to determine content validity of the PLE scale; it was given to five experts in the field of education and their opinion regarding relevance of each item has been considered. The items which were agreed by 85% of the experts were retained and the other items were either discarded or modified. In this way 49 items remained in the final form. The experts also checked the construction of items. Thus after determining the content validity further the pilot study was carried out.

3.6.3.2.2 Pilot Study

The pilot study was conducted in order to carry out item analysis and establish the reliability of the scale. For the pilot study, the PLE scale was administered to 50 students of standard ninth. After administering the tool, the responses were quantified. The time taken by students was recorded which is half an hour.

3.6.3.2.2.1 Item Analysis

The main objective of item analysis was to determine the discrimination index of each item. According to the total scores on the rating scales the forms were arranged in
an ascending order. This was followed by taking the uppermost 27% and the lowermost 27% forms, i.e. uppermost 13 and the lowermost 13 were taken out. Scores for each item from higher and lower group were written down and the discriminating index was calculated using the formula

\[ D. I. = \frac{N_H - N_L}{N} \]

Where
\[ N_H = \text{Number of correct responses in the group high on the rating scale} \]
\[ N_L = \text{number of correct responses in the group low on the rating scale} \]
\[ N = \text{sample size} \]

The items with discriminating index of 0.20 or more were regarded as satisfactory and were retained. The items with discriminating index lying between 0.18 to 0.20 were modified. Items with discriminating index less than 0.18 were discarded. The details are mentioned in the following table

**TABLE 3.2: PERCEPTION OF LEARNING ENVIRONMENT SCALE**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Items prepared</th>
<th>Discarded items</th>
<th>Items retained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher preparedness</td>
<td>7</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Communication of Learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objectives</td>
<td>08</td>
<td>04</td>
<td>04</td>
</tr>
<tr>
<td>Learning opportunities</td>
<td>14</td>
<td>06</td>
<td>08</td>
</tr>
<tr>
<td>Learning Resources</td>
<td>15</td>
<td>02</td>
<td>13</td>
</tr>
<tr>
<td>Feedback</td>
<td>07</td>
<td>04</td>
<td>03</td>
</tr>
<tr>
<td>Laboratory work</td>
<td>04</td>
<td>01</td>
<td>03</td>
</tr>
<tr>
<td>Motivation</td>
<td>08</td>
<td>00</td>
<td>08</td>
</tr>
<tr>
<td>Classroom Arrangement</td>
<td>05</td>
<td>01</td>
<td>04</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>19</td>
<td>49</td>
</tr>
</tbody>
</table>
The scale with 49 statements was administered to a group of students in order to establish reliability. The Cronbach’s alpha and test retest is used for establishing reliability. To establish reliability by test retest method, the tool was again administered to the same group of students after a gap of fifteen days.

**TABLE 3.3: RELIABILITY OF PLES**

<table>
<thead>
<tr>
<th>Name of Tool</th>
<th>Test Retest</th>
<th>Cronbach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Learning Environment</td>
<td>0.763</td>
<td>0.72</td>
</tr>
</tbody>
</table>

From table 3.2 it can be seen that the reliability of PLES by test retest method is 0.76 and by Cronbach’s α is 0.72. It means that the tool is internally consistent. The tool is attached in Appendix B.

**3.6.3.2.2 Scoring of the Perceived Learning Environment scale:**

PLES is a four point rating scale with positively worded statements. The rating points and scoring is given in table no.3.4

**TABLE 3.4: SCORING OF STATEMENTS OF PLE SCALE**

<table>
<thead>
<tr>
<th>Options</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scores</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 3.4 shows that the PLES has rating points always, often, sometimes and never with scoring of 3, 2, 1 and 0 respectively.

**3.6.3.3 Test of Basic Science process skills (BAPS)**

The BAPS test is prepared by Padilla M. Professor of Science Education, University of Georgia, Athens. This test is comprised of 36 questions. Permission was taken from the Prof. Padilla via email dated 1/10/2014 to use the test. The names of the characters in the scenario have been changed to Indian names without changing any other content so that the students get a feel of connectedness. The items in a test are based upon basic science processes such as Observing, Inferring, Measuring, Communicating, Classifying and
Predicting. The following table shows the items classified on the basis of Basic Science Process Skills.

**TABLE 3.5: TEST ITEMS WITH BASIC SCIENCE PROCESS SKILLS**

<table>
<thead>
<tr>
<th>Skill</th>
<th>Item number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>2, 13, 15, 16, 30, 33</td>
</tr>
<tr>
<td>Inferring</td>
<td>6, 9, 24, 26, 28, 34</td>
</tr>
<tr>
<td>Measurement</td>
<td>1, 5, 14, 23, 29, 36</td>
</tr>
<tr>
<td>Communication</td>
<td>8, 9, 20, 21, 22, 27, 27</td>
</tr>
<tr>
<td>Classifying</td>
<td>4, 7, 11, 18, 31, 35</td>
</tr>
<tr>
<td>Predicting</td>
<td>3, 10, 12, 17, 25, 32</td>
</tr>
</tbody>
</table>

The tool is prepared by western educationist, Padilla. In order to check the reliability in Indian context, the test retest method has been used. The tool was administered to 50 students of standard ninth twice with a gap of two weeks. The results of the reliability of the tools are as follows.

**TABLE 3.6: RELIABILITY OF BAPS**

<table>
<thead>
<tr>
<th>Name of Tool</th>
<th>Test Retest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test of Basic Science process Skills</td>
<td>0.7738</td>
</tr>
</tbody>
</table>

The coefficient of reliability is found to be 0.7738. So the tool is said to be reliable in Indian context. The tool is attached in Appendix C.

**3.6.3.3.1 Scoring of the test of basic Science Process Skills**

The BAPS Scale has 36 questions with one correct answer. The maximum possible score is 36. The each correct response was scored by 1. The answer key is given in appendix D.
3.6.3.2 Rationale of the test of basic Science Process Skills

The sample selected for the study is state board IX std. students who have just finished primary education. In a developing country like India laboratories are not available in school, if available, it is not maintained properly. The access to mobile laboratory is also limited. The subjects like chemistry and physics needs abstract thinking and on the other hand, biology is having very close resemblance to students’ daily life. Therefore these science process skills can be enhanced through biology without expensive equipments. E.g. the food consumed is perceived as ‘dal’/pulses/cereals and not as proteins or fat content in their diet. The surrounding is taken as environment with biotic and a biotic factors and not as metals/nonmetals/organic compounds etc.

Therefore to measure the basic science process skills like observation, inference, measurement, communication, classification and prediction the BAPS test developed by Michel Padilla is chosen as it measures above said skills.

3.6.3.4 Test of Scientific literacy

This test is prepared by Prof. Carrier R. It contains 24 statements which is based on seven aspects of SL defined by Abd-El-Khalick and Lederman. The seven aspects are;

a) Science is a Tentative Enterprise  
b) Science is an Empirical “Faith” 
c) Science is Not a Single Method 
d) Experiments are a Goal-Oriented Form of Scientific Observation 
e) Scientific Theories are Explanations of Scientific Facts  
f) Scientific Laws are Descriptions of Nature’s Behavior  
g) Science is a Creative Enterprise.

(http://infidels.org/library/modern/richard_carrier/SciLit.html). The items with different aspects of SL are as follows.
TABLE 3.7 ASPECT WISE NUMBERS OF STATEMENTS IN SL

<table>
<thead>
<tr>
<th>Aspects of nature of science</th>
<th>Item number</th>
<th>Aspects of nature of science</th>
<th>Item number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science is a tentative enterprise</td>
<td>2, 10</td>
<td>Science is an Empirical faith</td>
<td>5, 6, 12,16</td>
</tr>
<tr>
<td>Science is not a single method</td>
<td>3</td>
<td>Experiments are a Goal-oriented form of scientific observation</td>
<td>1, 7, 9, 11</td>
</tr>
<tr>
<td>Scientific theories are explanations of scientific facts</td>
<td>4, 8, 14, 18, 22</td>
<td>Scientific Laws are descriptions of nature’s behavior</td>
<td>15, 17, 19, 24</td>
</tr>
<tr>
<td>Science is a creative enterprise</td>
<td>13, 20, 21, 23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In order to check the reliability in Indian context, the reliability of the test was established by using test retest method. The tool was twice administered to 49 students of std. ninth maintaining a gap of 15 days. The coefficient of reliability is found to be 0.999. The scale is attached in Appendix E.

3.6.3.4.1 Scoring of the test of Scientific Literacy

There are 24 items with choice true and false. The each correct response leads to score of 1 and incorrect to zero. The minimum possible score on SL is 0 and maximum possible score is 24. The answer key is given in appendix F.

3.6.3.4.2 Rationale of the test of Scientific Literacy

After reviewing the related literature it was observed that many educationists has attempted to measure the Scientific Literacy of the students/people. But, the test used by them is found to be content specific which are based on ‘memory’ of the individual related to content. The researcher intends to understand students understanding of subject science. Therefore it was decided to use the test of Scientific Literacy developed by Carrier R.
3.6.3.5 Situational test of Scientific attitude

This test is prepared by Inamdar R. (2014). It is based on nine components, viz, critical thinking, open mindedness, readiness to change the decision, curiosity, aversion to superstitions, suspended judgment, intellectual honesty, problem solving ability, respect for scientific experiments and is developed in Marathi Language. After seeking permission from researcher the test was translated into English.

The following table indicates the no. of statements prepared for each component of Scientific Attitude.( Inamdar R. 2014)

TABLE 3.8: COMPONENT WISE STATEMENTS IN THE SITUATIONAL TEST

<table>
<thead>
<tr>
<th>Components of Scientific Attitude</th>
<th>No. of Items</th>
<th>Components of Scientific Attitude</th>
<th>No. of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Thinking Ability</td>
<td>05</td>
<td>Suspended judgment</td>
<td>05</td>
</tr>
<tr>
<td>Open Mindedness</td>
<td>05</td>
<td>Intellectual honesty</td>
<td>05</td>
</tr>
<tr>
<td>Readiness to change the decision</td>
<td>05</td>
<td>Problem solving ability</td>
<td>05</td>
</tr>
<tr>
<td>Curiosity</td>
<td>05</td>
<td>Respect for scientific experiments</td>
<td>05</td>
</tr>
<tr>
<td>Aversion to superstitions</td>
<td>05</td>
<td>Total</td>
<td>45</td>
</tr>
</tbody>
</table>

All items are multiple choices and expected time required to finish the test is approximately 30 minutes. The test is attached in Appendix G.

3.6.3.5.1 Pilot study

The pilot study was conducted in order to establish the reliability of the scale which has been translated by the researcher. For the pilot study, situational test on scientific attitude is administered on 50 students’ of standard ninth. After administering the scale the responses were quantified and scale was re administered after a gap of 15 days.

The reliability of the tool is as follows.
TABLE 3.9: RELIABILITY OF THE TOOLS

<table>
<thead>
<tr>
<th>Name of Tool</th>
<th>Test Retest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Situational test on Scientific attitude</td>
<td>0.8194</td>
</tr>
</tbody>
</table>

3.6.3.5.2 Scoring of the Situational test of Scientific Attitude

There are 45 situations in the test. For each situation there are 3 options of which one is correct. Every correct response gets a score of one. The minimum possible score is 0 and maximum possible score is 45. The answer key is given in appendix H.

3.6.3.5.2 Rationale of the Situational test of Scientific Attitude

Different educationists like Bhaskar Rao, Dani etc have listed different components of Scientific Attitude. But, majority of them opines critical thinking, open mindedness, readiness to change the decision, curiosity, aversion to superstitions, suspended judgment, intellectual honesty, problem solving ability, respect for scientific experiments as essence of Scientific Attitude. Attitude can be measured by observing one’s overt behavior or responses to certain stimuli. Though it is ideal to observe the behavior, it was not possible for the researcher to do that. The rating scale can bring limitations as the students may rate without reading completely. In this tool, students are expected to place themselves in situation and answer. Therefore this tool was found to be suitable.

3.7 Data collection

Data collection is an important step in the research process. It was necessary to seek the permission from the school principal so researcher personally went to the school to take permission for data collection. The researcher then went on the appointed day to collect data from students. The four scales namely PLE, SL, BAPS and SA were administered to students. After the data collection, the responses of the students were quantified and the tabulation of the data has been done.

3.8 Data Analysis

Data collection is an important step in the research but in order to give it a meaning and draw conclusion it should be organized properly and analyzed using
appropriate statistical technique. For the present study the descriptive and inferential analysis is carried out.

3.8.1 Descriptive Analysis

The data analysis has been carried out to determine the normality of the distribution of data. For the present study the statistical measures used for descriptive analysis are as follows:

a. Measures of central tendency: This included mean, median and mode.

b. Measures of variability: This included standard deviation, skewness and kurtosis.

c. Graphical method: This included bar diagrams and scatter grams.

3.8.2 Inferential Analysis

Inferential analysis is carried out to draw the conclusions on the basis of data collected. Following statistical techniques have been used.

i. **Pearson’s product moment coefficient of correlation r**: This Coefficient of correlation is carried out to ascertain the relationship between the variables of the study.

ii. **‘Z’ test**: ‘Z’ test is used to determine the gender difference in the relationship among variables.

iii. **Partial correlation**: Partial correlation is carried out to find the extent of influence of one variable on the relationships of other variables.

iv. **Multiple R**: Multiple regression analysis is carried out to find out the effect of independent variables on the dependent variable and to find out relationship among them.

Detailed discussion about the techniques of inferential analysis is given in chapter V.