Chapter-III

RESEARCH METHODOLOGY

3.1 INTRODUCTION

According to Kerlinger and Pedazur, "Research plan is the plan, structure, and policy of the enquiry conceived so as to obtain answers to research questions, and to control variances. The Plan is the overall scheme or program of the investigate. It includes an outline of what an researcher will do from writing the hypothesis will do from writing the hypothesis and their functioning implications to the finishing analysis of the data. The structure of the investigate is more specific. It is the outline, the scheme, the paradigm of the operation of the variables. Strategy includes the methods to be used to get together and analyse the data. In other words, plan implies how the problems encountered in the investigate will be tackled."

In a Masters and doctoral degree research, a research design is a working text that may be the result of the courses in research methodology and the discussions between the student and the straight.

A research design is an outline or blueprint of the research procedure which helps the beneficiary to take out his work more efficiently. It helps in planning a research, visualizing the data and the trouble associated with the employment of the information. Research and scientific method are generally considered as synonymous. The main difference in both the method is that we can do the scientific method without the research but we cannot think about research method without scientific enquiry. Hence we can say that research is the specialised forms of scientific method which can be perform with the use of rational thinking.

The normal human minds works when the problem arise. If the problem is easy to solve and are familiar to that person then he resolve the problem without applying thought process. But if the problem is complex and not familiar to that individual than he apply additional thought process and this additional thinking is known as reflective thinking.
It is the most important and critical aspect of the methodology. It throws an insight into the collection of the example and the process of data collection. A research design wants to answer the following questions:

- What will be studied?
- Which method or strategy will be used?
- Where will the data come from?
- How will the data be collected and analysed?
- When will each stage of the research be conventional out?

**Meaning of Research design**

After selection of problem and formulation of hypothesis the third step of a scientific research is to prepare a research design. It is a mapping strategy based on example technique. Education commission in 1964-66 as had given the following comment for the educational research.

- Lack of quality
- Lack of planning
- Lack of sufficient facilities
- Lack of communication
- Inadequate training facilities, for the research scholar
- Lack of carriers in study
- Un Enlightenment educational administration

Education commission 1964-66 as had given the following suggestion, to improvement in the field of research.

- According to the commission dissimilar universities should come together at regional and national level to mutual their facilities in the field of research.
- A national research academy of teaching should be developed, to encourage educational research and thought.
For funds distribution a study education council should, be developed at the ministry of education.

A research scholar should work two to three years for obtaining a Ph.D. quantity which should be thought, as the beginning and not the peak of that particular research career of the student.

Universities should have to conduct study to find out, and to resolve the problem of the education.

It is essential to increase charge on research field.

Multiple class teaching: research should be done, in the problem and techniques of manifold class teaching.

NCERT, NCTE, and other state institute should endorse education research but should not give affiliation, to other educational research institute.

Compared to the other Institute and countries education research in our countries is still in its infancy. The start of the research in the India was started in the first decade, from Baroda when they introduced compulsory elementary education all through the state.

Educational research refers to a systematic attempt to gain a better understanding of educational process. Generally for the purpose of improving its efficiency. It is actually an application of scientific method to the studies of educational problems. The main concerns of educational research are to understand, explain, predict and control human behaviour in individual and social situations so that event of situation can be improved further.

**Purpose of educational research** :- Research on education is conducted for full filling the following purposes.

- To solve the immediate local problems in educations
- To a ascertain principle and develop processer for use in the fields of education to determine to what extent we should go in educating children and adults.
- To answer the question related to education through reflective thinking to determine what should be on the bases of what is present and what was in the past.
- To discover new application of principle and laws in the fields of educations.
Need and Importance of Research in Education

Research in education is needed because of the following reasons:

- Educational has a direct link with history, philosophy, sociology, psychology, and economics. It is through an intensive process of scientific enquiry about the philosophical, sociological, psychological, and economic impact on various aspects of educational that scientific theories can be established.

- Educational is science and arts both. So there is a need to add scientific knowledge to it for enrichment and improvement. This will help in adjusting educational programmes according to the situation. Research will also give suggestions of what to do and what not to do.

- Introduction of democratic principles into the fields of education has given rise to numerous problems like the problem of individual difference, expansion of relations, building, discipline, etc. Solution of these problems needs systematic research and experimentation so that defects of traditional methods may be avoided.

- Meaning and application of many concepts of educational change today. So the limits of educational research have to be extended from the formal and conventional modes of education to the norms formal and innovative systems based on ecological and cybernetic models.

- Many new changes have taken place in the fields of knowledge in the 21st century due to scientific and technological development. Educational has to play a convincing role here too so that we can accept these changes with pleasure and adapt to these changes. Educational research will help us in this regard to construct curriculum, to prepare new textbooks, and to adopt new methods of teaching.

Numerous areas of educational research

Research conference which was held at Bangalore optional research in the different areas which are as follow:
Indian philosophy:

**Educational Management**: Educational Management and Administration. Educational research in this field can help us to understand the following aspects.

- Problems of educational administration in India and its impact on performance.
- Impact of educational planning and legislation on performance.
- School plants as a function of output.
- Development of management theories and its implications on educational institutions.
- Role of teachers and principals in enhancing performance of students.
- Impact of recruitment policies on output.
- Supervisions and performance.
- Contribution of NGOs in educational.
- Liberalization and privatization of higher education in India and so on.

**Educational evaluation, and measurement, Curriculum development**: nature and scope of research in this field can be understood by the following topics –

- Structure of curriculum in India from primary to higher level
- Analysis of psychological demands of learner at different stage of education.
- Analysis and organization of curriculum in various subjects.
- Curriculum in relation to needs of the learner of the society.

**Pedagogy and Child Psychology**: Research in these fields helps the teacher to understand the child in the classroom in order to improve teaching-learning process. These researches provide the following information’s.

- Relative effectiveness of socio-cultural forces on the development of children.
- Usefulness of learning theories in various educational setting.
- Relative effectiveness of various learning theories by field experiment.
- Identification of factors conducive to learning.
- Role of physical/intellectual efficiencies and defect in learning.
- Understanding the personality of children in the class.
- Effects of parental and teachers attitude towards children on learning.
- Understanding the problems of physically and socially handicapped children in the school systems.
- Role of teachers and text books in removing delinquency in adults and so on.
Syllabus, text book and teacher training.

Educational and occupational guidance.

**Educational Philosophy:** Philosophy of education – Researches in this fields can provides us the following information's

- Role of logic in various area of education from concept formation to theories development.
- Role of knowledge, beliefs, values and duties in developing educational theories.
- Role of ideologies and religion for improving educational practices.
- Development of a practical philosophy in Indian context.
- Finding new implication of ancient Indian philosophies in the present scenario.
- Determining the contribution of various Indian philosopher and their implications at present.
- Reorganisation of social structure and educational system at India.

**Educational Sociology:** Sociology of educational – various dimensions of research in these fields are given below:

- Effects of changes in the demographic structure on education.
- Role of educational institution in bringing about social change and vice-versa
- Role of social and culture factors in bringing about social and educational equity.
- Role of teachers as agent of social change, modernization and social equity.
- Education in disadvantage sections of the society.
- Minorities and their problems.
- Reservation polices and its impact on the social system and so on.

**Comparative education:** Educational researches in this field can help us to understand the following aspects of education.

- Administrative and educational polices of different countries and their impact on the society as a whole.
- Impact of various systems of education in the world on each other.
- Comparison of educational progress in various countries of the world.
- impact of economic progress on education
- Allocation of budget on education in different countries and its impact on educational progress and so on.

**Curriculum Development:** nature and scope of research in this field can be understood by the following topics:
- Structure of curriculum in India from primary to higher level.
- Analysis of psychological demands of learners at different stages of education.
- Curriculum in relation to needs of the learner and the society.
- Analysis of text books at different stages of learning.
- Modernization of curriculum in relation to changing needs.
- Inculcation of national values through curriculum development.

**Guidance and counselling:** researches in this field help us to understand the following aspects of education:
- Role of family and neighbourhood in making the children adjusted in the society.
- Construction of tools for diagnosis adjustment problems of students.
- Methodology of vocational guidance for children belonging to different strata of society.
- Identification of factors contributive to success in the life of students.
- Adaptation of foreign tests and inventories to Indian situations.

**Special Education:** physical handicap is genetic and acquired both 34 million special children in India invites the researchers in India to do something in their interest. From diagnosis to their rehabilitations, we come across a number of problems that are to be investigated scientifically to arrive at a definite solution.

**Educational Technology:** Educational technology researches contributes to the following aspects of knowledge:
- Development of new teaching learning strategies by action researches
- Role of technology in teaching learning process.
- Application of psychology to solving teaching problems.
- Developments of new audio visual aids and so on.
Characteristics of Ideal research design

- It should be complimentary from bias or learning.
- A good research design keeps the variables to a least amount so that understanding of results can be done easily.
- Hypothesis should be tested by appropriate arithmetical techniques.
- There should be enough places to inflict control over the situation.

Problems in research design

- Bias in sampling
- Lack of correct measurement.
- Improper stating, and testing hypothesis
- Unused data or missing data
- Lack of good statistical technique or unsuitable stat. devices

3.2 METHODOLOGY OF THE STUDY

The system of collecting data for research projects is known as research methodology. "Educational research methods can be categorized on the foundation of the, end results or goals, data gathering technique, method of data processing, degree of control exercised, approach, source of the data, and a number of other considerations". (Barr, 1960).

"The decision about the method depends upon the nature of the difficulty certain and the kinds of the data necessary for its solutions" (Sukhla 1974).

The validity and the reliability of the findings depend upon the method adopted and hence methodology occupies a very important place in any type of study. Following are some of the important types of research methodologies past Research.

- Experimental Research.
- Correlational research
- Descriptive Research.
Historical research
Survey method
Inter relation method
Casual comparative
Case study

These studies help us to know the extent of relationship between any two variables at present and to what extent one variable is expected to affect the other one in future. Coefficient of correlation gives us this scale and direction of relationship. For example if coefficient of correlation is 0.70 between academic achievement, and socio economic status.

It means that if socio economic status of the child improves in future, his achievement will also increase. The direction of relationship between two variables may be positive or negative and amount of relationship may range between zeros to one. Negative sign means inverse relationship Positive sign means direct relationship .Zero coefficient means no relationship Coefficient in the range of 0.45 - 0.55 means average connection and coefficient above 0.70 means high degree of positive correlation means if subject scores high in one field (intelligence) he is expected to score high in the connected field (achievement)

Case study It is an concentrated study of a social unit or an individual. They are sometimes conducted for the purpose of hypothesis testing, and thus it takes the appearance of experimental research.

In case study, the researcher gathers intensive information about an individual or a social unit in relation to the environmental forces that add the individual or social unit to behave in a particular manner.

This process was originally used in medical sciences to know the health status, and development of the person from the very beginning in order to ascertain the possible causes of the disease. Psychologists use this method to treat maladjusted people
and those who have any performance problem. This method is also used by counsellors and direction workers in the school system.

Case study is different from social surveys in the sense that social surveys collect information about few factors from a large sample but in case study a wide variety of intensive information’s from a limited sample, on an individual basis are gathered here.

Step Involved in Case Study: Following steps are involved in case studies:

- The present status of the individual or the social unit is determined through observation, physical investigations, or measurement. Standardized tools and techniques are used here for this reason. For example, if we want to conduct case study of a delinquent child, we will administer intelligence and personality tests to be familiar with his cognitive ability, and behaviour. His physique and other physical problems are also examined to know exactly what he is at present.

- In the second step hypothesis is formulated by formative the most probable antecedent of the case. For example the researcher can formulate the hypothesis that aberrant behaviour of the child is due to poor academic environment of the school.

- Hypothesis is verified in the third step on the basis of the information’s composed by the researcher. Interview and questionnaire are also used as research tools along with watching for gathering data here.

- In order to prepare a comprehensive report about the case, data are also collected from teacher, friends and relatives and then on the basis of these data hypothesis is either accepted or rejected.

- Some remedial measures are suggested to the individual, or the social unit in the fourth step. These suggestions are given in the beam of the possible causes of the problem.
Follow up study is conducted in the last step to know whether the treatment optional to the individual or social unit, is producing desired result or not. If the change is significantly positive, remedial measures are considered correct.

Limitations of Case Study

- Role of subjectivity concerned on the part of the researcher can give very prejudiced results.
- If exceptional have been targeted, in case studies no conclusion can be drawn about ordinary people. If sample is not representative. Conclusions will be misleading.
- Conformation of a case study is not possible, by other experimental methods of study.

Causal Comparative Studies

Through these studies an associate explains not only the status quo but also how and why it is so. This method is used when experimental method is impracticable or costly.

Through such studies similarities and differences among different phenomena or systems, are discovered. For example, “a comparative study of attainment of student of GGIC and Arya Kanya School in terms of infrastructure available”.

In this example following procedure will be followed –

Achievement of pupils in these schools in 10\textsuperscript{th} and 10 +2 will be compared. If difference between the two is important then infrastructure, and other facilities like availability of class rooms, library, laboratory playground required number of teachers every respect except the administrative arrangement then difference in administrative agreement will be considered the function of achievement. Causal comparative studies are conducted when a researcher cannot manipulate independent uneven by controlling the dependent one i.e. laboratory experiment is not possible.

Limitations of the study
The results obtained by this method can be criticized on the opinion that so many factors contribute to a particular effect and it is very difficult to isolate the real factors responsible for that result.

Classification of subjects into dichotomous group is very difficult

Control of variable is not likely here.

When connection between variables is established. It is very difficult to decide which the cause is, and which the result is.

Steps in Educational Research:

B.W. tucks man as given the following steps:

- Identifying the problem
- Constructing a hypothesis.
- Identify the labelling variables.
- Constructing operational definitions.
- Manipulation and overprotective variables.
- Construct research design.
- Identifying and constructing plans for observation, and measurement.
- Constructing questionnaire and interview schedule.
- Carrying out arithmetical analyses.
- Data analyses.
- Writing a research report.
- Conducting assessment studies.

Correlational and Prediction Studies:

These studies help us to get the information about the relation between two variables and how one variable affect the second variable and up to which extent in the future. Coefficient of correlation gives us this magnitude and direction of relationship among them. For example if coefficient of correlation is .70 between academic achievement
and socio economic status, it means that if socio economic status of a child improves in future, his achievement will also be increase. The direction of relationship between two variables may be positive or negative and degree of relationship may range between 0 – 1. Negative sign means inverse relation whereas positive relation means direct relation. 0 coefficient means no relationship is there. Coefficient in the range of 0.45 – 0.55 means average relationship and coefficient above 0.70 means high level of relation between two variables. High degree of positive correlation means if subject scores high in one field he is expected to score high in the related field.

**Types of correlation and corresponding types of scales**

- Pearson product correlation: here variables are expressed in interval scales.
- Spearman’s rank order correlation: here variables are expressed in ordinal scale.
- Point Biserial: here one variable is expressed in interval scale and other variable is expressed in nominal scale.
- Tetrachoric correlation: here artificial dichotomy is used for both the variables and they are expressed in nominal scale.
- Biserial correlation: here one variable is expressed in interval scale and the other on an artificial dichotomy.
- Phi coefficient of correlation: here both the variables are expressed in nominal scale and genuine dichotomy is used in both the variables.

**Limitations of Correlation Studies**

- Coefficient of correlation is only a number representing degree of relationship but they should not be taken arbitrarily, 0.70 coefficient is not double the degree of 0.35 coefficient.
- A high degree of correlation between any two variables doesn’t necessarily mean that there is a cause and effect relationship between them. Other factors may also be at work that might have influenced both the variables.
- Some logical relationship must be there in advance between the two variables. Merely correlating the numerals on two variables is wrong. For example, if we correlate anxiety with food habit then it will be wrong.

**Survey method:**
They describe the status quo of educational variables they are conducted to collect three types of information’s:

- Data concerning existing status.
- Comparing the existing status with the standard norms.
- Means of improving the existing status.

Survey studies may have different forms depending on the nature and scope of the problem. They may restrict to one region and encompasses the whole country. In survey studies the data may be collected from the whole population and a representative sample may also be approached to collect relevant data.

Important types of survey method are as follows:

- School surveys: It includes testing aptitude, intelligence, and achievement of student’s appraisal of school status and performance, study of financial position of schools, infrastructure of the school and its impact on performance of pupils, curriculum and text book studies, and service condition of teacher.

- Job analysis: it is basically used in business enterprises and industries. In the field of education it is used to collect information about duties and responsibilities of School Personnel, working condition of teachers and other staff, qualification of teachers, appraisal of performance of teachers, administrative decisions taken by the principal and other administrators etc.

### 3.3 THE METHOD OF THE PRESENT STUDY

The present investigation attempts at studying the attitudes of the primary school students towards the job education subject. In order to carry out the present investigation, the normative survey method, existed found suitable for this study.

**Normative survey method:** the methodology of research which is concerns with the present phenomena in term of situation, practices, beliefs and processes is termed as normative survey method, or descriptive survey, or trend survey.

**Characteristic of Normative method**

- It is not concerned with the persons but the whole population.
Scope of Normative survey method is very vast.
- Description may be verbal or given in arithmetical terms.
- Surveys may be Qualitative or quantitative.
- Data has been collected from large number of subjects.
- It gives information which is useful for answer of local problems.

**Significance of Normative survey method**

For the solution of a problem one has to assess the present conditions and get the information about what we want, and how to reach there.

- Normative survey method can help in locating the current problems,
- These type of studies are based on fact that’s why give practical information.
- These studies give much special emphasis on the application of scientific method by significantly analysing , and examining the source materials.
- Normative survey method helps in securing historical viewpoint, through a series of cross sectional picture of similar condition at different times.
- It helps in developing many tools, and suggestive of the course, of future development.

**Characteristics of a Good Research:**

- The researcher should contribute to the welfare of human being and to their knowledge.
- A researcher should never be an ending process. It must open the new avenues of research.
- It is a deliberate effort not a flash of intuition. Though it starts with sudden sparks of ideas.
- A research is a specialised process rather than generalised ones.
- It must be able to solve the local and national problems.
A research is more than compiling or analysing the data. It must be able to develop theories and principles.

A research is a creative process that can question the authority.

It should be objective in nature and should be free from any bias.

3.4 POPULATION

Until or unless the population of the study will be clear the researcher cannot be able to find out the results, or suggestions. The researcher can define the population on worldwide basis. It can be defined as the total mass, of observation which is the close relative group and from which sample is formed.

According to Walter R. Borg. Population is the sum total of all the objects, person under the study.

According to K.P. Pandey population can be defined as well distinct class of individual, people, objects etc.

In research methodology population means the exact group, for example primary schools students of CBSE board which have some special character i.e. age, male or female, attitude, economic background, personality etc.

Because of their dissimilar characteristics they have we can say that one population is completely different from other. While selecting the sample the researcher should clearly defines the population, and describes its description. Thus the population for any research study is the description of those exacting characteristics which is to focus the study.

3.5 DESCRIPTION OF THE POPULATION

Population in statistics means, the entire set of entities or events that are relevant to the subject of question. Usually the characteristics of the population have to be inferred from example (Rowntree, 1981).

For the present problem under investigation, the population consists of student in various schools of CBSE Boards and has information about work education subject.
For study the researcher had taken lot of safety measures, to ensure that sample selected from the primary schools students which truly represent the population.

3.6 SAMPLING

Sampling is an integral part of the research where the method adopted is survey. Sampling stands for the procedure by which moderately small number of individuals or measures of individuals, objects or events are selected or analysed in order to find out something, about the entire population or making from which it was particular.

To obtain a sample representative of its population, different techniques have been employed. Random sampling stratified sampling; individual sampling and purposive sampling are only some of them.

Random sampling is a tool in which every single unit of the population has an equivalent chance of being selected. Stratified sampling ensures representativeness in selecting a sample from a population collected, of subgroups of different types. Stratified sampling was found appropriate for this study.

The population of this study includes all the students studying, in primary schools VIII class as a sample of 450 students were selected for the administration of the questionnaire. Students (both male and female) studying subject were sufficiently represented in the sample. Due representation was also given to government and private schools as well as the schools located in rural and urban areas.

It is a process in which a very small numeral of population, object, individual, event is certain and analysed, to figure out about the big population. Sampling helps in minimising expenses, power and time of person who is doing the research.

Meaning of the sample

Proportion which represents the entire population is recognized, as sample. Proportion is not fixed all the time. Only less than 2-3 per cent proportion of the population gives us as agent sample.

Steps of sampling: there are certain steps in sampling:
Defining of population: any population can be defined as any collection of specified group of humans’, non-humans such as objects, institutions, time units, geographical events etc. It is also called universe.

The population may be finite or infinite or both. Population may be existent and hypothetical collection of all possible ways in which an event can be materialised or both. Exact definition of the population is necessary before selecting any sample. For example if we want to survey the achievement of students in mathematics, the researcher will have to specify the following things:

I: age and class of students
II: type of schools: i.e. government and private
III: economic condition of students
IV: academic year of which the data has to be collected
V: place of the population.

Listing of population: after defining the population, a comprehensive and accurate list of the population is also prepared. It is technically known as sample frame. It is very difficult to prepare a perfect sampling frame in large scale surveys. In such cases special care is necessary so that no unit or group of the population is left out.

Selecting a symbol of sample: after preparing a list sample is selected from the frame. A sample must have at least the following characteristics:

- It must be unbiased and true representative of the population.
- It must be adequate enough to represent the entire population.
- It must have all the characteristics of the population.
- Sample must adequately represent all the units or groups of populations from which it is drawn.
- It must provide all the information about the population from which the sample is drawn.
- It must be adequate enough to provide statistical treatment of the data.
Getting a good size sample: if the population is homogeneous, relatively small sample may serve the purpose. But if the population is heterogenous larger sample will be needed. Similarly if study is clinical and experimental, small sample is needed because we can control them easily and since each subject is measured repeatedly so it will be less time consuming. Large sample is needed when the differences between variables under study are small and variables are not highly correlated. The size of the sample will also depend upon the method used in drawing the sample.

**Method of sampling**

There are basically two type of sampling methods:

- **Probability sampling:**

  - Probability sampling:

  - Non probability sampling:

**Probability sampling:** In this method each and every part of the population has equal possibility of getting selected. Just because of this it is known by Random samples. In probability sampling, a researcher designs the sample in a way that ensures that each unit in the population has a fair chance of being selected and numerical value of that chance also be calculated. These methods can help the researcher in the following ways:

  - The researcher can know the size of the sample which is needed for a desired level of accuracy.

  - He can tell the chance of each unit being selected.

  - He can calculate sampling error.

  - He can determine the level of confidence.

**Characteristic of probability sample**

- It may be true agent of the population.

- In probability sampling there is always a risk of getting conclusion.

- Comprehensiveness of probability sampling is depends upon size and area.

- Data used in probability sampling is used, for inferential purpose.
Every individual has equal possibility of getting in to the sample.

Types of probability sampling methods

Simple random sampling: Certain methods are there for simple random sampling:

- **Lottery method**: suppose if there are N numbers in a population then each number is assigned a number from 1 to N. then these numbers are properly mixed up. After that required numbers, are taken up from the lot one by one. It is appropriate when the size of population is small and numbering to that population is possible.

- **Use of random table**: fisher and Yates prepared a table after assigning figure to the population; the researcher starts, from any point from that random table and read the number in any direction i.e. vertically, horizontally, or obliquely. He reads the number on the table and picks up that very number of unit one by one and in this way the required number of unit is selected. If the number of population is less than 999 researchers takes only three digits of the random table from the left and matches the numbers of the table to the number given to different units of the population.

Limitations:

Simple random sampling procedure is an ideal plan theoretically but practically it is very tough job if number of units of population is very large.

Simple random sampling procedure fails when lists of units of the population are not available.

This procedure becomes fail when the population is infinite.

It is again not good to use this method when different units of the population are heterogeneous in characteristics.

**Stratified Random sampling**: This type of sampling is the improvement of systematic sampling. In this type of sampling researcher divide the population on the basis of some characteristics and random sample is drawn from each strata. This classification of the population makes different small homogenous groups of the population and simple random techniques can be applied to each group to get the
required number of sample. Researcher should select that characteristic which is more appropriate, for his research work. For example we can divide the whole population into upper class, upper middle class, middle class, lower middle class, and lower class and then we can select the sample from each group.

A population can be stratified on many grounds such as sex, grade, economic condition, place of living, occupation, and caste, etc.

**Advantages**

- It can overcome most of the difficulties of simple random sampling.
- It can be used when lists of all units of the population is not available.
- This method is especially useful in opinion surveys when we have to cover a large and scattered population.
- It can make different unit of the population homogeneous and small and thus we can use lottery method for each stratum very easily.

**Systematic sampling:** when a population is finite and can be properly listed, this method is used. Here all the units of the population are listed in an alphabetical order first. Then we have to select 100 units out of 1000 units of a population, we will keep interval of 10 units throughout the populations. For example if we have selected 4\textsuperscript{th} unit then we will select 14\textsuperscript{th}, 24\textsuperscript{th}, 34\textsuperscript{th}, 44\textsuperscript{th} and so on and thus required sample will be drawn. If the population is homogeneous this method of sampling is as good as simple random method and the researcher cannot apply his own bias here. This sampling is the improvement of simple random sampling. In this sampling total information, about person of the population in the systematic way. The size of sample is decided as follow:

\[
\text{If, sample size } = n \\
\text{And population size } = N
\]

\[
\text{Then } N/n \text{ th Individual of the list is known as systematic sample.}
\]

**Limitation:** This method will not work properly in two situations:

- If the population is showing some trend in its characteristics, then trend will not change from beginning to end and thus sample may be biased to a particular trend. For example selection of 2\textsuperscript{nd}, 12\textsuperscript{th}, 22\textsuperscript{nd}, 32\textsuperscript{nd}, etc may not have the same characteristics as 10\textsuperscript{th}, 20\textsuperscript{th}, 30\textsuperscript{th}, 40\textsuperscript{th}, etc. may have.
This method will also not work in case of cyclic variables. If the attendance of students of a school is generally very low on Mondays due to certain reasons and we select only Monday of the week for the whole year as a sample for studying the attendance of students, our sample will not give the correct result.

**Multistage sampling:** It is more complete agent of the population in this sampling primary samples are known as inclusive groups and secondary groups, are selected as sub units within this final unit. The individuals are selected from different stages for multistage sampling. It is used in large scale surveys to make the study more comprehensive. Sampling here is done in two or three or four stages. In large scales surveys we generally use mailed questionnaire to collect data. The missing data due to incomplete response or non-return of the questionnaire might cause a bias. In such cases double stage or triple stage sampling is used to make the sample representative to the population. The researcher draws a second sample at random from non-respondents and contacts them to personally to collect the required information with the help of the interview. Then generalizes the information to the entire non-respondent population. One more example is that if we want to study the attitude of the teachers across the country towards a particular text books, we will first sample states from across the country. Then sample of few districts will be selected from each state. Finally sample of few schools will be selected from each district and thus survey will be undertaken.

**Cluster sampling:** In this sampling the selection of intact group as a whole. In this sample units are in order in a cluster in place of individuals. for example in place of listing all the students, of degree college in a particular place and randomly selected 14% of these students for the sample, a member list all the degree colleges, in the city and select as chance 14% of the clusters of units and use all of the student selected for the sample. This method is used when

1- Population is infinite.

2- List of all units of population is not available.

3- Population is scattered over a wide geographical areas.
4- Individuals have to study as a group.

5- Individual units cannot be sampled due to administrative reasons.

For examples we cannot list all the students of class VIII or IX of the whole state so we will form clusters of whole population due to large area of population. That is why it is also called Area sampling. The individual in these clusters have almost all the characteristics of their respective groups. Suppose we want to study any educational problem of primary schools students in Maharashtra, we will not select all the primary schools. We will select only few representative schools and study their problem. Then the result will be generalized to whole state.

**Non probability sampling:** In this method researcher selected the sample on the basis of carefulness without any theoretical basis. In this method researcher just keep in mind that he/she as to collect his sample, to fulfil his reason only. There are certain methods of non-probability sampling which are as follow.

**Characteristic of Non-Probability sample**

- In Non-Probability sampling there is no preparation of population.
- The observation used in non-probability sampling is not used, for overview purpose.
- In non-probability sampling non-inferential or non-parametric statistics method is used.
- In non-probability sampling there is free sharing of sample.
- There is no chance of select any individual, in this type of sampling.

**Types of nonprobability sampling**

- **Quota sampling:** This type of sampling is the combination of both judgemental and chance sampling. In quota sampling population is classified into various categories. The number of population falling into each unit is determined on the foundation of judgement, or on the basis of previous knowledge.

- **Incidental sampling:** In this type of sampling samples are taken because they are most often available. It is refer to a group which is readily available or we can
say that associate, is not capable to admission more acceptable sampling methods.

- **Purposive sampling:** In this method sampling is done by some arbitrary method because it is agent, of the total population. It is suitable method which gives special stress on the control on some variables.

- **Judgemental sampling:** It involves the selection of a population through the available information, which should be the agent of the total population. As in this type of sampling researcher, takes the example with his own that’s why this method of sampling is highly risky.

- Snowball sampling:
- Model instance sampling:
- Expert sampling:

- **Double sampling:** this type of sampling is the new application in sampling techniques. It is usually used to get the reliability, of a sample. This type of sampling leads to free determination accuracy based on observation. Chance of error is very less this type of sampling. These sampling techniques cannot be used for the large sample. This techniques is time consuming and very expensive.

**Advantages of non-probability sample:**

These methods are very useful in the situation when.

1- The sample to be selected is small and researcher want to get some idea about the population characteristics in a very short period of time.

2- The researcher wants to understand the problem by contacting with only informed people.

3- Different units of the populations have total characteristics of their respective units then selection of few units of so many is considered sufficient.

**Limitations of non-probability sample:**

1- Such sample can be biased and hence generalisation of results for the entire population may be misleading.

2- Sampling error in these samples cannot be determined because they can affect variance within the group as well as between groups.
3- Such sample depends on uncontrolled factors and researcher insight which cannot be realised on all the time.

4- Such sampling frame does not adequately cover the population.

**Characteristics of a good sample:** good sample behaves like a mirror to the research. Characteristics of a good example are as follow;

- **True representative:** a good sample should be true representative of population regardless of their characteristics.
- **Free from bias:** a good sample does not authorize bias. It should be free from bias prediction or an imagination, not to power its choice.
- **Objective:** a good sample should be objective in nature.
- **Accurate:** a high-quality sample is always precise. It gives the exact information which we need.
- **Economical:** sampling technique is much less expensive, and less time consuming than other technique.
- **Approachable:** a good sample should be simply approachable. It should be true representative and economical.
- **Feasible:** a good sample makes the research work more possible.
- **Practical:** sampling technique is scientific in nature. Because the conclusion which we get from study, can be check by other study.

### 3.7 NATURE AND SIZE OF THE SAMPLE

The researcher had intended likert five point attitude scales for the students, the researcher managed to get all 450. Finally the sample size was 450 students.

### 3.8 TOOLS FOR DATA COLLECTION

The instruments which are used to get the new things, facts, and new things are known as equipment. Various tools are used to collect different types of data. The tools which is to be used is depends upon type of research proposal. The research scholar may use one, or more equipment according to the research.
The choice of the tool depends upon the nature and purpose of the research. A suitable research tool contributes to the power of the findings of any research study. The success of any research study, depends mainly on the nature of tools used.

**Classification of Research tools**

Research tools are of various types.

- Inquiry types: inquiry types of research tools contain following thing:
  - Questionnaire,
  - Schedule,
  - Check list,
  - Rating scales
  - Score card
  - Opinionnaire extent or attitude scale.

- Observation tools:
  - Interview:
  - Sociometry:
  - emotional tests:

As far as this research study is concerned, its purpose is to make a relative study of attitude of students towards, the WE subject. For this purpose the researcher had used the likert five point approach scale method of data collection based on the 5-point Likert scale.

**The Likert Scale:** In interpret the results of research in which the method concerned the use of questionnaires, one commonly used psychometric scale is the Likert Scale. The Likert extent is a popular format of questionnaire that is used in educational research. It was invented, by Rensis Likert, an instructor and psychologist. The researcher has used the 5-point Likert scale.

The researcher collected more than 28 statements, about the subject. After the statements were gather, a trial test was administered on 130 students.
The attitude or opinion scale such as the Likert Scale may be analysed based on the percentage responses, for each individual statement. The Likert scaling technique assigns a scale value to each of the five respondents as follows. All statements favouring the point of view are scored:

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>RESPONSE</th>
<th>SCALE RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strongly agree</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Agree</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Indifferent</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Disagree</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Strongly disagree</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3.1

All statements opposing the point of view are scored in the opposite order:

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>RESPONSE</th>
<th>SCALE VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strongly agree</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Agree</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Indifferent</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Disagree</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Strongly disagree</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3.2

Guidelines for making opinionnaire items:
Available literature on that exacting matter should be surveyed before preparing opinionnaire scale.

Different subject should be contacted for expresses their views, consideration, and idea about the topic.

Both negative and positive thought, and statement should be taken to arrange the opinionnaire.

Both the statement should be arranged alternatively or in a chance order.

As far as possible both positive and negative report should be in equal number.

Limitations of the Opinionnaire:

Opinionnaire may not be correct.

Respondent may give the answer or respond dishonestly.

Respondent may tend to respond according to their wishes as per to the opinionnaire rather than what they in fact feels about that topic.

3.9 VALIDITY OF TOOLS

"Validity is that quality of the tools used or process that enable to measure what it is supposed to determine" (Best & Kahn, 1999).

Validity of a tool lies mainly in the procedure adopted for construct it. The attitude scale was constructed by taking care to cover all the aspects relating the approach of the students. Moreover, it was submitted to five experts for necessary modification, and the draft scale was item analysed. In the words of the experts "... it is developed properly by taking awareness skills, cognitive development and perceptions towards different dimensions ....." Thus, the attitude scale can be careful valid and reliable. The final form of the opinionnaire consisting of 28 items was administered to students (N = 450). The final form of the attitude is given in Appendix.

The research should be externally and inside valid. This is essential for the testing hypothesis according to camphel, and Stanley there are two types of soundness

Internal validity
External validity

**Internal validity:** The extent to which extraneous variables are not affecting the results of the experiment is a measure of internal validity of trial. Those extraneous variables that can affect the internal validity of the research design are given below –

- If subject has gained something extra in between the period of first and second measurement it will affect the trial results.
- Physiological changes in the subject due to maturation due to long period of experimentation, can affect his presentation in the second measurement.
- The subject can use his pre-test experiences in his post test presentation.
- Different measuring instrument used in the first and second test will also affect the real result.
- Group chosen on the basis of extreme scores can cause statistical regression effect. When action is given, to this extreme group of population, it will move towards the population mean.

- The groups selected for experiment may differ significantly on variable that are related to dependent variable, even before the application of experiment

**External validity:** It is related to whether the relationship that has been identified and measured can be generalized outside, the experimental setting or not. The extent to which this objective is achieved is the measure of external validity.

**Reliability of the Tool**

The researcher used the SPSS package to conduct the reliability study of the tool by making a pilot study of the target group.

**The Corn Bach’s Alpha Table showing the Reliability of tool used for data collection**

<table>
<thead>
<tr>
<th>Cornbach’s Alpha</th>
<th>Cronbach’s Alpha Based on Standardized, items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.10 DATA COLLECTION

For the reason of the present study, data was composed from the primary class students of government, and private schools of CBSE Boards. The respondents were given a period of time, to answer the questionnaire. Some responded promptly while some took quite some time to do so.

To begin with, the researcher made telephonic contact with the principals' of different schools. It was difficult to even obtain a preliminary meeting with the respective heads to give details the purpose of the study.

Once the researcher could meet the heads of institutions on the basis of pre fixed meeting, the researcher might show the letter of authority, given by the Guide. The researcher explained the purpose of the research, the topic under study and the benefits that would occur to the policy makers, from the findings of the study.

After the permission to collect data was secured, the investigator met the respective class teachers. The importance of the study, objectives of the study was told to them with clear instructions, on how to answer the questionnaire was given to them. After the period was over the investigator has collected the questionnaire, and analysed it with the help of TISS SPSS packages.

Table 3.4 Data chart of different CBSE schools in thane district

<table>
<thead>
<tr>
<th>Total number of school in thane</th>
<th>4500 (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of CBSE schools in thane</td>
<td>265 (approx.)</td>
</tr>
<tr>
<td>Total number of private CBSE schools in thane</td>
<td>155 (approx.)</td>
</tr>
<tr>
<td>Total number of government CBSE schools in</td>
<td>110 (approx.)</td>
</tr>
<tr>
<td>thane</td>
<td>105 (approx.)</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Total number of CBSE schools in rural area of thane</td>
<td>105 (approx.)</td>
</tr>
<tr>
<td>Total number of CBSE schools in urban area of thane</td>
<td>160 (approx.)</td>
</tr>
</tbody>
</table>

**Table 3.5**

List of schools for Data collection:

<table>
<thead>
<tr>
<th>S.no.</th>
<th>Name of school</th>
<th>Area</th>
<th>Type of school</th>
<th>Type of educational system</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arunodaya public school</td>
<td>Rural</td>
<td>private</td>
<td>Co education</td>
</tr>
<tr>
<td>2</td>
<td>Little angel high school</td>
<td>urban</td>
<td>private</td>
<td>Co education</td>
</tr>
<tr>
<td>3</td>
<td>Seven square academy</td>
<td>Rural</td>
<td>private</td>
<td>Co education</td>
</tr>
<tr>
<td>4</td>
<td>St. Xavier’s school</td>
<td>Urban</td>
<td>government</td>
<td>Co education</td>
</tr>
<tr>
<td>5</td>
<td>Kids kindom high school</td>
<td>Rural</td>
<td>private</td>
<td>Co education</td>
</tr>
<tr>
<td>6</td>
<td>New horizon public school</td>
<td>Urban</td>
<td>private</td>
<td>Co education</td>
</tr>
<tr>
<td>7</td>
<td>Adarsh vidya mandir and jr, college</td>
<td>Rural</td>
<td>government</td>
<td>Co education</td>
</tr>
<tr>
<td>8</td>
<td>D.A.V public school</td>
<td>Urban</td>
<td></td>
<td>Co education</td>
</tr>
<tr>
<td></td>
<td>School Name</td>
<td>Location</td>
<td>Ownership</td>
<td>Type</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------</td>
<td>----------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>9</td>
<td>Saraswati vidya mandir</td>
<td>Rural</td>
<td>government</td>
<td>Co education</td>
</tr>
<tr>
<td>10</td>
<td>Kendriya Vidyalaya kolshet</td>
<td>Urban</td>
<td>government</td>
<td>Co education</td>
</tr>
<tr>
<td>11</td>
<td>Universal senior secondary school</td>
<td>urban</td>
<td>private</td>
<td>Co education</td>
</tr>
<tr>
<td>12</td>
<td>Army public school</td>
<td>Rural</td>
<td>government</td>
<td>Co education</td>
</tr>
</tbody>
</table>

Table 3.

3.11 ANALYSIS

The collected data was processed and analysed with the main outline of the research design. For the present study the analysis, is divided into descriptive analysis and inferential analysis. For item-wise analysis, the percentage method was used, while for testing the hypothesis the "t" test was worn.

For study of the data collected the researcher has come in contact with the head of TISS SPSS and sends the raw data for analysis. With the help of SPSS raw data has been analysed. Analysis of any data can be done by two methods:

- Quantitative analysis
- Qualitative analysis

Quantitative analysis: when we use questionnaire, interview, rating scales etc. Quantitative analysis method is used. Analysis of data refer to study the data collected and to find out the hidden facts, about the topic. Various methods are applied to find out these hidden facts basically there are three types to analyse the Quantitative data.

- Content analysis
- Logical analysis
Inductive analysis

**Qualitative analysis**: qualitative analysis method is used for qualitative analysis in which different tools are organised, interpreted and analysed.

There are certain steps in qualitative Analysis of Data which are as follow:

- Organising of Data
- Analysis of Data
- Interpreting of data
  - Ignoring of unstudied factors
  - Ignoring of selective factors
  - Interpreting extra results
  - Interpreting negative results
  - Interpreting the results when null hypothesis is retained
- Drawing of conclusion and generalisation

**Formulation of hypothesis**: Here hypothesis about a population parameter is formulated. Then we collect sample data, use sample statistics and make use the result to decide how far our hypothesized population parameter is correct.

In short in hypothesis testing the disparity between, the assumed value and the actual value of the sample mean is determined After that we judge by using tables whether the difference is significant or not. For this purpose the observed value, and the table value are compared. Two hypotheses are simultaneously formulated for this purpose —

**Null hypotheses**: (Ho) This type of hypothesis asserts that there is not any difference in the sample and the population in the particular matter, under study. The word null actually means invalid void, Zero or not considerable. If there is any difference found it is accidental our unimportant, arising out of fluctuations of sampling?

For example if a hypothesis that achievement of students from higher and middle class does not differ is formulated and achievement of these two groups of students
are compared, we see that if the difference of achievement is not significant null hypothesis is accepted It means that there two groups of students. If slight difference is there it is due to the variation in sampling or due to other reasons than economic status.

Similarly, if we want to know whether extra coaching, has benefited the students or not. Null hypotheses will be extra coaching has not benefited the students: Thus rejection of null hypothesis indicates that difference, is statistically significant and vice versa.

**Alternative hypothesis:** (ha) It specifies those values that the researcher believes to hold true for example he may hold the assumption that drill technique enhances achievement. For this purpose he will select two groups controlled and experimental, and apply the technique on experimental group finally he will compare the achievement of these two groups . If difference is significant hypothesis will be conventional. In that way null hypothesis will be rejected.

One more example will make the difference between, these two hypotheses clear.

If a researcher is interested in testing the difference between the mean IQ of two groups, null hypothesis will be that the two groups have equal means \( H_0 = \mu_1 - \mu_2 = 0 \)

\[
H_a = \mu_1 - \mu_2 \neq 0
\]

- Fixing a suitable significance level: In the second step the validity of \( H_0 \) against \( H_a \) is set up at a certain level of implication the significance level, is generally expressed as a percentage such as 5 % or 1% is the probability of reject the null hypothesis, if it is true when a hypothesis is accepted at 5% level of implication it means that in the long run the researcher will be making wrong decision about 5 times on every hundred occasions.

- Formulating a test criterion: Formulating a test criterion is the third step of testing hypothesis here an suitable probability distribution, for the particular test is selected If distribution is normal t or F test is applied and in other cases non-parametric tests are applied.
Computation: After formulating a test criterion a number of computations are done. These computations include testing symbol, and standard error of testing statistic.

Making Decisions (Drawing conclusions): A statistical conclusion is a decision either to reject or accept a null hypothesis. This decision is made on the variety of level of meaning. If 5% level of significance has been fixed and experiential set of result has probabilities less than 5% (the value of the test is more than table value) we consider the difference between the sample statistics and the hypothetical limit important.

On the other hand if at 5% level of significance the observed set of result has probability more than 0.05 we come to the conclusion that the difference is there due to chance factors or chance variation as a results $H_0$ is accepted and $H_a$ is rejected and we state that trial observations, are not inconsistent with the null hypothesis.

Types of errors in testing hypothesis

- While testing a hypothesis, two types of errors are seen –
- Hypothesis is true, but our test reject it (Type I Error)
- Hypothesis is false but our test accepts it (Type II Error)
- Type I error is committed by rejecting the null hypothesis when it is true i.e $\alpha = \text{Prob (type I error)}$
- Similarly, when type II error is committed following equation is seen i.e. $\beta = \text{prob (type II error)}$.
- While testing hypothesis a researcher reduces these two types of errors But due to fixed sample size, it is not possible to manage, both errors simultaneously. If we want to keep $\beta$ low, we will have to put up with a high $\alpha$. And vice versa. Technically it is more dangerous to commit type II error than that of type I error. Hence we keep the probability of comprise type I error at a, convinced level of significance.

Properties of ‘t’ distribution –
‘t’; Distribution ranges from minus perpetuity to plus infinity.

Constant C actually a function of v so that for a particular value of v, the distribution of f (t) is completely specified. Thus f (t) is a family of functions one for each value of v.

Like the standard normal distribution the ‘t’ distribution is regular, and has a mean zero.

The variance of ‘t’ distribution is greater than one, but slowly approach to one as the number of degree of freedom and hence size of the sample increase.

Procedure for using ‘t’ table

‘t’ value is evaluate with reference to ‘t’ table with a convinced degree, of freedom.

This t table consists of five columns. The first column indicates the degree of autonomy from 1 to 100.

The remaining four columns show the ‘t’ value at four levels of significance i.e. 0.10, 0.05, 0.02 and 0.01, Out of which 0.01 and 0.02 levels of significance are used, for concurrent means. It is also called one tailed test.

\[ df = (N-1) \]

0.05 and 0.01 levels of significance are use, for unrelated means. It is also called two tailed ‘t’ test.

\[ Df = (N_1+N_2 -2) \]

Here \( N_1 \) and \( N_2 \) are the figure of observations in the two samples.

Advantages of ‘t’ test

We can test the meaning of difference connecting two means of the two groups we can thus find out, whether there i really a difference between means or it is due to chance factors.

We can easily find out the effectiveness, of a treatment given to two different groups or to a singly group.
We can also discover out the mean, of the population from which the sample is drawn.

‘t’ test can be applied to even large sample, and we will get very dependable result.

**Limitation of Hypothesis Testing**

While testing hypothesis the following points must be kept into account.

- Mechanical use of testing is absurd: There may be situations where huge difference between means exist. In such situation too we cannot say whether difference is significant or not without going during, such tests. Even after testing the significance results should be interpreted very carefully.

- Conclusion is to be drawn in terms of probabilities not in terms of certainty: When test of significance shows real difference between, means it cannot be definitely stated that this difference will always occur. It only shows the 99% or 95% level, there is 5% chance that this disparity between two means will not be seen.

- Testing does not respond the question of why the difference between means is there: Hypothesis testing is only a numerical treatment, of the data. It does not deal with those factors responsible for the difference.

- Precautions regarding assumptions: many hypotheses are tested even though the assumption regarding the procedure is not fulfilled. For example samples are not strained from the population about which study is being conducted or the population and hence sample is not normally distributed or model is biased in any way etc. Hypothesis testing does not touch these problems.

- Limitations of behavioural science: No testing is direct and hence perfect in all behavioural science so degree of deficiency should always be taken in view. It means that chance of error is always there due to indirect nature of measurement in behavioural sciences.

**Sampling Tree**
Mean of the variables and its subgroups:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Boys (rural)</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>Girls (rural)</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td>Boys (urban)</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td>Girls (urban)</td>
<td>112</td>
</tr>
<tr>
<td>Area</td>
<td>Rural</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>225</td>
</tr>
<tr>
<td>Grade</td>
<td>Seventh class</td>
<td>450</td>
</tr>
<tr>
<td>Type of school</td>
<td>Government (rural)</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td>Private (rural)</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>Government (urban)</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>Private (urban)</td>
<td>113</td>
</tr>
</tbody>
</table>