Chapter-3

DESIGN OF THE STUDY

3.1. INTRODUCTION:

The present chapter intends to provide an overview of the research design of the study. Choosing a design for a study basically involves selecting the most appropriate methods of technique to solve the particular problem under investigation. Research design is the plan, structure and strategy of investigation conceived so as to obtain answer to research questions and to control variance. Therefore, design of the study continues to be one of the most vital aspects of any research work. Without it, the research work is just wandering in the wilderness. A research design conditions the choice of method of research, sample, nature of tool and statistical technique.

Hence, the role of design of the study cannot be ruled out in the context of research activity. As a matter of fact, no one readymade design can solve all problems. The nature of the problem determines which design should be tailored for the study. A study should be systematic in order to avoid confusions. For being systematic, prior design of the study is required. An investigator has to plan the techniques and tools to be used for collecting, organizing, analyzing and interpreting data. A well thought out plan of action in advance followed by a systematic execution, brings out fruitful results. Any activity to be carried out must be properly planned before hand. Thus, the task is to synchronize the statement of the problem with the design to be used in its solution and every aspect of study to be the last details of execution must be planned before the study is undertaken. Keeping in mind the importance of this idea, the procedure adopted to tackle the present problem, was decided in advanced. It describes just what must be done, how it will be done, what data will be needed, what data gathering devices will be employed, how sources of data will be selected and how the data will be analyzed and conclusions sorted out.
Following are the various aspects of the research design which have been used in the present study:

- Method
- Population
- Sample and Sampling Technique
- Tools used
  Collection of data
  Statistical Techniques used

3.2. METHOD:

In educational research, the research method is an important aspect. Selecting area of study, identifying and defining the problem, reviewing the related literature, stating hypotheses, defining the objectives of the study, concluding the research plan are the preliminary aspects of a researcher before involving actively in that study. During planning, the researcher thinks about the problems by which entire research activity followed. Therefore, the research methodology or the procedure is an indispensable aspect for the research work. Best method shows the pages of the best use of the methodology. The researcher should be very keen and clear about his methods that he uses in his research work.

Dictionary meaning of method is the way of the manner of doing something systematically, when it is considered educationally. Method refers to orderly activity in formulating the problems, defining the terms, selecting subjects involved for study, developing and using tools for data collection, analyzing and interpreting data and reaching inferences and generalizations of the problem.

Method is an infrastructure of the research study basing on which the whole research work is executed for searching the solution to the problem/truth.
3.3 IMPORTANCE OF METHODOLOGY:

1. Methodology shows the researcher the right way for conducting the research work.
2. Methodology delimits the area, sample and gender.
3. It specifies the specific tools and techniques of the use.
4. It makes easy for data collection and data interpretation.
5. It provides pinpointed idea for conducting research.
6. It keeps the researcher alert.
7. It acts as a blue print for the research activity.
8. It keeps good contact with different subjects.
9. There exists a relationship amongst variables under study.
10. It explains entire activity of the research study.

3.4 AIMS OF METHODOLOGY:

1. It aims at guiding the researcher in a systematic way.
2. It aims at delimitation of the problem.
3. It aims at preparing the tools.
4. It aims at interpreting data by using statistical principles.

According to Good, Barr, and Scates (1941 p.207) research methodology may be classified from various points of view basing on;

1. The fields to which it is applied are education, history, philosophy, Biology and psychology etc.
2. Purpose, description, prediction determination of causes and status.
3. Place of conduct – either in the field or in the laboratory.
4. Application – pure research or applied research
5. Tools and techniques – various standardized and non-standardized tools, checklist, rating scale and questionnaire
6. Type of data- objective, subjective, qualitative, quantitative
7. Symbol employed – language and mathematical symbols
8. Type of thinking – deductive, uncontrolled
9. Method employed – agreement differs, residues, and concomitant
William H. Kilpatrick describes three types of methods such as scientific, historic, and philosophic. Crawfield describes experimental, historical, psychological, case study, survey, interview, job analysis, curricula making, questionnaire, observation measurement, statistical, tabular, graphic, and library techniques.

Wapler and Taylor describes techniques of analysis, reading and recording, observation, personal interview & group conference, checklist, sampling, classification, summarization, evaluation, individual judgment, group rating, comparison, space and frequency counts, testing and experimentation. Knos says the questionnaire, experiment, measurement, documentary analysis, case Mathematics and survey. Moreover, a method is selected basing on the nature of study.

But generally, there are three types of methods in educational research such as Historical, Descriptive and Experimental.

1. **Historical method:**
   Historical method provides a method of investigation to discover, describe and interpret what was existed in the past.

2. **Descriptive method:**
   Descriptive method provides a method of investigation to study, discover, describe and interpret what exists at present.

3. **Experimental method:**
   Experimental method is a method of investigation to describe basic relationships among phenomena under controlled condition or more simply, to identify the conditions underlying the occurrence of a given phenomena.

4. **Descriptive Method:**
   The descriptive method is widely used in educational researches. This method tells what exists at present by determining the nature and degree of existing conditions. This method refers to a type of investigation which attempts to describe and interpret what exits at
present in the form of conditions, practices, process, trends effects, attitudes and beliefs etc. It is concerned with the phenomena that are typical of the normal conditions. It analyses, interprets, and repeats the present status of a social institution, group or area. It is otherwise known as normative survey method. The word normative means ascertaining the normal condition and survey means gathering data regarding present condition. Hence, normative survey studies suggesting too closely related aspects of this kind of study. Survey studies collect three types of information

1. Of what exists
2. Of what we want
3. Of how to get

Types of Descriptive Survey Research:

Survey studies refer to description of existing phenomena with the intention of employing data for justifying present condition and practices or to make more intelligent plans for improving them. It analyses, interprets, and reports the status of an institution, group, or area in order to guide practice in the near future but determines the adequacy of status by comparing it with established facts; it depends on the scope, nature and purpose of the problem under investigation. Survey may be narrow or broader in scope. The data are collected from a representative population sample.

3.5. NATURE OF DESCRIPTIVE METHOD:

1. It gathers data from a relatively large number of cases.
2. It is more realistic because it investigates phenomena in the natural setting.
3. It is essentially cross-sectional.
4. It is concerned with characteristics of the individuals.
5. It provides data to form the basis of research of a more fundamental nature.
6. It varies greatly in complexity.
7. It may be qualitative or qualitative.
8. It is expressed either in verbal or mathematical symbols.
9. It brings the attention of the current trends.
10. It does not deal with many variables.
11. It involves the elements that have already taken place and are related to the present condition

12. It provides information to assist in decision-making.

3.6. VALUE OF DESCRIPTIVE RESEARCH:

It solves problems of children, school organization, supervision and administration, curriculum, teaching methods and evaluation. It explains the educational phenomena in terms of the conditions or relationships that exist in opinion that are held by the students, teachers, parents, experts etc. It helps the teachers to study the behavior of the students in the classroom. It is useful in the development of data gathering instruments and tools like checklist, schedules, questionnaire and rating scales. It provides the background information from which many more refined or controlled studies of cause relations are made. Hence, this method has a great value in the field of research.

Steps of Descriptive Research:

The followings are the various steps of Descriptive Research;

1. Selection of the problem
2. Statement and definition of the problem
3. Identification of data
4. Selection or development of tools
5. Selection of the sample
6. Collection of data
7. Analysis and interpretation of data
8. Writing the research report

According to Best (1977 p. 15) "Descriptive Research describes what is? It involves the description, recording, analysis, and interpretation of conditions that now exist. It involves some type of comparison or contract and may attempt to discover relationships that exist between existing non manipulative variables."

In the present study, all those steps and characteristics have been adopted which have described to be essential for the descriptive method of research by several authors.
3.7 POPULATION:

Any group of people or observations, which includes all possible members to that category, is called population. According to Best and Kahn "A population is any group of individuals that have one or more characteristics in common that are of interest to the researcher. The population may be all the individuals of a particular type or a more restricted part of that group." Population for the present study was the students of the S.T.C course. In the present study all STC students of Rajasthan state are involved.

3.8. SAMPLE:

For the solution of any research problem, it is not only difficult but also impossible to study the whole of the universe; therefore, a representative sample is drawn from the population to ensure the valid generalization leading to the contribution to knowledge.

"The principal purpose of research is to discover principles that have universal application; but to study a whole population in order to arrive generalizations would be impracticable, if not possible. The process of sampling makes it possible to draw valid inferences on the basis of careful observation or manipulation of variables within a relatively small proportion of the population."(Best & Kahn 1985)

Thus, a sample is a small proportion of the population selected for study. The essential requirement of any sample is that it should be as representative as possible of the population or the universe from which it has been drawn. The scope of generalization of the findings depends on the representativeness of the sample. However, a good sample is one which is unbiased and represents the whole population.

3.9. CHARACTERISTICS OF A GOOD SAMPLE:

1. A good sample provides greatest possible accuracy within its restricted size.
2. Selection is deliberate and, hence, it is free from error.
3. It should be free from sampling error. Sampling error means the difference between population value and sample value.
4. It covers complete coverage of the units meant for research study.
5. The possibility of sample technique should be used for reducing similar discrepancies.

6. A good sample is the true representative of the population corresponding to its properties.

7. It should be free from bias and does not permit prejudices, pre-conceptions and imagination to influence its choice.

8. A good sample is an objective one which refers to objectivity in selecting procedure in absence of subjective elements from the situation.

9. It is economical considering energy, time and money point of view.

10. It is comprehensive in nature, which is controlled by specific purpose of investigation.

**Self-Selected sample:**

Self-Selected sample is a type of sampling in which the researcher does not select the sample. The respondents send their responses to researcher. The researcher does not know regarding the sample before conducting the research. He knows the samples only after collecting the responses at the end. There are no fixed units.

It is a fact that there is not a single procedure of sampling. The researcher selects the samples as per objective of the study. There is no hard and fast rule for selecting the particular method of sampling. Therefore, a researcher should analyze about his study and then find out that sampling method which justifies the necessary for his problem.

For the present study, first of all the S.T.C institutions of Jaipur city were selected randomly. Using simple random sampling 600 students of general and Sanskrit S.T.C class were selected, thus constituting a sample of 800 students only 600 students were finally taken. Rest 200 students were not selected because they did not fill the scale properly.
Table- 1

Selected sample;

<table>
<thead>
<tr>
<th>Sr. N o.</th>
<th>Total Students</th>
<th>Students</th>
<th>Subject Streams</th>
<th>Location</th>
<th>Academic Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arts</td>
<td>Commerce</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Science</td>
<td>Rural</td>
<td>Urban</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Above 60% Below 60%</td>
</tr>
<tr>
<td>01</td>
<td>600</td>
<td>300</td>
<td>300</td>
<td>150</td>
<td>150</td>
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<td></td>
<td>150</td>
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<td>300</td>
<td>300</td>
</tr>
</tbody>
</table>

3. 10. SAMPLING;

"The purpose of sampling theory is to make sampling more efficient. It attempts to develop method of sample selection and of estimation that provide at the lowest possible cost estimates that are precise enough for our purpose."

Purpose of sampling:

A satisfactory coverage is made from a large population.

1. It is useful when data are unlimited.
2. It saves energy, time and money.
3. When the units are homogeneous, it is very useful.
4. It is required when there is no cent percent accuracy.

3. 11 METHODS OF SAMPLING:

There are two types of sampling. They are probability and non-probability sampling.

1. **probability sampling:**

Probability sampling refers to those in which sample elements are automatically selected by some procedure under which a particular sample of a given size is selected from a specified population. It is used largely in educational and
psychological research due to the development of a theory. Randomness is basic element of control.

2. **Non-probability sampling:**
   Non-probability sampling refers to those in which the samples elements are arbitrarily selected by the researcher because in his judgment the elements thus chosen will meet effectively represent the population. It derives control from the judgment of the researcher.

3.12. **CLASSIFICATION OF SAMPLING:**

   ![Diagram of Sampling Classification]
   
   1. Simple Random
   2. Systematic
   3. Systematic
   4. Purposive
   5. Quota
   6. Cluster
   7. Double
   8. Judgment
   9. Sequential
   10. Incidental
   11. Convenience
1. **Simple Random Sampling:**

Simple Random sampling means every member of the sample is selected from the total population in such a way that all members of the population have essentially the probability of being selected. It is a trustworthy and most popular method of securing representation of the total population.

Example:-

If 50 members are to be selected out of 400 of total members, we may draw one by one through lottery system. It is simple and more representative of the population. It is free from bias and prejudices.

2. **Systematic sampling:**

Systematic sampling includes nth term from a list of names by selecting randomly selected names from a randomly selected page. Each member of the sample comes after an equal interval. It provides a more even spread of the members of the sample over the population. It is easier and speedier to draw.

3. **Stratified Sampling:**

Stratified sampling is the modification or refinement of simple random sampling. Randomly the population is divided into smaller homogeneous groups or strata by some characteristics.

4. **Purposive Sampling:**

Purposive sampling is a type of stratified sampling in which the selection procedure for selecting the cases is determined by some kind of criterion acting as secondary control. The criterion reflects the whole of the sample. The samples are selected basing on the purpose. If the researcher wants to have a sample from two or even ten states for representing India, purposive sampling serves better. The variables should be in the same proportion i.e. the proportion of boys and girls. When the researcher has a specific objective then this sampling is possible. The sampling will be within the control of the researcher.
5. **Quota Sampling:**

Quota sampling is also a form of purposive and stratified sampling in which the units of sample from each strata i.e. quota are chosen according to the willingness of the researcher.

6. **Cluster sampling:**

Cluster sampling is a type of sampling in which the units of sampling consist of multiple cases. It is particularly appropriate when the population of the sample is infinite. The cases are selected at random when the area is large and not easy to study the whole population, taking equal size basing on a small number of large clusters. It is economical, easy and expensive. The data is collected from over a wide area. It produces sampling area and may not be possible for applying in other area.

7. **Double Sampling:**

Double sampling is a kind of sampling in which the second sample is taken on a sub-sample of the first. It is a two-phase sampling within the samples. It is employed in case of administering questionnaire and interview for data collection. The researcher chooses samples basing on the characteristics that are readily made available and highly correlated with the primary characteristics for which the data collection is expensive and difficult.

8. **Judgment sampling:**

Judgment sampling refers to the selection of a group from the population basing on available information considered to be the representative of the total population of the selection of a group by criterion-based judgment. It is one of the non-probability methods of sampling. The researcher's judgment is very important for selecting units. It saves time and money. Certain stratification is included in the sample.

9. **Sequential sampling:**

Sequential sampling is a type of sampling in which sampling continued until a significant result on which base a decision is obtained. It enables the researcher to test for significance and observations, until there is sufficient evidence for accepting or rejecting a null hypothesis. This method is used when two or more samples are taken on a random or
purposive basis utilizing the result from analysis of earlier samples in order to design the later. In this sampling there are various sequences. In the sequences when decision response is made available, the study may be dropped quickly and if not it may be continued till getting the numbers of units selected previously. It reduces errors and number of observation. It requires more computation.

10. **Incidental sampling/ Accidental sampling:**

Incidental sampling or Accidental sampling refers to a sampling when sample groups are easily available. This method is usually used for conducting action research. These samples are poor samples.

11. **Convenience sampling:**

Convenience sampling is a type of sampling in which the researcher feels convenient in selecting the units. The researcher selects whatever essential he chooses. There is no hard and fast rule for him to select the sample. He gets every freedom to use his reasons.

In the present study Random Sampling is used for selection of Sample.

3.13. **VARIABLES;**

Independent variables: The independent variables manipulate of controls the attempts to ascertain the relationship to the observed phenomena. Dependent variables: The dependent variables appear, disappear of change when independent variables are introduced, removed or changed.

Dependent variable; Academic achievement in English of STC students.

Independent variable; Psychological Stress

3.14 **TOOLS USED:**

The research activity is based on data gathering tools. He collects the information by administering the data gathering tools in various forms. If tools are minutely keeping the eye on the objective of the research study, the outcome focuses the problem and the research study becomes a satisfactory one. There are so many techniques in data collection.
The purpose of this study was to ascertain if there is any effect of stress on the academic achievement in English of STC trainees in relation to gender, habitat, academic achievement and subject streams. The tools were used as following:

3.14.1. Individual information: The individual information regarding himself/herself, his family background, his interest and disinterest were recorded of every STC student who appeared in the test.

3.14.2. Record of achievement on the basis of marks in internal examination of STC students.


3.15 VALIDITY:

Validity means a test measures what it intends to measure. If a certain test measure the purpose for which it is prepared, then the test possesses validity. Hence, the test is a good test and becomes valid one. These various types of validity are content validity, criterion related validity and construct validity. The index of reliability is sometimes taken as a measure of validity. The correlation co-efficient, it will be re-called, gives the relationship between obtained scores and their theoretical true counterparts. If the reliability co-efficient of a test is .81, for example, $r_1 = \sqrt{.81}$ or .90.

This means that the test measures true ability to the extent expressed by an $r$ of .90.

In the present study validity of the tool established.

1. **content validity:**

A test, which measures a sampling of knowledge of performance, is termed as content validity. It is generally applied to test the proficiency and educational achievement. It is estimated by evaluating the relevance of test items in relation to instructional objectives, as this validity is based on judgment and rational analysis; it sometimes called as rational or logical validity.

2. **Criterion Related validity:**

A test, which is evaluated basing on some criteria, is known as criterion related validity. A test which predicts the type of behavior, is said to be the predictive validity. When the present test conveys the good result it is presumed that the test possesses the
predictive validity and the individual's future can be predicted in any branch either in study or in placement of job. Another type of criterion related validity is the concurrent validity in which the test measures the present behavior. While assessing the concurrent validity, the test is proposed as a substitute for some other existing cumbersome techniques. The information obtained through this technique acts as a criterion. Criterion related validity establishes both the present and future behavior.

3. **Construct validity:**

   Construct validity refers to the meaning and interpretation of the test scores obtained in terms of psychological or theoretical constructs. A construct means a trait or ability, temperament or attitude that explains certain aspects of behavior like motivation, intelligence, creative ability, and reasoning etc.

4. **Time of Administer:** How long time the measuring instrument takes to administration and is there sufficient time to use it within the confines of the study?

5. **Expertise Required:** Does the investigator require special expertise in order to use the instrument or can it be used with standard instruction by anybody?

6. **Administration Procedures:** What biases are likely to be introduced into the subject's responses depending on the administration procedures employed and situation in which the instrument is used?

Following tools have been used to achieve the objectives of the present study:

1. Psychological stress scale for English Students (PSSES) developed by the investigator was used to measure the psychological stress of English students:
2. Achievement of the students in English was considered as the marks obtained in English in internal exams of STC.

The researcher has used the Descriptive Survey method for the present study. Descriptive research studies are designed to obtain pertinent and place information concerning the current studies of phenomena and whenever possible to draw valid general information from the discovered facts. They are restricted not only to fact finding but may often result
in the formulation of important principles of knowledge and solution of significant problems concerning on Local, State, National and International issues

Descriptive studies are more than just a data collection but they involve measurement, classification, analysis, comparison and interpretation. This research is also called Survey Research. This method is useful for investing a variety of educational problems and issues. A high percentage of all research studies are descriptive in nature. Descriptive research is not as simple as it appears. It is guided by the basic steps of the scientific and disciplined enquiry approach.

Descriptive research is also categorized in terms of cross sectional research collects data at one point in time while longitudinal research collects data at more than one time in order to measure growth or change.

The scale was given to experts in the field of education and psychology who had sufficient orientation and experience in this area. They were requested to read each and every item and judged carefully the degree of stress expressed by each item judges were requested to mention such items, which were either not well worded or difficulty to understand. They were also requested to judge meaningfulness of each item under particular dimension. On the basis of their opinion some items were modified and rejected. Finally, items, which were found meaningful by the experts, were considered as valid item statements. Therefore, this scale has content validity.

3.16. DEVELOPMENT OF PSYCHOLOGICAL STRESS SCALE

FOR STUDENTS OF STC CLASS (PSES):

Rationale

Sources like the Handbook of Psychological and Social Instruments, India Mental Measurement Yearbook and the 9th Mental Measurement Yearbook, were tapped in an effort to locate an instrument which would suit the purpose of the present study. But most of the instruments were not found appropriate for the present study because they tended to relate to measurement of some particular aspect of stress, in a variety of populations like children, employees, organizations, families, school psychologists, and even those
which concerned themselves with adolescents, did not deal directly with English. Investigator found a comprehensive scale, Bisht Battery of Stress Scales (1987), which contains 13 scales related to different aspect of stress. It gives measurements in terms of stress battery and also composite stress scores. This scale could also not be used as it measures stress in a general adolescent population while the study focuses on stress among English students. On the basis of related literature and detailed discussion with experts in the fields, it was decided to develop psychological Stress Scales for STC Students (PSSES) The process of construction of scale is given below:

**Selection of Dimensions:**

First of all, S.T.C. students were contacted and were discussed about causes of stress related teaching and learning of English, discussions and interviews were held with STC teachers educators to find out the reasons of stress in achievement of English subject. Based on the variety of sources, as explicated in the preceding discussion, (PSSES) was structured around the following dimensions

**Preparation/Selection of Items:**

The researcher then prepared the Items related to dimension of stress. Maximum care was taken to see that each item corresponds to the specific dimension under which it was constructed and they do not overlap each other. Each item was followed by five options, namely, 'Always', 'often', 'Sometimes', 'Rarely', and 'Never'. Altogether (90) items were constructed and the following precautions were taken while constructing the items.

1. Each item was constructed in simple Hindi language so that it could be easily understood.
2. Careful attention was taken to make the items free from the factor of social desirability.
3. Sufficient care was paid to see that each item was closely related to stress.

**Experts Comments:**

After preparation/selection of items, the scale (PSSES) was sent to experts in the field of education and psychology with a covering page which includes instructions for experts’
opinions about items ambiguity, relevancy and sentence structures. They were also requested to exercise their judgment about whether each item in a particular dimension was representative of that dimension or not. Items, on which the consensus level among expert was 80% or more were included and rest, were discarded. On the basis of expert comments, out of (90) items only (50) items were selected.

This scale was also sent to guide and co-guide.

**Small Group Tryout;**

After selection of (50) items on the basis of experts comments, cover page instructions of experts were replaced by instructions for students. The scale stated with specific instructions for students regarding how to attempt it, which gave the students some background about what expected to them. The students were given freedom to tick any one of the five options (always, often, sometimes, rarely, and never), depending on how often, he/she felt concerned about the situation given in the item. No time limit was given to the students and they were asked to read carefully each of the items and express their own opinion.

The scale was applied on 50 students, previously. They were also asked to mention, if the items were either vague or different in respect of their meanings. The scale items were again checked on the basis of the responses obtained in the tryout. Items that belonged to any of the following categories were dropped.

1. Statements which were responded to either favorably or unfavorably almost invariably.
2. Statements which were considered difficult or vague.

Thus, not a single item was rejected. All 50 items were retained for final tryout and item analysis.

**Final Try-Out:**

The (PSSES) with 50 items on Likert type five-point scale was administered on a sample of 600 English students of S.T.C. class. Students were selected from different STC
institutions running in Jaipur city province. If the student has marked "Always" as his/her answer in response to that item, then a stress score of 5 is assigned to it. Similarly, the responses 'often', 'sometimes', 'rarely', and 'never', are assigned scores of 4, 3, 2 and 1 respectively. To find out total score of each individual on PSES scores of 50 items were summed up.

Reliability; the Split half method was used to measure the reliability.

The reliability of the test is- \(0.92\)

**Scoring:**

Each item in the scale is followed by five options, namely, Always, Often, Sometimes, Rarely, and Never. The students have to mark any one of the options, which is indicative of how often they feel concerned about the situation mentioned in that particular item. If the students has marked "Always" as his/her answer in response to that item, then a stress score of 5 is assigned to it. Similarly, the responses 'often', 'sometimes', 'rarely', and 'never' are assigned scores of 4, 3, 2 and 1 respectively. Thus, the maximum score possible is five while the minimum score then can be obtained is one.

**3.17. STATISTICAL TECHNIQUES USED**

Good data are important but what is done with it is equally so. In the present study the investigator used the most appropriate statistical techniques available in the treatment of data.

Following statistics is used in this study;

1. Mean—measurement of central tendency
2. Standard deviation—measurement of dispersion
3. T-test—measurement of significance.

**Formula:**

Level of significance; whether a difference should be taken as statistically significant or not depends upon the probability that the given difference could have arisen by chance. It also depends upon the purposes of the experiment. Usually, a difference is marked Significant when the gap between two samples mean points to signify a real difference between the
parameters of the populations from which samples were drawn. Before a significant or non-significant is made, some critical point or points must be designated along the probability scale which will serve to separate these two judgment categories. At the same time it must be stressed that judgment concerning differences are never absolute, but on the contrary range over a scale of probability. The confidence with which an experimenter rejects or retains a null hypothesis depends upon the level of significance adopted. In the present study, the level of significance is as following:

**Value at 0.05 level ----1.97**

**Value at 0.01 level ---- 2.67**