CHAPTER III

PLAN AND PROCEDURE OF THE STUDY

3.1 Planning of the study
3.2 The population and the sample
3.3 The variables and their measurement
3.4 Instrumentations
3.5 Description of the tools
3.6 Data collection
3.7 Data organization
3.8 Statistical Technique Used
This chapter presents an account of research method, population and sample, different variables involved in the study, description of tools, data collection and statistical techniques used in the present study.

**Research Methodology**

**3.1 Introduction**

Research methodology is a systematic process in which researcher finding a path to solve the research problem. During this procedure the researcher adopted several steps to solve the research problem. The researcher must have a knowledge about the research methodology and it is necessary what type of research methods/techniques should be used to find the solution of the research problem. Researcher also need to understand the assumptions underlying various techniques and they need to know the criteria by which they can decide the certain tool/techniques and methods will be useful to solve certain problem and other will not. Every research problem have a specific problem in nature and what type of research tool/technique is relevant to solve problem. These are many research tool & techniques used in research, but the researcher have adopted those research tool & techniques which is useful for his research problem.

Thus research methodology has many dimensions and research methods do constitute a part of the research methodology. Research methodology is not only the research methods but also the consider the logic behind the methods.

There are several methods of investigation. It will be difficult to say which one of them is most appropriate as each has it’s own merits and short comings. Moreover the selection of research method depends on the nature of the research topic. The choice of research method is sometimes determined by the nature of topic under study, Objectives of the study resources of the investigator etc. These considerations have led the investigator to use the descriptive survey method of research studies of this kind representing a specific population collected through highly structured and detailed questionnaire or interview. In the present investigation all the steps have been followed which are essential for survey method.

**Descriptive method**
A descriptive study is present oriented research. It describes and interprets what is. It is primarily concerned with conditions or relationships that exist, opinions that are held, processes that are going on, that are evident or trends that are developing.

Descriptive research deals with the relationship between variables, the testing of hypothesis and the development of generalization, principles or theories that have universal validity. In other words, in this type of research the researcher engaged in descriptive studies carry on the same activities as researcher of the other field do: they

1. Identify their research problem
2. List the assumptions upon which their hypothesis and procedure are based.
3. State their objective and hypothesis
4. Choose appropriate subjects and source materials
5. Select or construct tools for data collection
6. Specify categories of data that are relevant for the purpose and capable of bringing out significant similarities, differences or relationship
7. Describe, analyze and interpret their data in clear and precise terms.
8. Draw significant and meaningful conclusion

The primary purpose of the present study was to determine the comparative impact of teacher training through distance mode and formal mode on teaching competence and attitude forward teaching of B.Ed. teacher trainees. The researcher reviewed most of the related literature to identify the appropriate method of strategy which is most suitable for the present study. To ascertain the effect of teacher training, a number of studies conducted so far were reviewed and it was found that most of researchers had used survey method.

**Survey method**

The survey is present oriented research. It is therefore, suitable for problems in which the researcher believes that although the data needed to resolve his research question do not exist, the setting in which those data could be generated do exist. The researchers approach then is to go to those setting, administer appropriate data collection devices and analyze the data. In the sense that the settings are known and data required reasonably well defined by the statement of the research problem, the
survey approach is more structured for the researcher than the historical approach. However, surveys have their own problems, the difficult problems of instrument development—data collecting devices.

Survey research is a new technique for social science research. Survey, as such, is quite an old technique and was largely developed in the eighteenth century. However, in the second part of the nineteenth century a systematic literature was made available by Booth who is regarded as the father of scientific social surveys (Moser & Kalton, 1971). But survey research as a special branch of social science research, is considered as a new technique developed in the twentieth century.

Survey research, mostly used by psychologists, sociologists and anthropologists, should be distinguished from sample survey, which is its close ally. The survey researcher is primarily interested in assessing the characteristics of the whole population. Thus, survey research may be defined as a technique whereby the researcher studies the whole population with respect to certain sociological and psychological variables. For example, if a researcher wants to study how many people of both sexes in India adopt contraceptive devices as a measure of birth control, this will constitute an example of survey research. But a survey researcher rarely takes pains to make an approach to each member of the population or universe probably because it requires a lot of time, money and patience. Thus he takes a convenient random sample, which is considered to be representative of the whole universe and subsequently, an inference regarding the entire population is drawn. When a researcher takes a sample from the population for studying the relative incidence, distribution and relationship of psychological and sociological variables, the survey is termed as a sample survey.

Survey research depends upon three important factors:

1. As survey research deals with the characteristics, attitudes and behaviours of individuals or a group of individuals called a sample, direct contact with those persons must be established by the survey researcher.

2. The success of survey research depends upon the willingness and the co-operativeness of the sample selected for the study. The people selected for the survey research must be willing to give the desired information. In case, they are not willing and do not co-operate with the survey researcher, he should drop the plan in favour of some other technique.
3. Survey research requires that the researcher be a trained personnel. He must have manipulative skill and research insight. He must possess social intelligence so that he may deal with people effectively and be able to extract the desired information from them.

**Purpose of surveys**

The purpose of surveys research is simply to provide someone information. the someone may be government wanting to know how much pupil spend on food; business concerned interested to find out what detergents people are using. Research institution study in housing of old age pensioners and so on. the survey or conducted to collect detailed description of existing phenomenon with the intent of employing data to justify current condition and practices or to make more intelligent plan for improving them. their objective is not only to analyze, interpret and report the status of an institution, group or area in ordered to guide practices in the immediate future, but also to determine the adequacy of status by comparing it with establish standard. some survey are confine together all three types of information:

1. data concerned for existing status
2. comparison of existing status with the establishes status and standards
3. means of improving the existing status

A full inventory of all types of survey research is out of place here but we may take note three types of survey given by fox stemming from the researcher intent to describe, compare or evaluate. these types are descriptive survey, concerned with describing a specific set of phenomenon at one point in time, the comparative survey intended to compare to more research situation in terms of some preselected criteria and evaluate survey planned to evaluate some aspect of a research situation, again in terms of preselected criteria.

Survey is an important type of study. it must not be confused with the mere clerical routine of gathering tabulating data. it involves clearly define problem and definite objective. it requires expert and imaginative planning, careful analysis and interpretation of data gathered and logical and skilful reporting of the findings. survey is defined in libraries glossary as “a scientifically conducted study true which data is
gathered according to a definite schedule which is presented in statistical, tabulated or summarized form”

Thus, on the basis of research studies conducted so far in this area, the investigator reached the conclusion that only the normative survey method. “Now accepted as a fundamental instrument of Sociological Research” is more appropriate for the study undertaken by this researcher.

**Types of Survey Research**

Depending upon the ways of collecting data, survey research can be classified into different categories, namely, personal interview, mail questionnaire, panel technique and telephone survey. A detailed discussion of each of them is presented below-

1. Personal interview
2. Mail Questionnaire
3. Panel Techniques
4. Telephone Survey
Personal Interview

Personal interview, also known as the survey interview, is one in which a direct conversation between the interviewer and the respondent is held with a view to elicit some information from the latter. The situation of a personal interview is such that the interviewer neither tries to help the respondent nor to educate him. He is simply interested in eliciting information from the respondent where he (the respondent) is likely to be one of many from whom similar information is elicited. According to Cannell & Kahn (Lindzey & Aronson, 1968) there are three necessary conditions for a successful personal interview. The first is accessibility. By accessibility is meant that the information required be such that the respondent be able to convey it to the interviewer.
In other words, the content of the required information must be expressible without producing any embarrassment to the respondent. The second is cognition by which is meant the understanding on the part of the respondent of what is required of him and what types of information are required. The respondent must know and understand what types of information he is going to express and in what terms of reference he should express the required information. Sometimes, it has been found that the respondent does off the point and where this occurs, it becomes the interviewer’s job to teach the respondent his appropriate role so that he may return to the right track. The third is motivation of the respondent. The respondent must be motivated to give accurate answers because a highly distorted answer is no better than no answer at all. When the respondent is motivated, he would tend to co-operate with the interviewer. Where the respondent lacks motivation, the interviewer should try to build up those factors, which may increase his motivation.

The success of personal interview is dependent upon the satisfactory fulfillment of these three factors. Apart from this, the success of an interview is largely dependent upon the interviewer’s personality. An interviewer cannot be regarded as merely a means of extracting information. His personal bias and attitude may affect the required information. It is, therefore, suggested that the interviewer must be a trained person so that he may be able to ask probing questions in an impartial way and also be able to exhibit a permissive attitude throughout the interview.

**Mail Questionnaire**

Mail questionnaire (or survey) is one of the most common types of survey methods used in educational and sociological researches. As its name implies, the questionnaire consisting of several items designed to elicit the required information is prepared and mailed to the respondent with the request to return it after answering all the items. Thus the mail questionnaire appears to be a direct means for obtaining information from every respondent. There are several advantages of a mail questionnaire.

First, the mail questionnaire is less costly than an interview. The cost of mailing questionnaires in which postal expenditures take the place of interviewer’s expenditures is generally less than the cost of interviewing the respondent.
Second, through the use of mail questionnaires a widely scattered population can be surveyed rapidly and with less expenditure. Thus, a mail questionnaire is a quick method of survey even in the case of a scattered population.

Third, a mail questionnaire easily avoids many problems associated with the use of the interviewers. There are many sources of interviewers’ errors, particularly their personal bias, and influence, which tend to lower the reliability and the validity of the survey. The use of a mail questionnaire automatically avoids these errors of the interviewers.

Fourth, the problems arising out of contacting the respondent are avoided in the mail questionnaire.

There are ten principal disadvantages of the mail questionnaire.

1. The main problem is the non-response from the respondent. Generally, the percentage of responses to a mail questionnaire is very poor, although Scott (1971) has mentioned in his reports of five mail surveys carried out by the Government that the percentage of response rate was in the region of 90. In a mail questionnaire it is not the loss of sample numbers (due to the non-response of the respondent), which is serious, rather the probability that the personality characteristics of non-respondent differ from the personality characteristics of the respondents and any inference based upon the latter is likely to be automatically biased. There can be two suggestions for improving the response rates of mail surveys. First, no awkward and/or embarrassing question should be asked because even a single awkward question is likely to produce a high rate of non-response. Second, the mail questionnaire should be accompanied by a stamped self-addressed reply envelope because many respondents do not wish to pay the postal charge and for that reason, may not reply. Besides, a third suggestion may also be made for improving the response rate to the mail questionnaire. If the design and the purpose of the study permit, those persons who are less educated, less interested and belong to the lower socio-economic status should not be included in the sample because evidences indicate that such persons do not reply to any questionnaire mailed to them.

2. Married women, especially those having above-average numbers of children have a higher rate of non-response.
3. The mail questionnaire is an ineffective technique of survey where the objective and purpose of the survey needs sufficient explanation for its complete understanding.

4. The mail questionnaire is an effective technique where the questions to be asked are simple and straightforward so that they may be understood with the help of printed instructions. Where the questions are difficult, complex and technical, the mail questionnaires become useless.

5. When it is desirable to probe the respondents deeply or to talk with them, the mail questionnaires serve little purpose.

6. Mail questionnaires are inflexible techniques of survey. In other words, in a mail questionnaire there is no way to check the validity of the answers, to clarify the vague answers and to know the reasons behind the unwillingness to answer a particular question.

7. In a mail questionnaire the different answers cannot be treated as fully independent because the respondent usually reads the whole questionnaire before he starts answering the questions.

8. In the mail questionnaire the surveyor has no means by which he can be sure that the right person has answered the questions. Sometimes, it has been noticed that the questionnaire is completed by a person other than the right person. According to Scott (1971), there are two types of situations in which this usually happens. The first situation is one in which the questionnaire contains many questions, which do not apply to the respondent. In this situation the respondent falsely thinks that the questionnaire is not meant for him and therefore, it should be passed on to persons who are more appropriate for answering the questions. The second situation is one in which the respondent gives little importance to the questionnaire and therefore, thinks that it matters little who responds to it.

9. When spontaneous answers are needed, mail questionnaires are not considered to be appropriate.

10. In a mail questionnaire there is no way to supplement the answers with variable background data. The researcher cannot observe the mode of expression of the respondents, their reaction to typical questions and their general attitude towards the survey. All these observational data are lacking in the case of a mail questionnaire.
Some of the disadvantages of a mail questionnaire are such that they can be removed if they are combined with interviewing. For example, the questionnaire can be mailed and collected by the interviewers or interviewers can personally deliver questionnaires to each respondent who can mail them after completing them. When the interviewers collect the questionnaires, many problems arising out of ambiguity of the questions or printed directions can be solved. Similarly, personal delivery by the interviewers may solve the problem of wrong or incomplete addresses of the respondents because an interviewer can afford more time and take more pains than a postman in locating a respondent’s house or flat.

**Panel Technique**

Some survey techniques require successive interviews with the same sample. The panel technique is one of them where the re-interview design is used and the same sample is interviewed more than once. Where the purpose of the survey is wide and extensive, multiple interviews are taken with the same sample. But where the objective of the survey is less extensive and wider, two interviews are sufficient. The panel technique has two advantages.

First, the panel technique enables the investigator to know how the various factors bring changes through time in the attitudes of the sample being studied.

Second, when the same sample is interviewed twice (or more than twice), it becomes a more sensitive and an accurate measure of change than when two different samples from the same population are tested.

The panel technique has, however, two important limitations.

First, in the panel survey there occurs a loss of the sample being studied. The loss may occur due to any of the three factors, namely, death, refusal to be reinterviewed, and moving from one place to another. The loss of a certain proportion of the sample naturally increases the probability of serious bias in the study.

Second, re-interviewing sometimes tends to sensitize the sample to the extent that the individuals refuse to give the desired response and may act as if they are no longer representatives of the population to which they belong.

**Telephone Survey**

Telephone survey is a rare form of survey research. In this survey the respondent is interviewed by the investigator on telephone. This type of survey has the
advantage of being quick and speedy in collecting information about the respondents. But the technique has several disadvantages. When the investigator is not known to the respondents, they usually do not co-operate and answer only simple and straightforward questions. In a country like India the telephone survey has one additional disadvantage: Only a limited section of the population has telephone facilities and therefore, the chance is that not all respondents can be contacted on telephone. In such a situation the telephone survey automatically defeats its purpose.

**Characteristics’ of survey research**

the survey has the advantage of being an extremely effective way of gathering information from a large number of sources relatively cheap and relatively short time. facts one gathered through the use of questionnaire, interview, standardized test and other data gathering techniques and the analysis of such information has enabled decision to we made which have transform many administrative, financial and other practices. The main characteristics of survey research is given below-

(a) survey research is essentially cross sectional, mostly of exist type, i.e.to say it is design to determine the nature of existing state of affairs.

(b) It is an important type of research involving clearly define problems and definite objective. it requires an imaginative planning, careful analysis an interpretation of data and a logical and skillful reporting of the findings.

(c) Survey research does not aspire to develop an organized body of scientific laws but provide information useful to solutions of local problem. it may however provide data to form the basis of research of a more fundamental nature.

(d) Survey vary greatly in complexity, some concerning themselves with the frequency count of events while other to establish relationship among events.

(e) Survey may be qualitative or quantitative. at one level survey or status studies may consist of naming and defining constituents, elements of various phenomenon. at another level they may involve the amount of constituents or characteristics. Descriptions may be either verbal or expressed in mathematical symbols.

**Advantages And Disadvantages of Survey Research**

Survey research is one of the popular methods of research in behavioural sciences. It has some advantages and disadvantages. Its major advantages are given below:
1. Survey research has wide scope. In other words, through survey research a great deal of information can be obtained by studying the larger population. Although conducting a survey research is more costly than conducting a field experiment or a laboratory experiment, still, in view of the quality and amount of information rendered by a survey research, it can be taken as an economical method of research.

2. Survey research is more accurate. As Kerlinger (1986, p.387) has put it, “The accuracy of properly drawn samples is frequently surprising, even to experts in the field. A sample of 600 to 700 individuals or families can give a remarkably accurate portrait of a community, its values, attitudes and beliefs.”

3. Survey research has been frequently used in almost all the social sciences. Hence, the method has inter-disciplinary value, In fact, such researches provide raw materials for a vast increasing ‘gross discipianary research’ (Cambell & Katona, 1953).

4. Survey research is considered a very important and indispensible tool for studying social attitudes, beliefs, values, etc., with maximal accuracy at the economical rate.

Despite the advantages, survey research has some disadvantages also as mentioned below:

1. Survey research remains at the surface and it does not penetrate into the depth of the problem being investigated. There are other types of researches which are preferred to survey research because they make deeper exploration of relations.

3.2 THE POPULATION AND SAMPLE:

POPULATION

The word ‘population’ or ‘universe’ denotes all that area or all those units of the investigation about which information is too be obtained. the well specified and identifiable group is known as a population. For example-all primary school teachers all college teachers, all office workers, all house wives, all school students etc. are the example of population.

There is two types of population one is finite and other is infinite.

FINITE POPULATION
It is type of population in which all the members of population can be easily counted. For example—population of university teachers, population of school students, population of educational institutions etc.

**INFINITE POPULATION**

It is a type of population whose have a unlimited size and therefore its members can not be counted for example—number of honey bee in honey comb ,fish in a river is an example of infinite population.

**ON THE BASIS OF EXISTENCE**

The population is categorized in to two one is real population and another is imaginative population .Real population is one which actually exist. and imaginative population is one which exist only in the imagination.

On many occasions in a psychological and educational research the population is imaginative.

**SAMPLE**

The word is come from Latin word ‘exemplum’. which means few selected members selected in large universe thus sample is small part representing total population and have silent feature of population. for example if a survey to be conducted relating to economic condition of poor’s families belonging to below poverty line. for this purpose when researcher selected few poor’s for his study is called sample.

Some researchers are also defined samples such as —

“sampling is the selection of certain percentage of a group of items according to a predetermined plan.”

- **Bogardus**

“A sample is that part of the universe which we select for the purpose of investigations.”

- **Simpson & Kafka**

“A sample is that group of sampling unite which is microcosm of the universe”

- **Ya-Lun-Chou**
“A sample is a relatively small group scientifically chosen so as to represent the population.”

-Norma Gilbert

A sample is any number of person selected to represent the population according to some rule or plan. Thus sample is a smaller representation of population. A measure based upon a sample is known as a statistic.

The different type of sample or the method of sampling, it is essential to define the term ‘probability’, which is the base of sampling theory. The general meaning of probability of less than certain and for which there exists some evidence. In sampling theory the term ‘probability’ is used as equivalent to the relative frequency. Thus when we say that the probability of a tail on a single toss of a coin is 1/2, it is meant that when we make several tosses, the relative frequency of a tail will be about 1/2 or 0.5. If one say that the probability of having a male child is 0.8, it is meant that on previous occasion that relative frequency of the birth of a male child has been 0.8. Probability may be expressed in term of a fraction or in decimal numbers.

It is based on theory of probability and it is also known as random sampling the units of sample from a population are selected from that of the population according to known probabilities. Probability sampling from bias in selecting sample units. They help in estimation of sampling errors and to evaluate sample result in terms of their precision, accuracy and efficiency. Probability sampling is a process of a sample selection in which elements are chosen by chance methods such as flipping coins, drawing numbered balls from an urn or through table of random numbers. There are several variations in probability in sampling, but all share a common traits, i.e. the selection of the units for the sample is carried out by chance procedure and with known probabilities of selection. Following Blalock(1960) most sampling method can be categorized in to two-

(A) Probability sampling method
(B) Non probability sampling method

A. Probability sampling method
Probability sampling methods are those that clearly specify the probability or likelihood of inclusion of each element or individual in the sample. Technically, the probability sampling methods must satisfy the condition given below.

(i) The size of the parent population or Universe from which the sample is to be taken, must be known to the investigator.

(ii) Each element or individual in the population must have an equal chance of being included in a subsequent sample.

(iii) The desired sample size must be clearly specified.

If, for example, a researcher known that the population which is going to study contain 500 elements, or individuals and if he known that all the elements are accessible and may be included in a subsequent sample, it can be said that each elements in the population has an equal chance, that is, 1/500 of a chance of being selected. This constitutes the probability sampling method. In practices, however, sometimes researcher are not able to known for certainly that conditions (i) and (ii) will be satisfied. Sometimes the population studied is so large as to be considered infinite and unknowable for all important and practical purpose.

The positive point of probability sampling method is that the obtained sample are considered representative, and hence, the conclusion reached from such sample are worth generalization and are comparable to similar population to which they belong.

The negative point of probability sampling method is that a certain amount of sampling error exists because the researcher has only a limited elements of entire population. Sampling error refer to the degree to which the sample characteristics approximate the characteristics of the parent population. The smaller the sample, the greater the sampling error.

The major probability sampling method are the sampling:

(1) Simple random sampling
(2) Stratified random sampling
(3) Area or cluster sampling

**RANDOM SAMPLING OR PROBABILITY SAMPLING**

Random sampling is also called as 'Chance Sampling' or Probability Sampling'. In this method of sampling all units of the sample are selected by chance because each unit of
the universe has an equal change of being included in the sample. the main types of random sampling are as follows:

(1) "A simple or unrestricted Random Sampling

**Meaning and definition**

In practice simple random sampling is called random sampling only. It refers to that sampling technique in which each and every unit of the universe has an equal opportunity of being included in the sample and every unit selected in the sample depends purely on chance i.e., personal bias or desire of the investigator dose not influence the selection. some definition of random sampling are as follows:

1. " A sample is considered a sample random one, if its members are drawn in such away that each observation of the universe has an equal chance of being included in the sample."
2. "Random sampling is the from applied when the method of selection assures each individual or element in the universe an equal chance of being chosen."
3."Random sample is a scientific undertaking..............It indicates not a haphazard choice but a careful selection to ensure that every item has an equal chance of inclusion."

there are different method for random selection of the sample units. some important method are as follows :

1. **Lottery method**

under this method, all item of the universe are numbered or named on separate slip or card of paper. These slip are then folded and mixed up in container or drum. A blind fold selection is then made of the number of slips required to constitute the desired sample size. suppose there are 3,000 student in college and a random sample of 100 students is to be drawn, then 3,000 slips numbering from 1 to 3,000 will be prepared and a sample of 100 slip will be drawn one by one.

2. **By Rotating the drum**

This method is an improvement over the lottery method. In this method separate slip are not prepared for all numbers but round or square wooden plastic or iron pieces of equal seizing are used on which digits like 0,1,2,3,4,5,6,7,8, & 9 are written. These pieces are put in a drum and the drum is rotated by mechanical device and the number of sample is formed on the basis of digit written on the piece which is drawn one by one
the digit of the first piece forms the unit-digit of the random numbers. The digit of the next piece forms the tenth place in the number. This process continues like that and digits for hundreds, thousands and so on, places are drawn out. This method is very popular in drawing the number of lottery ticket for prizes.

3. Random numbers

If the population size is very large, then difficulties arise in the lottery method of rotating the drum. Furthermore, these methods become time-consuming with chances of errors. In such cases, random number tables are used as alternatives. Several standard tables of random numbers are available, among which the following may be specially mentioned:

(a) Tippett's table of random numbers sampling numbers: They are 10,400 numbers in this table arranged 4 digits a time.
(b) Kendall and Smith's random sampling numbers: They consist of one lakh digits which have been grouped in 25,000 sets of four digit numbers.
(c) A Million random digits of Rand Corporation: They consist of one million random digits grouped in 2,00,000 random numbers of five digits.
(d) Fisher and Yates numbers: They comprise of 15000 digits which are arranged in numbers consisting of two digits each.
(e) Snedecor's 10,000 random numbers.
(f) Computer–generated random sampling number: Nowadays computers are also used to obtain random numbers. For example, the participants in T.V. programme 'Kaun banega crorepati', where selected by computer-generated random selection programme.

2. Stratified random sampling

In stratified random sampling the population is first divided into two or more strata which may be based upon a single criterion such as sex, yielding two strata—male and female or upon a combination of two or more criteria such as sex and graduation, yielding four strata namely, male, undergraduate, male graduate, female under graduate and female graduate. These divided population are called sub population which are non-overlapping and together constitute the whole population. Having divided the population two or more strata, which are considered to be homogenous internally. A simple random sample for the desired number is taken from
each population stratum thus in stratified random sampling the stratification of the population is the first requirement.

3. **Cluster sampling**

In this method the total population is divided in some recognizable sub-divisions which are termed as cluster. This method is very useful in industrial production. For instance, if 1,000 locks are manufactured per day in a factory and we wish to make inspection of 10 locks intensively, the manufactured locks be divided into 10 lots of 100 locks each and the sampling will be formed by selecting one lock at random from each lot.

**B. Non probability sampling method**

Non probability is one method in which there is no way of assessing the probability of the elements of the group of elements of the population being included in the sample. In other words non probability sampling method are those that provide no basis for estimating how closely the characteristics of a sample approximate the parameter of the population from which the sample had been obtained. This is because non probability sample do not use the techniques of random sampling. Important techniques of non probability sample method are –

1. Quota sampling
2. Accidental sampling
3. Purposive sampling
4. Systematic sampling
5. Snow ball sampling
6. Saturation sampling
7. Dense sampling

(1) **Quota sampling**

Quota sampling is also a type of stratified sampling. In this method separate quota is fixed for each enumerator. Each enumerator is told in advance the number of the sample units he has to select from the stratum assigned to him. The quota may be fixed on the basis of some specified characteristics such as income group, sex, occupation, religion or political affiliation, etc. After the quota is fixed it is left entirely at the discretion and desire of the investigator to select units within that quota and
generally random sampling is not the 10 areas of a city to study the views of voters before polling and each investigator is asked to interview 20 person including 10 males and interviewing 20 person selected by him according to his own judgment and discretion.

(2) Accidental Sampling

Accidental sampling also known as incidental sampling. In another popular method of non-probability sampling plan, it refer to a sampling procedure in which the investigator select the person according to his convenience. here he does not care about including the people with some specific or designated trait, rather he is mainly guided by convenience and economy. this is a crude method of sampling and investigator knows that little can be generalized from the sample thus drawn.

(3) Purposive Sampling

In this method the investigator select the units to be included in sample according to own choice and requirement. it is clear that decision entirely depends on the ability, rationality and likening of the investigator that which item should be included in the sample. Thus, purposive deliberating sampling cannot be considered as scientific one, but it is useful Where certain units of the universe are so important that their inclusion in sample is necessary. Moreover, the success of this method depends on the ability and expert background of the sample designer.

(4) Systematic sampling

Systematic sampling is another method of non-probability sampling plan, though the label ‘systematic’ is some what misleading in the sense that all probability sampling method are also systematic sampling method. due to this its often sounds that systematic sampling should be included under one category of probability sampling, but in reality this is not the case.

(5) Snow ball sampling

Snow ball sampling is basically indirectly sociometric. it is define as having all the person in a group or organization identifying their friends who in turn identify their friends and associate until the researcher observe that a constellation of friendships converges in to some type of a definite social pattern.

(6) Saturation sampling
Saturation sampling is defined as drawing all elements or individual having characteristics of the interest to the investigator. Drawing all physician having at least the age of 45 would be called Saturation sampling.

(7) Dense sampling

Dense sampling is a method of sampling which lies somewhere between sample random sampling and Saturation sampling. When the researcher selects 50% or more from the population and takes majority of individual having specified characteristics which are of interest to him, it called dense sampling.

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**Figure 4. Types of Sampling**

- **Sampling method**
  - **Probability sampling**
    - (1) Simple random sampling
    - (2) Stratified random sampling
    - (3) Area or cluster sampling
  - **Non probability sampling**
    - (1) Quota sampling
    - (2) Accidental sampling
    - (3) Purposive sampling
    - (4) Systematic sampling
    - (5) Snowball sampling
    - (6) Saturation sampling
    - (7) Dense sampling
Population for the purpose of this study has been defined as the total number of B.Ed. teacher trainees (trained through either distance or formal mode) of kasha Vidyapith University Varanasi Region. As per the definition of the population, the unit of sampling was the ‘B.Ed teacher trainees’. Since the number of trainees was too large as it was not feasible to collect the data from all the trainees. Therefore, researcher decided to take 300 B.Ed trainees as the sample of the study. In the present study B.Ed trainees of Formal mode and Distance mode formed the basis of data collection. The specialist utilized efficient examining system for selecting units. For this, first he serially made a rundown of all the B.Ed Institutions of Kashi Vidyapith University Region, region shrewd and chose two regions arbitrarily i.e. Varanasi and Chandauli. From each of the chose region, scientist chose two establishment of separation and another two formal foundation arbitrarily (add up to eight educator preparing focuses i.e. four of separation and four of formal). After this, specialist chose an irregular specimen of 40 B.Ed students of every separation and formal foundation, all out three hundreds twenty(320). In, at long last the arbitrarily chose test comprised of three hundreds (300) i.e 150 B.Ed instructors’ students of every mode i.e. separation and formal method of educator learners.

3.3 VARIABLES

A variable, as the name implies, is some things which varies. This is the simplest and the broadest way of defining a variable. However a behavioural scientist attempts to define a variable more precisely and specifically. from his point of view, variables may be defined as those attributes of objects, events, things and beings which can be measured. in other words, variable are the condition that are manipulated, controlled or observed by the experiments, intelligence, anxiety, aptitude, income, education, achievement etc, are examples are variables commonly employed in social sciences.

In statistics, characteristics are of two kinds-measurable and non-measurable. Measurable characteristics are those which can be numerically expressed in terms of some units. These measurable characteristics are known as ‘Variables’ or ‘Variates’. It can be classified in several ways. Some of commonly accepted classification are presented below.
Dependent variables and Independent variables

The term ‘dependent variables’ and ‘independent variable’ have been borrowed from the field of mathematics in behavioural researches. The classification of variables into dependent and independent is frequently employed in experimental research. The dependent variable is defined as one about which the experimenter makes a prediction. The independent variable is defined as one about which is manipulated, measured and selected by the experimenter for the purpose of producing observable change in the behavioural measure for dependent variable. In other words, the independent variable is the variable on the basis of which the prediction about the dependent variable is made. The occasional synonym of independent variable is controlled variable, which is rarely used because of its confusing nature with control variable. Underwood (1966) calls the independent variable as the stimulus variables and the dependent variable as the response variables.

The present study involves three variables out of which one is independent and two are dependent variables. There variables are:

**Independent variables**
1. Teacher training through distance mode and formal mode.

**Dependent variables**
1. Teaching competency.
2. Attitude toward teaching.

3.4 Research Tools

**Characteristics of a good tool’s of Research –**

The collection of data for research work. The research tool have following characteristics.

1. **Objectivity** – Tool should have the trait of objectivity i.e. it must be free from the subjective element so that there is complete interpersonal agreement among experts regarding the meaning of the tool.

2. **Reliability** – A tool must also be reliable. Reliability here refers to self-correlation of the tool. It shows the extent to which the result obtained are consistent when the tool is used once or more than once on the same sample with reasonable time gap.
3. **Validity** – Validity is another important characteristic of research tools. Validity indicates the extent to which the tool measures what it intends to measure, when compared with some outside independent criterion. In other words, it is the correlation of the tool with some outside criterion.

4. **Discrimination Power** – A tool must have the ability to discriminate between two different individuals. It means a good tool has the power to identify the differences among the different types of people.

5. **Standardized Tool** – For a better result of the research problem, the tool should be used a standardized tool, because a standardized tool has all good qualities.

6. **Practicability** – A tool must also be practicable from the point of view of the time taken in its completion, length, scoring, etc. In other words, the tool should not be lengthy and the scoring method must not be difficult nor one which can only be done by highly specialized persons.

**Tools of Data Collection** -: In the field of research, these are many kinds of tools used to collect data. These are:

1. Observation
2. Test
3. Interview
4. Schedule
5. Questionnaire
6. Rating scale
7. Projective technique
8. Sociometric
Figure 5 Types of Tool

- Observation
- Interview
- Schedule
- Rating Scale
- Projective Technique
- Sociometric
- Questionnaire
- Test
OBSERVATION

It is the oldest method of data collection observation use as a fundamental technique of data collection. In this type the searcher is watching and listening to the behavior of other persons over time without manipulation and controlling it and record findings in ways that allow some degree of analytical interpretation an discussion.

Thus It is a tool in which the researcher involves broadly selecting recording and encoding behavior of empirical aims of description or development of theory (wieck 1968).

DEFINITION OF OBSERVATION

According to Mrs. P.V. Young, " Observation is a systematic and deliberate study through the eye, of spontaneous occurrences at the time they occur. The Purpose of observation is to perceive the nature and extent of significant interrelated elements within complex social phenomena, culture patterns or human conduct."

As per Young's definition, observation is carried out with help of the eye and the purpose and aim of observation is to discover significant mutual relations between spontaneously occurring events and thereby pinpoint crucial facts of a situation. It is quite plain from these remarks that observation in not just equivalent to perceiving, observation is not random perceptions but a close look crucial facts, It is not ion the sense of random perception. but in the sense of a deliberate effort to pinpoint significant fact that observation is considered to be a scientific method. the observation can be of two types: participant observation and non-participant observation. In the former the observer himself a part of the events. i.e., he is an active onlooker, and in the latter, he is remote from the events and is a passive onlooker.

According to Oxford Concise Dictionary, observation means " Accurate watching Knowing of phenomena as they occur in Nature with regard to cause and effect on mutual! relations." This meaning of observation highlights two points. Firstly, in observation an attempt is made to discover causal and other relation between facts of a phenomenon: secondly, phenomenon is watched realistically and precisely and the facts written down.

FEATURES OF OBSERVATION

1- Observation, an affair of eyes-
By and large, observation in social sciences is done through the medium of eyes. The observation is an affair of the eyes has been stressed by C.A. Moser. According to him. "In the strict sense, observation implies the use of eyes rather than of the ear and the voice." A trained observer never trusts the hearsay. He puts his trust only in that which he has seen with his own eyes, and only if a report in a first-hand evidence of the eyes, it can merit to be called "Observation" in the scientific sense of them. It is said, half believe what you see, and do no believe at all what you hear. The implication of this wise statement is that even eyes are liable to mistake a illusion and, that only a trained person who taken all precautions against possible error, is a competent observer. His report is worthy of scientific status. The evidence of eyes an a rule is most trustworthy of all evidences.

2- **Definite Aim**

Before making scientific observation, it is imperative to define and make clear the aim purpose of observation, because aimless seeing is not tantamount to observation. Without knowing to watch we cannot watch anything fruitfully. Every scientific observation has its peculiar aim. The aim can be verification of hypothesis, discovery of certain facts or the knowledge of causal relations inherent in a phenomenon. Accordingly, observation is always purposeful and mostly the purpose is discovery of causal relations between various facts of a phenomenon.

3- **Planning**

Besides being purposeful, observation needs to be a well organized and systematic efforts. In the planning of an observation, we need at times certain equipment and instruments. In physics and social sciences, different types of apparatus are made use of. Sometimes we need to control the subject matter of an observation: but, however, control is not an essential feature of observation, because observation can be made even when no control over the subject matter is exercised.

4- **Noting**

In no scientific method much reliance on memory is pleased because memory is proverbially deceptive. We forget a great deal of we learn and even most vivid impression are blurred with the passage of time. There, all impressions are suitably recorded simultaneously or immediately after. The general means of keeping record is
writing down the impressions. But nowadays wherever possible, the actual impressions are tape recorded. The greatest benefit of tape recording is that the possibility of making error is zero. Moreover a tape is a permanent record in which actual words are recorded and there is no interpretation and no possibility of prejudicial reporting. Moreover, a tape is free from all the illusions and errors to which our eyes are liable. As far as the problem of erroneous seeing is concerned, even this is obviated by the use of powerful cameras: which also like a tape cannot lie. Moreover a camera can record more truthfully than even human eyes. Besides, camera photo is a fairly permanent record, which can be multiplied added, and a battery of scientists can interpret the meaning of the photo. Again, photo observation, unlike the eye, is repeatable. The delineation of moods of man, topography of a physical feature, movements of a ballerina and many other phenomena require considerable amount of observation for proper interpretation. This is not quite possible by human eye when the events are unfolding themselves: but a photo record of such things can be watched at leisure and the extensible in it studied carefully. In the modern social research generally use of tape-recorder, camera and similar other devices is being made. This helps every greatly in correct observation and maintenance of fairly reliable records. The powerful move camera of modern days penetrates into depths of the subject.

The ability of observational data to generate useful and researchable information Reiss (1971) divides observation into the two posts:

1. Systematic observation
2. Unsystematic observation

In systematic observation is done according to some explicit procedures as well as in accordance with the logic of scientific inference while unsystematic observation is a type of casual observation made by the investigator without specifying any explicit and objective inference.

On the basis of role played by the investigator the observation has also classified into:

1. Participant observation
2. Nonparticipant observation

Participant observation is a type of observation in which investigator actively participate in the activities of the group to be observed. The observer is already the
member of a group or organization and decide to observe it under one or more situations.

On the other hand in non participant observation is the observation in which the investigator observes the behavior of other person in a natural setting but does not remain a participant in the activities being observed. It is structured and therefore the observes preplans the likely nature of the natural setting represent activeness of data, problem associated with the presence of the investigator.

**TEST**

**Meaning of Test**

According to the dictionary ‘test’ is defined as a series of questions on the basis of which some information is sought. In psychology and education, the meaning of test is something more than this. A psychological (or an educational) test is a standardized procedure to measure quantitatively or qualitatively one or more than one aspect of a trait by means of a sample of verbal or nonverbal behaviour. The purpose of a psychological test is twofold. First, it attempts to compare the same individual on two or more than two aspects of a trait; and second, two or more than two persons may be compared on the same trait. Such a measurement may be either quantitative or qualitative. In the words of Bean (1953:11), a test is “an organized succession of stimuli designed to measure quantitatively or to evaluate qualitatively some mental process, trait or characteristic”. Likewise Anastasi and Urbina (1997) have defined a psychological test as “essentially an objective and standardized measure of sample of behaviour”. Similarly, Cullari (1998) has said, “A test is a standardized procedure for sampling behaviour and describing it with scores or categories”. Kaplan and Saccuzzo (2001) have opined, “A psychological test or educational test is a set of items designed to measure characteristics of human beings that pertain to behaviour”. These definitions reveal some important characteristics of a psychological and educational test.

**Classification of Test**

Psychologists and educators have taken pains over classifying the test from the point of view of different criteria. A brief introduction to this classification may be presented as follows:
(1) On the basis of the criterion of administrative conditions

Tests have been classified on the basis of administrative conditions into two types-individual tests and group tests. Individual tests are those tests that are administered to one person at a time. Kohs Block Design Test is an example of the individual test.

Group tests are tests which can be used among more than one person or in a group at a time. Bell Adjustment Inventory is an example of the group test.

(2) On the basis of the criterion of scoring

Scoring is one of the vital parts of a test. Based upon this criterion, tests are classified into two types-objective test and subjective test. Objective tests are those whose items are scored by competent examiners or observers in such a way that no scope for subjective judgement or opinion exists and thus, the scoring remains unambiguous.

Subjective tests are tests whose items are scored by the competent examiners or observers in a way in which there exists some scope for subjective judgement and opinion. As a consequence, some elements of vagueness and ambiguity remain in their scoring. These are also called essay tests.

(3) On the basis of the criterion of time limit in producing the response

Another way of classifying tests is whether they emphasize time limit or not. On the basis of this criterion, the tests are classified into power tests and speed tests. A power test is one which has a generous time limit so that most examinees are able to attempt every item. Usually such tests have items which are generally arranged in increasing order of difficulties. Most of the intelligence tests and aptitude tests belong to the category of power tests.

Speed tests are those that have severe time limits but the items are comparatively easy and the difficulties involved therein are more or less of the same degree. Here, very few examinees are supposed to make errors. Speed tests, generally, reveal how rapidly, i.e., with what speed the examinees can respond within a given time limit. Most of the clerical aptitude tests belong to this very category.
In fact, whether a test is a power test or a speed test depends, in part, on the nature of the examinees for whom it is meant. An arithmetical test for class VII students might emphasize speed if it contained items that were easier for them, but the same test could be a power test for class III or IV students or for less-prepared students. Today, a pure power test or pure speed test is rare, rather a mixture of the two is common.

(4) On the basis of the criterion of the nature or contents of items

   (i) A verbal test is one whose items emphasize reading, writing and oral expression as the primary mode of communication. Herein instructions are printed or written. These are read by the examinees and, accordingly, items are answered. Jalota Group General Intelligence Test and Mehta Group Test of Intelligence are some common examples.

   (ii) Nonverbal tests are those that emphasize but don’t altogether eliminate the role of language by using symbolic materials like pictures, figures, etc. Such tests use the language in instruction but in items they don’t use language. Test items present the problem with the help of figures and symbols. Nonverbal tests are commonly used with young children as an attempt to assess the nonverbal aspects of intelligence such as spatial perception. Raven Progressive Matrices is a good example of nonverbal test.

   (iii) Performance tests are those that require the examinees to perform a task rather than answer some questions. Such tests prohibit the use of language in items. Occasionally, oral language is used to give instruction, or, the instruction may also be given through gesture and pantomime.

   (iv) Nonlanguage tests are those which don’t depend upon any form of written, spoken or reading communication. Such tests remain completely independent of the ability to use language in any way. Instructions are usually given through gestures or pantomime and the examinees respond by pointing at or manipulating objects such as pictures, blocks, puzzles, etc. Such tests are usually administered to those persons or children who can’t communicate in any form of ordinary language.

(5) On the basis of the criterion of purpose or objective

Tests are also classified in terms of their objectives or purposes. Based upon this criterion, tests are usually classified as intelligence tests, aptitude tests, personality tests, neuropsychological test and achievement tests. Intelligence tests intend to assess
intelligence of the examinees. Aptitude tests assess potentials or aptitudes of the persons. Personality tests assess traits, adjustments, interests, values, etc., of the persons. Neuropsychological tests are the tests, which are used in the assessment of persons with known or suspected brain dysfunctioning. Achievement tests assess what the persons have acquired in the given area as a function of some training or learning.

(6) On the basis of the criterion of standardization

Tests are also classified on the basis of standardization. Based upon this criterion, tests are classified into standardized tests and teacher-made tests. Standardized tests are those which have been subjected to the procedure of standardization.

Teacher-made tests are those that are constructed by teachers for use largely within their classrooms. The effectiveness of such tests depends upon the skill of the teacher and his knowledge of test construction.

QUESTIONNAIRE

Meaning

The questionnaire is a printed list of questions sent through mail to respondents to be returned by the respondents after filling up the questionnaire. According to G.A. Lundberg, "Fundamentally, the questionnaire is a set of stimuli to which literate people are exposed in order to observe their verbal behaviour under these stimuli." In the questionnaire, as the name indicates, there is a set of selected questions whose' answer the researcher seeks from respondent in of selected question whose' order to gain knowledge about certain specified matters. Since the questionnaire can be addressed only to literate people". A second feature of the mailed questionnaire which has been emphasized W.J. Goode and P.K. Hatt is the fact that responses to a mailed questionnaire have to be made by respondents themselves. According to the, "In general, the word questionnaire refers to a device for securing answers to questions by using a form which the respondent fills in himself. The exchange of questions and answers by mail is the most economical of all other research methods of data collection". Writing about this aspect, C.A. Moser observes: "Without doubt the mailed questionnaire is generally quicker and cheaper than other methods." Since the mailed questionnaire is sent to a restricted number of individuals, its scope is rather limited but
within its limited scope, it can prove to be the most effective means of eliciting information, provided, however, that it is well formulated and the respondents fill in their genuine responses.

**The type of the information required**

In the field of social research, the usefulness and effectiveness of the mailed questionnaire is determined by the kind of the information sought. Not every type of information can be elicited through it. A questionnaire, which will consume more than 10 to 20 minutes, is unlikely to be responded well. Therefore, an appropriate should contain only that number of questions which can be easily filled in 10 to 20 minutes. Moreover, the questions should be explicit and capable of clear-cut replies. Some research workers have found that if the information sought through a questionnaire is of personal and intimate nature, the responses are better if the names of the respondents remain anonymous. By allowing the respondents to remain anonymous, the information regarding sex and income can be had. If the questionnaire of this type is prepared with due caution, the respondents disclose their identity.

Thirdly, if the information sought is not very complex deep, the mailed questionnaire is suitable. However, the information sought through it is not so deep as in the case of an interview.

**FORMATION OF QUESTIONNAIRE**

The success of questionnaire depends largely on the skill and insight with which the list of questions are formulated. These questions must be unequivocal and easily intelligible. The following considerations should be kept in mind while formulating a questionnaire-

1- **Appeal**

Attached with every questionnaire is an appeal in which the aim and purpose of the enclosed questionnaire is set forth and sincere cooperation fo the respondents is sought. The appeal should be short, clear and direct, establishing the genuineness of the research and its utility for all concerned. The long and wordy. Appeals tax. the patience of the respondents. Though the appeal must be short, it must cover the following points without fail:-

(a) The appeal must state clearly the individuals or organization undertaking the research. If the research is government aided, the fact should be clearly mentioned. The quality
of paper and printing is quite an important consideration. If the paper is of superior quality and printing and get up of high order, respondents feel inclined to take interest in it. Shabby and defective printing act as disincentive.

(b) The appeal should set forth in clear terms the aim and purpose of the proposed study and also the benefits likely to accrue from it. Usually, line missing "The breakdown of Joint Family in urban areas," but if some further explanation is necessary it must be give.

(c) The appeal should make clear why is it important for the respondents to fill it up. The respondents should be maintained and made to realize the validity and utility of the research project. Sometimes some monetary incentive is also given. But as a rule this is not enough to produce a real interest. The wording of appeal should be such that an interest is created among the respondents. It may be helpful if the respondent is told that his contribution is likely to make difference in the world of knowledge and he can feel proud to be a partner in the promotion of knowledge. Depending upon the nature of research, the availability of funds, many ways can be found to motivate the respondent.

(d) Another method of making the appeal effective is an offer to the respondents that their names will be Kent anonymous and all steps will be taken to ensure that no one comes to know anything about them. This precaution is necessary where information about private life or income is required.

2- Instructions for filling up the Questionnaire-

Besides an appeal, the questionnaire must carry a list of instructions for filling it up and dispatching it. The respondent must not have to pay for the returned postdates. It should either be pro-paid; stamps for the required amount should be enclosed.

3- Form of the Questionnaire-

The questionnaire must not have more than a number of questions which can be answered in 10 to 15 minutes. No one can be expected to fill up a questionnaire of 100 queries.

4- The get-u-p of Questionnaire-

The get-up and appearance of the questionnaire should be attractive. It must be tastefully printed on a high quality paper. The sentences, by which the questions are
asked should be direct and forceful. Lacking these qualities, the questionnaire will be consigned to W.P.G.

5- Clarity of Questions-

For the desired responses, it is of utmost importance to formulate the question clearly and precisely. There should be no ambiguity and no dubiousness about. They should lend themselves to a single interpretation. The best method is to ensure that our questionnaire does not have any misleading or confusing question. It should be first tried on a selected group of individuals and suitable modifications should be made in question in the light of the experience with the selected group.

6- Serial order of question-

The question should be broken which are mutually interrelated. The order of questions should be such that the first should seem naturally to lead to the second. The second may be dependent upon the first, but the first should not depend upon the second: otherwise the order of questions will cease to be systematic and will become chaotic.

7- Attractiveness-

Upon the attractiveness of the questionnaire depends to a large extent the success of the questionnaire. The attractiveness of questionnaire is determined by the prestige of the researcher, of research organization, and the form and style of the questionnaire. Besides, if the research project is aided by the government its prestige increases. If the above qualities are present, the respondents are likely to take interest in the questionnaire.

Types of the questionnaire

Questionnaire can be classified on the basis of two dimension
(a) type of response required and
(b) type of questionnaire administration

(a) Type of response required

On the basis of the type of response required the questionnaire may be of the following two types
1. fixed-response questionnaire
2. open-ended Questionnaire

1. fixed-response questionnaire
A fixed response questionnaire is a which consists of statement of questions with a fixed number of options or choices. the respondent is asked to check the option or response that based fixed or suits him. Such types of questionnaire is also known as closed -form questionnaire or pre-coded type of questionnaire.

2. open-ended Questionnaire

It is a type of questionnaire which consist of questions that require short or lengthy answers by the respondent. usually here the answer are longer than those given in the fixed response questionnaire

(b)type of questionnaire administration

On the basis of the method of administrating questionnaire there are two common types of questionnaire –

1. Mail questionnaire
2. Face to Face administrator Questionnaire

1. Mail Questionnaire

A Mail questionnaire is a questionnaire which is mailed to the designated subject which a request to answer to questions and return it through mail. instruction for completing the questionnaire are usually enclosed and return envelop is also provided. Generally the researcher wait for a fortnight or so for the reply.a survey conducted in this area has revealed that about 70 percent of the questionnaire mailed are not returned.

2. Face to Face administrator Questionnaire

A face to face administrated questionnaire is one where the selected subjects are given questionnaires with the instructions to complete them in the presence of investigator. this type of questionnaire is more common then the mail questionnaire. face to face administration questionnaire is usually preferred where subjects for the study are readily available at one place.
LIMITATIONS OF QUESTIONNAIRE

As a method of social research, the questionnaire method is, like all other methods limited in value and application. This means that it can be used in every situation limited in value and application. The means that it can be used in every situation, and that its conclusions are not always reliable. Following, briefly the limitations of this method-

1- **Limited response**-

As noted above this method cannot be used either on illiterate or semi-literate persons. Furthermore, very preoccupied, travelling and aristocrate individuals do not reply. Therefore, the number of persons who cooperate and respond to the
questionnaire is very small. The percentage of such persons is extremely low in the undeveloped countries.

2- **Lack of personal contact**-

   There is no provision in this method for coming face to face with the respondents. However, much a researcher may try to simplify and rationalize his questionnaire, it is not possible to avoid each and every technical term. Even if this can be done, the purpose of the questionnaire can be much better explained personally then through the appeal. Lastly, in the absence of personal contact, very little can be done to persuade the respondents to fill-up the questionnaire.

3- **Useless in depth-problems**-

   If a problem requires deep and long study, obvious, it cannot be studied by the questionnaire method.

4- **Possibility of wrong answers**-

   A respondent may not really understand question or may give the answer in a casual manner. In both cases there is storm likelihood of misleading information being given.

5- **Illegibility**-

   Some persons write 30 badly that even they themselves find difficult to read their own hand writing.

6- **Incomplete response**-

   Some persons give answers which are so brief that the full meaning is incomprehensible.

**INTERVIEW**

Then method of interview is used very extensively in every field of social research. In interview, a social scientist or someone authorized by him for the purpose meets individuals to interrogate them about various things. An interview is a direct method of enquiry. the purpose of interview, however, is not to collect superficial detail about the interviewee but is rather to probe into the inner life of the interviewee. Therefore, the method of interview as well as depth study. Emphasizing this point, Mrs. P.V. Young has observation, "The interview may be regarded a systematic method by which a person enters more or less imaginatively into the inner life of a comparative strange. "In an interview a rapport is established between the interviewer and the
not only is physical distance between the annihilated, the social cultural barrier is also removed: and free mutual flow of ideas to and fro-takes place. Both create their respective impressions upon each other. The interview brings them both on the same level and an emotional attachment supervenes between them. This single quality of bringing the scientist and layman into personal, emotional and intellectual marks the method of interview of from all other methods of social research. In the other methods, formality and remoteness persists between the scientist and layman and this clock of formalism never gets tripped in these methods, with the result that the information and data obtained by other methods can never the seal of reliability characteristic of the interview. In interview all formalities are laid down the gate is opened for delving into intellectual, emotional and subconscious stirring of the interviewee. It is the sterling qualities of interview which enable a psychoanalyst to unravel the "depth" of man and go to the very bottom of his emotional pool.

W.J. Goode and P.K. Hatt have correctly observed that "Interviewing is fundamentally a process of social interaction." In the interview two personas are not merely present at the place, but also affect each other emotionally and intellectually. According to Vivien Palmar, "The interview constitutes a social situation between two persons, the psychological process involved requiring both individuals mutually research porch purpose. of the interview calls for a varied response from the two parties concerned."

AIMS OF INTERVIEW

1- Direct Contact-

The first and the foremost aim of the interview method is to bring the scientist and the layman into direct contact so that both may know each other and understand the respective need of each other. Furthermore, by direct contact the scientist is able to perceive imaginatively the social under-currents and the personal dispositions of his respondents.

2- Eliciting Intimate Facts-

There are many facts of personal life which a person does not like to reveal. All other methods are helpless in goading him to pass on information which he does not want to share. It is the aim of the interviewer not to waste time on facts which can be
easily knows by other methods. An interviewer concentrates on knowing the unique facts about a person. He can also persuade him to tell many intimate facts of his life.

3- Establishing Hypothesis-

Sometimes the interviewee reveals such facts about the background of his peculiar attitudes, outlooks, aspirations and behaviour as are not already in the comprehension of the scientists. There new revelations help him in forming new hypothesis about personal and social behaviour. For example, generally it is supposed that a man in whom the sex urge is very strong may seek its gratification outside the bounds of his marriage. but there are numerous cases, unraveled by depth interviews, in which the cause of straying marring is not the powerful sex impulse but most surprisingly, the sexual inadequacy. Ac unsatisfied person seeks satisfaction by various means available to him. Accordingly, now-a-days the usual hypothesis about Don-Juanism and nymphomania is not overactive sex gland but the feeling of sexual inadequacy. The interview also helps to verify of disprove the hypothesis of the scientist.

4- Verification of Unique Ideals-

This is as a matter of fact a corollary of the foregoing point. When a psychologist or a sociologist entertains a novel idea about certain type of behaviour, it is always desirable to hold interviews with the persons concerned and how far the ideas entertained are born out by actual facts. For example, if a psychologist believes that sexual behaviour is unaffected by moral values and that every person, if given opportunity, would try homosexual, heterosexual and multiple sexual contacts, he must make a deep study of a large number of persons differing in cultural vulture, and see if his idea really is borne out by facts.

From the above discussion, it becomes evident that the purpose of interview is to obtain specialized information rather than study the general facts. The interview steps into help in cases where other methods are inadequate. In the words of Dr. Lundberg. "The researcher is interested in the objective data secured from the interviews such as income, number of children, their ages etc. and also in the personality of the information – his attitudes, prejudices, likes and disliked as revealed by his verbal behaviour, including the subtle gestures that accompany it, such as facial expression, tone of voice and so forth." Explaining the nature and the purpose of the
interview, Mrs. Young has rightly observed that interview is not an independent tool of research but is supplements to other methods. Whereas the case studies can be prosecuted by interview, it can help scrutinize test the information obtained by other of social research.

**TYPES OF INTERVIEW**

Classification according of formalness-

The formal classification of interview gives us two main types-

(a) **Formal interview**-

In this type of interview, the interviewer presents a set of well defined question and noted down the answer of information in accordance with prescribed rules.

(b) **Informal interview**-

In contrast with the formal interview, the interviewer has full freedom to make suitable altercation in the questions to suit a particular situation, in formal interview. He may revise the order or paraphrase the questions to suit the needs of the respondents.

1- **According to the number**-

Another classification of interview is according to the number of persons taking part in it following are its types-

(a) **Personal interview**-

In personal interview a single individual is interviewed. The personal interview helps to establish close personal contact between the interviewer and the interviewee, and by its means detailed knowledge about intimate and personal aspects of the individual can be had. According to Bogardus, "Attitudes and changes in the may best be secured by the personal method i.e. interview."

(b) **Group Interview**-

As the name makes it plain, the group interview is the opposite of the personal, because in it two or more persons are interviewees. The first is aimed at probing into the inner life feelings of an individual, the group interview is suited for gathering routine information. Whereas the former is uneconomical of time and money the latter economizes both time and money. but compared with the former, the knowledge gained through the latter is very superficial and routine like.

2- **According to purpose**-
The interviews have also been classified by the purpose for which they are held. Following are the type of this classification-

(a) **Diagnostic Interview**-

As the name makes clear, this type of interviews are held to understand the cause of causes of a malady. In clinical psychology and psychoanalysis, the preliminary interviews with the patients are held with a purpose to grasp the nature and cause of the diseases.

(b) **Treatment Interview**-

If the cause of a psychological malady is diagnosed as non-physical, further interviews are held to bring to fore-conscious of the patient that his malady is due to this or that mental complex or faulty style of life these interviews are christened "Treatment interview".

(c) **Research Interview**-

These interviews are held to gather information pertaining to certain problem. The question to be asked to gather the desired information are are pre-determined and by asking them of the informants, the data is collected. In such as much as this data is gathered for the purpose of research into a problem, these are called 'Research Interviews.'

(d) **Interviews to fulfill curiosity**-

These interviews as the name implies are held to satisfy question lurking in the mind of a scientist. For example, if a scientist gest an idea that good lectures are delivered extempore, he has to interview some reputedly good lecturers whether they take extensive notes for delivering lecture or not.

3- **According to the period of contact**-

The different type of problem require different amount of time for contact with the respondents. The time can be short or long. Accordingly, two types according to time are as follows:

(a) **Short- contact Interview**-

For filling-up schedules etc., a single sitting of small duration suffices. Therefore, in researches of this type short-contact interview suffices.
(b) **Prolonged-contact Interview**

In contact with research by schedule, the case-history method requires prolonged interviews. In these, establishment of close personal relation between the interviewer and interviewee is very likely.

4- **According to subject matter**

The classification of interviews according to subject matter gives us the following three types-

(i) **Qualitative Interview**

The qualitative interviews are about complex and non-quantifiable subject matter. For example, interviews held for case studies are quantitative, because the interviewee has to range over past, present and future to know enough about a case.

(ii) **Quantitative Interview**

The quantitative interviews are those in which certain set facts are gathered about a large number of persons. The census interviews are its example.

(iii) **Mixed Interviews**

In certain interviews both types of data—the routine and specialized—are sought, some of it is quantifiable while some is not. Therefore, it is known as mixed interview.

5- **According to role**

Mrs. P.V. Young while recognizing the above mentioned categories of interview, has attached special significance to the classification of interview according to the role assumed by the interviewer and the interviewee during the interview. Following are the types according to his classification-

(a) **Non-directive Interview**

This is also known as free or unstructured interview. This is type of interview in which the interviewer exercises no control, provides no direction and has no brief or predetermined set of question to ask. The interviewer merely engages the interviewee in talk and encourages him to tell about his experiences and feelings. The information is left free to narrate as well as explain his experiences. When the interviewee has discussed his experiences elaborately and offered his explanation, the interviewer rounds off the interview by summing it up and raising the remaining questions in the interview guide.
This type of interview is used under very special circumstances, particularly when the researcher wishes to access the amount of awareness a person has about certain problems and the manner in which he views them. The information, thus gathered is made use of in the preparation of schedule. Therefore, this type of interview is a preliminary study for a schedule. By gathering the impressions and attitudes of various persons towards a particular problem, it becomes possible to know the important aspects of the problem, and the ways in which these are viewed by the people. All information is a qua non for a good schedule. This type of interview is also very useful in discussing the problem of social disorganization, the problem of divorce and other types of martial discords, Aging, this is the only method by which adequate information about underground activities can be obtained. This is an eminently suitable method for studying sexual deviations.

(b) Focused Interview-
This type of interview has been employed by Robert K. Merton and his associates for studying the socio-psychological effects of mass media like Radio, Television Cinemas, etc. They have enumerated four special features of focused interview which distinguish it from other types. These are-

(i) This type of interview takes place when the interviewees are in a specialized concrete situation. For example, when they seen a particular film or heard a particular radio broadcast or are eye-witnesses of a social situation, under these circumstances they can give information about these things.

(ii) This type of interview is possible in those concrete circumstances which have been analyzed beforehand, i.e., prior to the beginning of the interview.

(iii) This interview is done on the basis of an Interview Guide in which the field of inquiry any hypothesis are clearly stated.

(iv) In an interview of this the inner feelings and emotional attitudes of the interviewees vis-a-vis a given problem or situation is given particular attention.

The Specialty of the focused interview is that by its means the personal reaction, emotional and intellectual orientation of the persons to be interviewed towards specific issues can be studied. Therefore, the focused interview focuses attention on the background of emotional and intellectual atmosphere of the problem rather then its apparent feature. The peculiar and unique quality of the focused interview is that the
Interviewee cannot successfully conceal his reaction and sensibilities because the interviewer knows fully well before hand the reactions and responses likely to be made by the interviewees. He has analyzed these before undertaking the interview. Therefore, as soon as an interviewee tries to dodge or side track the issue, he is pulled up. This type of interview has proved very useful in the study of situation of social tension. At times this type of interview serves to verify hypothesis. For example, it has been observed that the fear complexes which develop in human beings as a result of specialized propaganda affect their thinking and emotional tone vis-a-vis those situations. For example, if as a result of concerted propaganda, a particular community thinks of the other community in consistently hastily terms, the very mention of that community or presence of its members would ignite hatred in the hearts of members of other community.

(c) Repeated interview-
This type of interview is made when we wish to study the development process of social psychological situation. According to Mrs. Young, this type of interview is eminently suited to trace the development of processes and to determine the factors or attitudes which are behind a given behavior pattern or situation. Paul Lazars field and his associates have used this method to study the voting behaviour of U.S. people in the successive American Presidential Elections. Though the repeated interview is very expensive of time and energy, we cannot study the developmental side of an issue by any other method.

<table>
<thead>
<tr>
<th>DIFFERENT TYPES OF INTERVIEW</th>
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<tbody>
<tr>
<td>Formal classification of Interview</td>
</tr>
<tr>
<td>A. Formal interview</td>
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<tr>
<td>B. Informal interview</td>
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<tr>
<td>According to the Number</td>
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<tr>
<td>A. Personal interview</td>
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<td>B. Group interview</td>
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<td>A. Diagnostic Interview</td>
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<td>According to the Period of contact</td>
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<tr>
<td>A. Short-contact Interview</td>
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<td>B. Pro-longed Interview</td>
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SCHEDULE

There are two ways in which the response to a questionnaire may be secured. In the first, it may be sent by post to various individuals: and in the second, the researcher any himself present the questionnaire to the individuals, whose responses are desired. The first method is called the mailed questionnaire, while the second method is called schedule. In the words of Thomas Carson Macormic, “The schedule is nothing more then a list of question which it seems necessary to test the hypothesis or hypotheses,” A schedule, therefore, is a list of questions formulated and presented with the specific purpose of testing an assumption of hypothesis. For example, if a social scientist believes on the basis of his general experience that women do not enjoy good status in a family, he will so formulate his questions that the actual state of affairs may come to surface in responses to those questions. A sample of questions i:

1- Do you often go out of your house?
2- What is the usual purpose of your outside visits?
3- Do you often entertain you fried at home?
4- Do you receive an allowance for personal expenses? etc.

- According to W.J. Goode and P.K. Hatt, “Schedule is the name usually applied to a set of questions which are asked and filled by an interviewer in a face to face situation with another.” By a schedule. wee cannot, however, obtain information about many things at once. It is best suited to the study of a single item thoroughly. Emphasizing this, G.A.
Lundberg observes, “The schedule is a device for isolating once elements at a time thus intensifying our observation.”

From the foregoing discussion, it is quite clear that in the schedule method, interview occupies a central place and plays a vital. As a matter of fact success in the use of schedule is largely determined by the ability and tact of the interviewer rather than by the quality of the posed. Because the interviewer himself poses the questions and notes down the answers all by himself, the quality of question has not any great significances. The list of questions is merely a formal document intended to maintain uniformity in the questions asked by different persons. C.A. Moser has pointed out this fact is the following words: “Since it is handled by interviewers, it can be a fairly formal document which efficiency of field handing rather then attractiveness is the operative consideration.” World, but by mailed questionnaire, people living in all countries can be approached.

CHARACTERISTIC OF SCHEDULE

From the above-mentioned definitions, following salient points about schedule emerge:

1- The schedule is presented by the interviewer. The questions are asked and the answers are noted down by him.
2- The list of questions is a mere formal document: it need not be attractive.
3- The schedule can be used in a very narrow sphere of social research.

OBJECTS OF SCHEDULE

P.V. Young has laid emphasis on the following objects of the schedule. According to her, a researcher “makes the schedule a guide, a means of delimiting the sense of this enquiry, a memory flicker, a recording device.” These may now be discussed point wise:

1- Delimitation of the topic-

A schedule is always about a definite item of inquiry: its subject is a single and isolated subject-item rather than the subject in general. The interviewer presents question about one item and notes down answers about it. Therefore schedule delimits and specifies the subject of inquiry.

2- Aids memory-
In an interview the choice of question is left entirely to the interviewer: he may ask any question. In this there is always a chance of some important points being left. Therefore, in the schedule that list of questions is preplanned and noted down formally. The interviewer is always armed with the formal document detailing the question. Accordingly in the schedule method an interviewer is not dependent upon the memory.

3- **Aid to classification and analysis**-

When the interviewer obtains replies to the questions given in the schedule, these replies are classified and analyzed. Many different tables are used in the schedule: and the questions are also of many types. Some need only yes/no answer: other require choosing one of the alternatives given or arranging the in order of preference: still others required certain amount of thinking and can be answered in small sentences. Therefore, all the varieties of replies are sifted and classified under various heads. This helps in the analysis of the replies. The above aims of schedule method have been considered by Mrs. Young in the following words: “An observation usually serves several purposes simultaneously”:

1- It is a specific memory tickler.

2- It is an objective recording device which make possible accurate accumulation of large quantities of data.

3- It is standardizing device: and

4- “It aids to delimit the scope of the study and to concentrate on the circumscribed elements essential to the analysis.”

**TYPES OF SCHEDULES**

P.V. Young has described four types of schedules. These are to be discussed new:

(1) Rating schedule
(2)Document schedule
(3) Institutional survey forms or Evolitional Schedule
(4)Observation Schedule
(5)Interview Schedule
Figure 8 Types of Schedule

1- Rating schedules:
In the field of business guidance, psychological research, and social research, the rating schedules are used to assess the attitudes, opinions, preferences, inhibitions and other like elements. As evident from the term “rating”, in these schedules, the value and trend of the above mentioned qualities is measured.

2- Documents schedules-

The schedules of this type are used to obtain data regarding written evidence and case histories. In these schedules, those terms are included which occur frequently in documents and are too generally found in case histories. For example: in the field of criminology, rating schedules are used to gather data to be found in crime studies. The different kinds of crime, their incidence, the nature of earlier crime and the personal data on criminals like school-leaving age, the age at the time of employment, the level of economic and social status and other sundry facts about crime and criminals.

3- Institutional Survey forms or evolutional schedules-

The use of these schedules. as is evident from the name. is made to gather data specialized institutions or agencies. The from and the size of evolutional schedules is determined by the nature and the complexity of the problems of an institution: more complex the problem, bigger the size of the schedule. To study the problems of American Public Organization for health services, a schedule running into as many as 3 pages, was used.

4- Observation schedules-

In these schedules, observer records the activities and responses of an individual or a group under specific conditions. The observation schedules may need once or more research research work to be completed. The main purpose of an observation schedule is to verify information.

5. Interview schedules-

A fifth form of schedules is sometimes treated independently and at other considered included in the 4th type. In an interview schedules, an interviewer presents the questions of the schedule to the interviewee and records their responses on blank spaces. Of all above-mentioned type of schedules, the observation schedule depends on blank spaces.

CHARACTERISTICS OF GOOD SCHEDULE
Mrs. Pauline Young has enumerated two characteristics of a good schedule. These are:

1- **Accurate communication**

   If a respondent is unable to understand the meaning of questions in a schedule, the schedule is defective in design. Therefore, the first and foremost quality of a good schedule is that it must communicate. That is, a respondent should be able to understand the meaning of questions on reading them. Whatever meaning the researcher wishes to communicate to the respondent should be grasped by him. If this does not happen, the researcher and the interviewer all work at cross-purposes. Accordingly, the language of the questions should be simple and free from technical jargon: it should also be free from ambiguity and circumlocution. In this as much as the aim and purpose of a schedule is to obtain accurate data, it is of utmost significance for the researchers so that the respondent can see clearly the meaning of the questions by all himself.

2- **Accurate response**

   Next in order, but equal in importance, is the second quality of schedule, that is, ability to elicit accurate response. For making accurate response, the respondent should be motivated and made to feel the importance of his cooperation. The schedule should be so constructed that it is easily understood by the respondent and that he realizes the value of this accurate response. The schedule should avoid all possible irritants—technical jargon, misleading and too intimate questions: otherwise, the respondent would feel no compunction or guilt in giving inaccurate responses. For example, if the respondents are asked, “Do you make fruitful use of your spare time?” Most of them would not know what the interviewer means precisely by “fruitful use.” Some may consider that fruitful use means monetary gain, whereas others may have different ideas. At times, the respondents willfully mislead by giving wrong responses. Therefore, the researcher must closely scrutinize the data made available in the schedule. He should test its veracity by every available means before drawing conclusions based on the data.

   From the foregoing discussion it is evident that a schedule can be considered good only if it has following features:

1- Attractive form and style:
2- Direct simple and unambiguous questions:
3- The questions should not be so intimate that the respondent may be reluctant to make replies:
4- The questions must be directly related to the specialized problem being explored:
5- And the responses should be such as are classifiable and amenable to statistical treatment.

**RATING SCALES**

As was stated at the outset, the second method of measuring attitude after the opinion scales, is that of rating scales. The special feature of the rating scales is that the attitudes are evaluated not the basis of the subjects but on the basis of the opinions and judgments of the experimenter himself.

In the rating scales the experimenter collecting the data by means of the following:
1- Non verbal behavior, such as accepting or rejecting customs.
2- Verbal behavior such expressing concurrence or objection.
3- Secondary expressive cues as facial expression, etc.
4- Clinical type interview.
5- Personal Documents-such as autobiography, letters, diary etc.
6- Projective Techniques-such as ink blot test.
7- Immediate experience-such as the emotions, thoughts, perception, imagination of the individual, etc.

From the above sources the experimenter gets enough data concerning, the attitude, the speechless behavior of the individual also provides a lot of information though of course precautions should be taken in interpreting it. Compared to speechless behavior, the easier method of understanding attitude is that of conversation. In addition to conversation, various facial expressions and flections in the volume of sound are also good indicators of attitude. “It is a common place belief that what a man says may be less reveling than how he says it”, wrote Kretch the Crutchfield, with a happier choice of phrase. In this way the manner of expressing an opinion may be more informative that the verbal expression itself. In a clinical interview the subject can be made to respond to question, from which he would normally hesitate, but he does now under the belief that the answers are necessary for his treatment. Diary essays, letters,
poetry, story and other kinds of individual writing manifest the attitude of the individual. Among them diary, is of the greatest importance since it is the most personal. An autobiography also reveals the attitudes of the other, projective techniques have also proved very useful in revealing attitude. Two among them are: (1) Rorschach’s Ink Blot Test and (2) Murray’s Thematic Apperception Test or T.A.T. In Rorschach’s Ink blot test the subject is given ten original cards with ink blots on them and he is asked to describe what he sees on time. In Murray’s Thematic Apperception test the individual is presented ten of them in a short but definite period of time. In the projective techniques the subject his attitudes ignorant of the fact that he is doing so. Beside these, the immediate experience such as feelings, emotions, thoughts, perceptions, etc., of the individual also help in revealing his attitude of the experimenter.

Types of Rating Scales-

Roughly, rating scales are of two kinds-relative and absolute. One example of the relative method is that rank order while one example of the absolute type is the percentage of population. It would be opportune to describe both of these scales briefly.

1- Rank Order Scale-

In this scale the experimenter gives to the individual’s attitude, a position in the scale extending from the highest to the lowest quantity. In examining the individual in the circumstances of the human group his position, relatively to the positions of others, is kept in view. In this way, in Rank order method, the individual is given a relative position on a similar scale, or putting it differently, in comparison with other individuals.

2- The Percentage of Population Scales-

In this scale, or more individuals are given a position. In this method, a definite population is put to the test and them the opinions of an individual are examined. Now, the examiner places the opinions of the individual on the scale, which, shows the percentage of the population concurring with his opinions as well as the percentage differing of the population concurring with his opinions, in which he leads the population and the percentage in which he is behind the population.
Methods of Attitude Scales

Attitude can be measured only on the basis of inferences drawn from verbal statements regarding belief, feeling and tendency to act towards the object or person. Attitude scales (also known as opinionnaires) which usually consist of a large number of statements towards objects of attitudes, are one such indirect measure. Here we shall discuss the three most common and frequently used techniques in construction of attitude scales, namely, the method of equal-appearing intervals, the method of summated ratings and the method of cumulative scaling.

Method of Equal-Appearing Intervals

Thurstone (1929), Thurstone & Chave (1929), Thurstone (1931) developed a method known as the method of equal-appearing intervals. The method, as used by Thurstone and Chave, is as under:

A large number of statements, both favourable and unfavourable, towards the object of attitudes, are collected from various sources. The number of items usually ranges from 100 to 200. Each statement is printed on a separate card and subjects are asked to sort these printed statements into a number of intervals. Along with the statements each subject is given 11 cards on which letters A to K are written. These cards are arranged before the subjects in a manner that A is kept at the extreme left and K is kept at the extreme right. A indicates the most unfavourable interval and K represents the most favourable interval. The middle category is designated by the letter F, which is the neutral category. The cards lettered from G to K represent various
degrees of favourableness and the cards lettered from D to A represent various degrees of unfavourableness as illustrated below:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>i</th>
<th>j</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfavourable</td>
<td>Neutral</td>
<td>Favourable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thurstone and Chave defined only the two extremes and the middle category (of the 11 intervals) on the ground that the undefined intervals between successive cards would represent equal-appearing intervals for all the subjects. The subjects are requested to sort the given statements in terms of 11 intervals represented by the 11 cards. Ordinarily, there is no time limit for sorting. But Thurstone and Chave reported that subjects took 45 minutes in sorting 130 statements into 11 intervals. They made the following assumptions in this method:

1. The intervals into which the statements are sorted or rated are equal.
2. The attitude of the subjects does not influence the sorting of the statements into the various intervals. In other words, subjects having favourable attitudes and those having unfavourable attitudes would do the sorting in a similar manner. Thus the scale values of the statement are independent of the attitude of the judges.

The method of equal-appearing intervals has both advantages and disadvantages. Its important advantages are given below:

1. Thurstone scales enable the researcher to differentiate between larger numbers of people regarding their attitudinal position. Here item weights are averaged (median) and this reveals a great variety of attitudinal positions. This makes it possible to make finer distinctions among people according to the attitudes they have.
2. In Thurstone scale it can be said with increased confidence that items being used have a stronger claim to reliability because they are based upon judges’ view who have higher degree of agreement about items used and who eliminate the bad items reflecting little or no agreement.

This method has the following disadvantages:

1. Judges or subjects do not keep the intervals equal. Fransworth (1943) has found evidence for the support of the above fact. As a matter of fact, in the method of equal-appearing intervals there is no way through which this assumption can be tested.
Thus one of the assumptions of the method does not stand the rigours of the experimental test.

2. It is also said that the attitude of the subjects or judges tends to influence the sorting of the statements into the intervals. In other words, the scale values of the statement are not independent of the attitudes of the judges who do the sorting.

3. Thurstone and Chave have provided no objective basis for selecting the most discriminating items from among items having approximately the same scale values. It may be possible that items having approximately same scale values differ in their discriminatory power.

4. The subjects may do the sorting work carelessly and with least interest. In such a situation the interpretation of the scale values may be a difficult task. Thurstone and Chave, have, however provided a technique to detect careless judgements and accordingly, they can be eliminated. They have pointed out that if any subject sorts more than 30 statements in any one of the 11 intervals, the judgements of that subject may be rejected on the ground that he has done sorting either carelessly or has misunderstood the instruction.

**Method of Summated Ratings**

Likert (1932) developed a different method for the construction of the attitude scale. His method, named by Bird (1940:159) as the method of summated ratings, is a simpler method than that of Thurstone’s equal-appearing intervals method. The main steps involved in Likert’s method may be summarized as mentioned below:

1. A large number of multiple-choice-type statements usually with five alternatives such as strongly agree, agree, undecided, disagree and strongly disagree concerning the object of attitude are collected by the investigator. Two examples of items intended to measure attitude towards nationalization are given below:

   Nationalization improves the economy of the country.
   
<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
<td>(2)</td>
<td>(1)</td>
</tr>
</tbody>
</table>

   Nationalization introduces a feeling of carelessness among individuals.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
</tbody>
</table>
2. Such statements are administered to a group of subjects who respond to each item by indicating which of the given five alternatives they agree with.

3. Every responded item is scored with different weights. The weight ranges from 5 to 1. For favourable statements a weight of 5 is given to ‘Strongly agree’, 4 to ‘Agree’, 3 to ‘Undecided’, 2 to ‘Disagree’, and 1 to ‘Strongly disagree’ (as shown in the first illustrative example) and for the unfavourable statement the order of weights to be given is reversed so that ‘Strongly agree’ receives 1 and ‘Strongly disagree’ receives 5.

4. After the weight has been given to items, a total score for each subject is found by adding the weights earned by him on each item. Thus his total score is obtained after the weights are summed over all statements. Since a subject’s response to each item may be considered as his rating of own attitudes on a 5-point scale and his total score is obtained after all these weights are summed, the method is known as the method of summated ratings.

5. Finally, selection of items is done through the procedure of item analysis. Probably, this step of item analysis is the major step, which distinguishes it from Thurstone’s method of equal-appearing intervals. As we have seen, Thurstone’s method makes no use of item analysis in final selection of items. There are several methods of item analysis. Edwards (1957) has suggested the setting of two extreme groups-high and low-on the basis of the total score and finding out the significance of the difference between the means of two groups by the t test. The value of t will indicate the extent to which a given statement distinguishes between high and low groups. But other methods such as correlational methods may also be used in place of the t test.

The Likert method has also advantages and disadvantages. Its major advantages are mentioned below:

(i) Likert scales are easy to construct and it takes less time. This method is simpler and easier than the method of Equal-Appearing Intervals. Some empirical evidences are available to support this content. Rundquist & Sletto (1936:5) have used Likert method in the construction of the attitude scale and expressed the belief that this method”… is less laborious than that developed by Thurstone.” Edwards & Kenney (1946) have made a comparative study of Likert’s method and Thurstone method and have concluded that the time required in the construction of the attitude scale by Equal-
Appearing Intervals is almost twice the time required by the method of Summated Ratings.

(ii) Scoring of Likert scale is easy as well. Statements on Likert scale are worded positively or negatively and subsequently, numerical weights are assigned to them. Subsequently, they are summed to yield total score. High total score indicates favourable attitude and low total score indicates unfavourable attitude.

(iii) Likert’s summated ratings are the most common measurement format. The ease of application and simplicity of interpretation have increased the popularity of this measurement format in social science researches.

(iv) Likert’s method of scaling possesses sufficient degree of flexibility. Here the investigator is free to include as many and as few items in his measure as he chooses. In this scaling, because each item is presumed to count equally in measuring the concerned phenomenon, increasing the number of statements increases the ability of the scale to reveal differences in the phenomenon measured.

Despite these advantages, some disadvantages or weaknesses have been reported in Likert’s method of scaling as mentioned below.

(i) In Likert’s method of summating ratings it is assumed that each item or statement has identical weight in relation to every other item or statement. This is not necessarily a valid assumption, In fact, the different individuals may have a given attitude to the same degree, yet they may respond differently to different statements or items of the scale. Therefore, it is difficult, if not impossible, to ensure that each statement counts the same as every other item.

(ii) The validity of Likert’s scaling is questionable. As we know the process of deducing items from an abstract universe of traits is a logical one. Therefore, there always exists the possibility that some items may be wrongly included in the scale at any given time. The problem is to know that we are measuring exactly what we claim to measure.

(iii) In summated ratings the persons receiving the same score on a measure don’t necessarily possess the trait to the same degree. This obviously means that this method is never as precise as it claims to be. Its raw scores may be regarded as crude estimates at best.
Despite these disadvantages the method of summated ratings, as devised by Likert, has been successfully used in assessment of attitudes. Recently, this method has also been fruitfully used in assessing, socio-economic status, intelligence, interest and special skills (Black & Champion, 1976).

**Guttman’s Scale, or Cumulative Scale**

Guttman’s method of scale analysis or scalogram analysis differs considerably from the two methods of attitude scale construction discussed previously. The Guttman scale is based upon the methods of attitude scale construction discussed previously. The Guttman scale is based upon the methods of cumulative scaling and has been defined by Guttman (1950) as follows:

“We shall call a set of items of common content a scale if a person with a higher rank than another person is just as high or higher on every item than the other person.”

Thus, if a set of statements with common content defines the Guttman scale, a person with higher score or rank than another person on the same set of statements will rank consistently higher than him on each statement in the set. For example, the following items illustrate the perfect Guttman’s scale:

(a) My height is more than 5’.
(b) My height is more than 5’-3”.
(c) My height is more than 5’-8”.
(d) My height is more than 6’.

A person who responds with “Yes” to item (d), will also be responding in “Yes” to items (a), (b) and (c). All the four items are measuring the same dimension, that is, height and constitute what Guttman (1944, 1945) called ‘uni-dimensional scale.’ Similarly, if a set of attitude statements measures the same attitude, they are said to constitute a uni-dimensional scale or a Guttman scale. According to Guttman, one advantage of the uni-dimensional scale is that from the total score of the person one can reproduce the pattern of his responses to the set of statements. Suppose, for example, that in the above example, “Yes” is given a weight of 1 and “No” is given a weight 0, then knowing that a person has secured a total weight of 4, we can say that he has responded “Yes” to items a, b, c and d. Likewise, if a person gets a total weight of 3, he has responded “Yes” to item a, b and c and “No” to item d. Such prediction regarding the perfect reproducibility is true in a perfect Guttman scale only. In case of
attitude, statements showing such a perfect reproducibility are rarely achieved because some degree of irrelevancy is always present.

The major steps in the Guttman scale may be enumerated as shown below:

1. A large number of statements are collected regarding the object of attitude. All statements seem to indicate the same attitude. This constitutes what Guttman calls a universe of items.

2. Out of these collected statements, a small number of items are selected. Usually, the number of selected items does not exceed 20. According to Guttman the selection of a small number of items from the large number of possible items is dependent upon the intuition and experience of the investigator. These selected items must be of homogeneous content. Thus one should look for items in the Guttman scale which are, to a greater extent, the rephrasings of the same content. Guttman believed that item analysis was not an essential part of scale analysis for selection of items as we find in case of the Likert’s scale.

3. Each statement may have two alternatives such as ‘Agree-Disagree’ or more than two alternatives such as ‘Agree, Neutral and Disagree.’ All these items are administered to a group of 100 persons who respond to each item.

4. All items are scored or weighted and a total score by adding the weights on all items is determined for each person.

5. On the basis of the total score, each subject is ranked from highest to lowest and is listed in a column. Each row indicates the responses of a subject to different items.

6. Subsequently, it is determined whether or not the responses to each item are in close agreement. In other words, those marking the response category (such as ‘Agree’), which strongly indicates the quality being measured should show consistency with the lower total scores. If this is reality, the scale is to be a homogenous one and in this case from the person total score (or rank) alone, we can reproduce his response to each item. In a perfectly homogenous test, the index of reproducibility will also be perfect and therefore, the coefficient of reproducibility will be one.

A case of perfect reproducibility has been demonstrated in Table where responses of 10 subjects towards five items have been displayed. Each item has two response categories-Agree and Disagree. The response category ‘Agree’ is scored with
+1 and the other response category ‘Disagree’ os scored with 0. Subsequently, an attempt is made to evaluate the scalability of the items and for this purpose, there are several procedures.

We shall here describe the most common method adopted by Guttman (1947). The method is called the ‘Cornell technique’. The question Guttman proposes to answer with this technique is whether the set of statements is unidimensional. Following this technique a table is constructed in a way that for each subject one row is constructed (See Table). Starting with the highest total score we place a cross mark in the appropriate cell of the table for indicating responses given by each subject towards each item. Thus the table makes available

**Table.1.0**

**Perfect Guttman scale of 5 statements responded by 10 subjects. +1 indicates favourable judgment-favourable judgment**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Statement 1</th>
<th>Statement 2</th>
<th>Statement 3</th>
<th>Statement 4</th>
<th>Statement 5</th>
<th>total score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+1 A</td>
<td>+1 A</td>
<td>+1 A</td>
<td>+1 A</td>
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<td>+1 A</td>
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<td>+1 A</td>
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</tr>
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<td>+1 A</td>
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</tr>
<tr>
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<td>0 D</td>
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</table>
all the responses of all subjects along with the total scores. Knowing the total score of a subject, we can reproduce his responses to each of the items. An inspection of Table indicates that subject 1 has agreed to all the five statements. Therefore, his score is five. Subjects 2 and 3 have similarly responded. Subject 4 has responded disagree to item number one but has agreed with other four items. Subject 5 has responded ‘disagree’ to item one and item two has agreed to the remaining three items. Subject 6 has responded ‘disagree’ to the first three items and has agreed to the last two items. Subject 7 has responded in a similar manner. Subject 8 has responded ‘disagree’ to the first four items and has agreed with the last item, that is, the fifth item. Hence his total score is one. Subject 9 has earned the score of zero which means he has disagreed with all the five items. When the items form a perfect scale and vary in graduated fashion in intensity as items 1, 2, 3, 4, and 5 in Table, Guttman has named the resulting scale a perfectly reproducible scale which obviously means that a person’s response pattern to all items in a set can be perfectly reproduced simply by knowing his total score on the scale. Such perfect reproducibility of scale can’t be achieved by either Thustone method or Likert method or Likert method and hence, this may be considered as one advantage over these two scales.

In practice the ideal model or perfect scale is rarely shown and therefore it becomes necessary to examine the degree of reproducibility for the set of given attitude statements after making allowance for the errors. For this purpose, Guttman suggests that a cutting point should be located in the table. A cutting point may be defined as that point where the most common response is shifted from one category to another in the statement. Locating a cutting point sometimes creates difficulties. To ward off these difficulties Guttman (1947) has given two points as guidelines. First, the cutting point for each statement should be located at a place where the error is minimized. Second, the cutting point should be located in a way that “no category should have more error in it than non-error.” In case of a perfect scale or perfect reproducibility the responses above the cutting point fall in one category and the responses below the cutting point fall in another category. This is clear from data presented in the Table. The cutting points have been shown in Table with horizontal lines. Now we are presenting another set of data in Table for the purpose of illustrating a non-perfect scale. The cutting points for each statement have been shown by horizontal lines in the Table, which displays the
score matrix for 6 statements each having two alternatives and answered by 10 subjects. In this table the cutting points have been located for each statement according to the two-point suggestion of Guttman. The sum of each row of the score matrix yields the total score for each subject and these have been recorded in the last column. The first row at the bottom of Table shows the frequency with which two categories of each statement have been responded. The sums for each column of the response category of 1 have been divided by the total number of subjects responding to this response category to obtain proportions p. The proportions of the subjects giving 0 responses will thus be equal to 1-p=q. The values of p and q have been shown in the second row at the bottom of the score matrix. Finally, errors for each response category have been counted and written at the bottom row of the score matrix. Here errors indicate response inconsistencies. For the response category of 1 of the first statement, no response falls below the cutting points and hence, the error is zero, whereas for the response category of 0 one response falls above the cutting point but it should theoretically fall below the cutting point and hence, one error has occurred. Therefore, 1 has been written in the row of error against this category column. For the response category of 1 of the second statement one response falls below the cutting point but it should theoretically fall above the cutting point and hence, one error has occurred. No response falls above the cutting point in the response category of 0 of the second statement and hence, no error has occurred. Similarly, error has been counted for each statement. The error for each statement has been added together which is equal to 8. We have a total of 60 responses (that is \(10 \times 6\)). The proportion of error is, therefore, equal to 8/60=0.133. Subtracting this value from unity, that is 1, we get the coefficient of reproducibility, which indicates the per cent accuracy with which the responses to various statements can be reproduced. Thus, coefficient of reproducibility =1-0.33=0.867=0.87. Thus, the equation for coefficient of reproducibility becomes:

\[
\text{coefficient of reproducibility} = 1 - \frac{\text{Number of errors}}{\text{Number of responses}}
\]

<table>
<thead>
<tr>
<th>Statement</th>
</tr>
</thead>
</table>

Table 1.01

An illustration of the Cornell technique in the Guttman scale
According to Guttman, if the coefficient of reproducibility is below 0.90, no cumulative scale is said to exist or if is between 0.85 to 0.90, a 'quasi scale' said to exist. Thus, for Guttman, the coefficient of reproducibility must be at least 0.90 for constituting the cumulative scale.

Guttman scale has some advantages and disadvantages. Its major advantages are as follows:

(i) The Guttman scale clearly demonstrates the unidimensionality of items. Such unidimensionality is assessed neither by the Likert scale not by the Thurstone scale.

(ii) The unidimensionality and scalability of the scale enable the researchers to identify any inconsistencies in the responses and probable untruthful replies given by the subjects.

(iii) In the Guttman scale the person’s response pattern can be easily reproduced with a knowledge of his total score on the scale. This type of advantages is not found in case of the Thurstone or Likert scales.

<table>
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<tr>
<th>Subject S</th>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<td>x</td>
<td>x</td>
<td>x</td>
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<td>4</td>
</tr>
<tr>
<td>p &amp; q</td>
<td>0.6</td>
<td>0.4</td>
<td>0.5</td>
<td>0.5</td>
<td>0.7</td>
<td>0.3</td>
<td>0.4</td>
</tr>
</tbody>
</table>
| error     | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 1 | 1 | Σ=8
(iv) Researchers have shown that the Guttman technique of scaling is relatively easy to use when a number of dichotomous items (such as agree-disagree) is 12 or less than that. When the number of items exceeds 12, the technique becomes cumbersome.

The Guttman scale has, however, some disadvantages. The major ones are given below:

(i) The Guttman scale is not well suited to those items which have three or more than three response categories. Although some psychologists have applied this scaling technique in such a situation, it is very cumbersome and tedious to proceed with this technique.

(ii) The Guttman scale can’t be used appropriately in situations where the number of items exceeds 12 and the number of subjects is more than 100. In such scalogram analysis, scoring and error determination will prove to be a Herculean task.

(iii) The Guttman scaling technique does not provide as extensive continuum for scaling as we find in the case of Likert’s and Thurstone’s scaling technique.

Despite these limitations, the Guttman scale has been successfully used in attitude assessment. Besides, the technique has also been used in opinion studies of a political, economic and social nature. It may also be used in combination with Likert’s and Thurstone’s scale to encompass a wide variety of attitude assessment.

**PROJECTIVE TECHNIQUES**

**Meaning**

Projective techniques which originated in clinical setting are the indirect measures of personality. The history of projective assessment goes back to the 1400s when Leonardo Da Vinici is said to have selected pupils on the basis of their attempt to find shapes and patterns in ambiguous from (Piotrowski, 1972). Galton constructed a word-association test in 1879. Carl Jung also used similar tests for clinical purposes. These informal projective techniques gradually evolved into projective tests. In fact, Frank (1939, 1948) had introduced the term projective method for describing a category of tests for studying personality with unstructured stimuli. In projective tests the individual is given an unstructured situation we mean in a situation whose meaning and interpretation vary from individual to individual. Such situations have no right or wrong
answers and are capable of evoking fantasy material from the testes (Lindzey, 1961). The most important assumption of projective techniques is that while responding to an unstructured situation, an individual projects his won feelings, need, emotions, motives, etc. (which are mostly latent and unconscious) without being aware of doing so. Since the individual is not aware of these revelations, he doesn’t resort to any defensive reactions. Thus in a projective test the individual has ample opportunity to project his won personality attributes that are mostly latent and unconscious in the interpretation of an unstructured situation. Such latent and concealed experiences are generally incapable of exposure by the questionnaire type of tests.

CLASSIFICATION OF PROJECTIVE TECHNIQUES

Refractive
Under this category are included all those techniques through which the examinee is given an opportunity to express his personality in the from of painting. Drawing, handwriting, etc. Graphology (or handwriting) has been cited by Frank as the best example of this category.

The more convincing classification of projective techniques has been recently provided by Lindzey (1959). Based upon the responses of the examinees, he has divided projective techniques into the following five categories.

1. Association Techniques
This category includes all those situations where the examinee is required to respond with the associations which are evoked in his mind after seeing or listening to stimulus materials. The Rorschach test, the Holtzman Inkblot test and the Word-Association test are its best examples. The Rorschach test requires the examinee to respond to an unstructured situation of inkblots in the form of verbal associations with objects, events, persons, etc. No attempt is made to mould those association either by the examinee or by the examiner. Similarly, in the word-association test the examinee is presented with a variety of words one after another with the instruction to respond with the very first word that comes to his mind after listening to the stimulus word. Subsequently, the responses and the reaction time (the time elapsing between the presentation of the stimulus word and the response word and the response word) are analyzed for studying the personality.
2. Construction Techniques

This category includes all those situations where the examinee is required to construct a story after seeing the stimulus materials (usually a picture) within a certain specified time. No record us generally kept of time but the examinee’s themes and mode of responding are considered revealant. The Thematic Apperception Test (or the TAT), the Children’s Apperception Test (or the CAT), the Blacky Pictures, the Object Relations Technique and the Pickford Projective Picture (PPP) are some of the test examples of construction techniques. In all these tests the examinee is required to construct or produce simple statements or complex statements or complex statements in the form of a story. A discussion of all these tests is beyond the scope of this book. However, some of them appear in detail in later sections of this chapter.

3. Completion Techniques

These techniques include those situations where the examinee is presented with some incomplete sentences with the instruction to complete them in any way he desires. A few examples which illustrate the techniques are given below.

I feel tense ...............  
My ambition in life is ..........  
I often get nervous ............

Responses given by the examinee are interpreted and analyzed to find some clue regarding his personality. These techniques, however, lack a uniform and standard mode of analysis. Stories have also been used as completion techniques. The Madeleine Thomas Completion Stories test (Mills, 1953) and Rotter’s Sentence Completion Test are examples. The Rosenzweig Picture-Frustration Study (Rosenzweig, 1949) is another example of completion techniques.

4. Expressive Techniques

This techniques includes those situations where the examinee express his personality through some manipulative tasks, which usually involve some interaction with given materials. Play, drawing, role-playing, painting, finger painting, etc., are the common expressive techniques. One important feature of expressive techniques is that the examiner pays much attention to the way of process by which the examinee
manipulates the given materials. For examples, he may ask the examinee to play with a
given set of dolls; he may pay attention to the process by which dolls are selected and
handled during the play. Thus in the expressive techniques attention is given to the
process and no to the end product of the process. Expressive techniques, in this way,
are different from construction techniques because here much emphasis is given to the
process or way of handing the test materials rather than upon the end product of the
process (such as the content of them of the stories, etc.). The famous Toy-World Test is
an example of Expressive technique.

5. Choice Techniques

Choice techniques (also known as Ordering techniques) are not projective
techniques in the true sense of the term; rather they may be regarded as a step towards
objectifying the projective techniques (Kerlinger, 1973). Usually, the examinee is
presented with some sets of pictures or items (which convey the different degree of a
trait) with the instruction to choose the most relevent and appropriate picture.
Sometimes, he may be asked to order or rank those pictures in terms of his preference
and hence, the name ordering techniques. The choice of the subject, becomes the
basis for the inference regarding his personality. The Szondi test is an example of
ordering technique because the examinees are required to rank sets of pictures along a
like-dislike dimension.

Still another important classification of the projective techniques has been done
by best (1978). He has proposed a four-way classification of projective techniques as
stated below.
Figure 10: Types of Projective Techniques

- Association Techniques
- Construction Techniques
- Expressive Techniques
- Completion Techniques
- Choice Techniques
A nominating techniques is a technique in which each person names or nominates other persons, events, objects, subject-matter, which are perceived as fitting into certain categories or situations. The technique is commonly applied for studying social choice and rejections. Sociometry is one type of a nominating technique which is used in the study of group structure, social status and personality traits. The basic principles of sociometry were first enunciated by Moreno in a volume entitled Who Shall Survive?, published in 1934. Sociometry may be broadly defined as a method of discovering and evaluating group structure, social status and personality traits through measuring the acceptance or rejection between individuals in a group. Thus it is a technique of evaluating interpersonal relationship in a group. Stanley & Hopkins (1972:403) have defined sociometry as “the study of interrelationship among members of a group, that is, its social structure: how each individual is perceived by the group.” With the help of the socio-metric technique the data relating to the choice, communication, and interaction patterns of individuals in groups are gathered and analyzed (Kerlinger, 1973, 1986).

Date obtained on the basis of socio-metric tests are usually analyzed by three principal methods: socio-metric matrix, socio-gram and sociometric index. Of these three, the first two are very popular and hence, will be given a wider coverage than the last one.

Socio-metric matrix, also known as sociomatrix, is a simple cross-tabulation or rectangular array of n x n dimensions, n being equal to the number of individuals in the group. The meaning of the matrix can be illustrated through an example: Suppose a group of eleven students (A, B, C, D, E, F, G, H, I, J and K) in a class was put a sociometric question: “With which two members of this group would you like to go for a picnic?” If a member choose the other member, it is displayed by 1; if he does not make a choice, it is shown through 0. The data (hypothetical) are presented in Table 1.02.

| Table 1.02 |
| Sociometric Matrix of an 11-member Group with two Choice |
It is convenient to read the above matrix from left to right row-wise. The first row can be read as A where one does not choose C, F, G, H, I, J and K but chooses B, D and E. The matrix is usually analyzed by examining who choose whom. Ordinarily, there are three kinds of choices-simple, mutual and no choice. A simple choice is one in which one person chooses the other person but he (the other person) does not choose him (the first person). Thus, the choice is one-way. For example, in Table, C chooses F but F does not choose C; G choose C but C does not choose G. Mutual choices are the two-way choices, that is, both persons choose each other. For example, in the above matrix B chooses D and D also chooses B; B chooses H and H also chooses B. The sum of the column of matrix indicates to what extent a particular member is chosen by other members of the group. We can say that the greater the sum, the higher the popularity. The matrix indicates that B receives 4 choices which means it is chosen by many members of the group. Thus, B is popular. A and G are not chosen by any one. D, E, H, I, J, and K each receives two technique of sociomatrix has the following advantages.

1. The relationship between each single pair is well recorded.
2. Joint relationships between all pairs are also recorded.
3. Two or more than two matrices can be easily combined and compared.

4. Sociomatrix is valuable in mathematical analysis and synthesis.

The sociometric matrix is, however, considered as an inferior graphic device to the sociogram (to be discussed later) in studying group structure. Sociogram, or directed graph, is another method for analyzing the data obtained from sociometric tests. Sociogram may be defined as a pictorial technique to produce a set of nominations of choices. Here a simple or one-way choice is presented by a one-arrowed line like $\rightarrow$ and the mutual or two-way choice is represented by a two-arrowed line like $\leftrightarrow$. A sociogram of the data presented in Table is given in Figure.

An analysis of figure reveals several interesting points about the structure of the group. B is surrounded by arrows, which means he is chosen by several members of the group. A is a rejectee as he chooses B, D and E but neither of them choose him. A has no arrowheads pointing at him. I, J and K form a clique, which refers to that structure of the group in which three or more persons choose each other. The other common patterns are mutual pairs and isolates. Mutual pair refers to a pair in which the two members like each other but no other person in the group likes them. C and F are mutual pairs. Isolates are those who do not choose any one and are not chosen by anyone in the group. G is an isolate.

**3.4 TOOLS USED:**

The selection of tools used for a particular study depends upon various consideration such as objectives of the study, availability of suitable tools, techniques of scoring etc. A review of measuring tools for the study was mode and it was found that for measuring teaching competence of teacher trainees/teacher many researchers have used 'General Teaching Competency Scale' (GTCS) and 'Teacher Effectiveness Scale' etc. After a comprehensive review the following tools were selected for measuring the dependent variables

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Variables</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
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<td></td>
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</tbody>
</table>
1. Teaching competence
   Teacher Rating Scale
   by R.C. Deva

2. Teacher's Attitude
   Teacher Attitude Inventory (TAI)
   by S.P. Ahluwalia

Table No.2

<table>
<thead>
<tr>
<th>S.N.</th>
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<th>Tools</th>
</tr>
</thead>
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<td>Teaching competence</td>
<td>Teacher Rating Scale</td>
</tr>
<tr>
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<td>by R.C. Deva</td>
</tr>
<tr>
<td>2.</td>
<td>Teacher's Attitude</td>
<td>Teacher Attitude Inventory (TAI)</td>
</tr>
<tr>
<td></td>
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<td>by S.P. Ahluwalia</td>
</tr>
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</table>

3.5 DESCRIPTION OF THE TOOLS:
1. Teacher Rating Scale.
( R.C. Deva)

Teacher Rating Scale (TRS) has been constructed by R.C. Deva. Teacher Rating Scales are the tools of choice for the assessment of teaching competence. At this scale, teachers are to be rated on various item of this scale on the basis of their behavior in actual teaching situations. Every characteristic is to be judged on a seven point scale. The items in this rating scale are bi-polar i.e. they represent two extremes of a continuum. Each continuum represents a characteristic or trait which makes teaching
either effective or ineffective. This scale consists of 17 dimensions. These dimensions have been grouped under 3 Major heads for help in locating them. These 17 dimensions are systematically as follows:-

A. PERSONAL QUALITIES:-
(1) Apathetic or Stimulating.
(2) Autocratic or Democratic
(3) Harsh or Kind
(4) Unimpressive or Impressive
(5) Nervous or Confident
(6) Excitable or Raised
(7) Careless or Conscientious

B. PROFESSIONAL COMPETENCE -
(1) Narrow or Broad.
(2) Stereotyped or Original.

C. CLASS ROOM PERFORMANCE
(1) Aloof or Responsive.
(2) Ineffective Questioning or effective questioning.
(3) Faltering or Fluent.
(4) Ineffective Material Aids or Effective Material Aids.
(5) Unsuitable B.B. Work or Suitable B.B. work.
(6) Poor Class Management or Good Class Management.
(7) Rigid or Adaptable
(8) Disorganized or Systematic.
Scoring the Scale
A seven point scale has been considered optimally useful from the point of view of accuracy of discrimination therefore the. The teacher competence score can be easily obtained by simply adding the numerical rating (1,2, 3-7) on the different dimensions of the scale.

**Direction for use**

For good rating, researcher should be thoroughly familiar to the teacher behaviour, so that he will not fail to detect them even though they are demonstrated in a quick succession in giving teaching situations. If you find something else in the behaviour of a teacher which may be taken as evidence of a particular characteristics or trait you may make your judgment accordingly. Before use, this rating scale, researcher should note the following points :-

1. Researcher don't confirm with others in making judgment let these rating represent researcher own opinion.
2. In each characteristic contained in the scale compare the individual being rated by researcher with the average teacher which he has known.
3. In rating for any particular characteristics disregard every others characteristics on the scale. Don't let your ratings of individual characteristics be differenced by a favorable impression. You have formed of the individual about any particular characteristics.
4. Give the highest score on the scale to the Individual whom researcher considers to be outstanding in that trait and so for.
5. Don't continue your observation too long over any characteristics. Give for each characteristic your best Judgment and go on to the next.
6. Give a rating for each characteristics of each individual rated by researcher.

**Validity and Reliability of the Scale**

The validity of a rating scale should be less in statistical terms and more in terms of apparent relevance of behaviors to ultimate goals of training. The scale may safely be assumed to be valid. Statistical validity of the scale was also computed. A coefficient of correlation of .85 was obtained between the present scale and judgment of experts. The rating scale has field on inter-rater reliability coefficient of .91.
2. TEACHER ATTITUDE INVENTORY (TAI)

(Author- S.P. Ahluwalia)

The inventory has been constructed and standardized by S.P. Ahluwalia, Ex. Reader in Department of Education, Banaras Hindu University, Varanasi, with the help of research assistants under a project of the National Council for Educational Research and Training - New Delhi. This inventory has 90 items (bilingual) linked instrument consisting of six subscales. These sub-scales were developed by the likert summated ratings procedure. Each scale has 15 statements that pertain to a particular aspect of prospective and practicing teacher's professional attitudes.

The six aspects dealt within the inventory are attitudes towards-(i) teaching profession
(ii) classroom teaching
(iii) child centre practices
(iv) educational process
(v) pupils
(vi) teachers.

Total Number of Favorable and unfavorable items, scale-wise and their serial number.

Table No.3

<table>
<thead>
<tr>
<th>Sub Scale</th>
<th>Serial Numbers</th>
<th>Total No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>F</td>
<td>1, 8, 20., 33,41,66, 85</td>
</tr>
<tr>
<td></td>
<td>UF</td>
<td>13, 34, 46, 48, 6-0, 72, 79, 86</td>
</tr>
<tr>
<td>II</td>
<td>F</td>
<td>2, 9, 14, 17, 42, 47 , 53, 67</td>
</tr>
<tr>
<td></td>
<td>UF</td>
<td>35,38,59,61,65,73,84</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>3, 11, 16, 27, 37, 39, 49, 62, 64, 80</td>
<td>10</td>
</tr>
<tr>
<td>UF</td>
<td>25, 54, 75, 83, 90</td>
<td>05</td>
</tr>
<tr>
<td>IV</td>
<td>15, 28, 36, 43., 50, 55, 871, 87</td>
<td>08</td>
</tr>
<tr>
<td>UF</td>
<td>4, 7, 10, 32, 63, 74, 76</td>
<td>07</td>
</tr>
<tr>
<td>V</td>
<td>5, 44, 81, 82, 89</td>
<td>05</td>
</tr>
<tr>
<td>UF</td>
<td>18, 22, 29, 31, 37, 51, 56, 58, 70, 77</td>
<td>10</td>
</tr>
<tr>
<td>VI</td>
<td>6, 23, 40, 52, 88</td>
<td>05</td>
</tr>
<tr>
<td>UF</td>
<td>12, 19, 24, 26, 30, 45, 57, 68, 69., 78</td>
<td>10</td>
</tr>
<tr>
<td>TOTAL NO.</td>
<td></td>
<td>90</td>
</tr>
</tbody>
</table>

**F = Favorable** = SA = 4, A = 3, U = 2, D = 1, SD = 0

**UF = Unfavorable** = SA = 0, A = 1, U = 2, D = 3, SD = 4

(a) **Response Mode:**

Likert continuum strongly Agree, undecided disagree and strongly disagree has been provided for each item, the subject responds to each item by putting a tick mark (✓) in the square of the chosen alternative against the serial number of the attitude statement in the answer sheet. Subjects are required to respond to all the items likewise.

They do not have the option to leave any item un-answered.

(b) **Instructions:**
The investigator will distribute the test booklets and answer sheets to the each teacher. After all teachers have received the proper test material the experimenter will say, don’t open it, unless told to do so. This inventory consists of 90 statements aimed to identify the professional attitudes of the teachers. There is considerable disagreement as to what these attitudes to be, therefore there are no right or wrong answers. What is wanted is your own individual feeling about the statements. Read each statement and decide how you feel about it. Then mark your answer in the space provided on the answer sheet. You should think also in terms of the general situation rather than specific one. There is no time limit, but work as rapidly as you can. Please respond to every item.

If you strongly agree, put a tick (__) mark in the space under ‘strongly agree’. If you agree, put a (__) mark in the space under ‘agree’. If you are undecided or uncertain, put a tick (__) mark in the space undecided. If you disagree, put a tick (__) mark in the space under ‘disagree’. If you strongly disagree, put a tick (__) mark in the space under strongly disagree’.

It is more important that you have not to make any mark on this booklet. Now read each statement carefully and record your response on the answer sheet.

(c) Each item alternative is assigned a weight ranging from 4 (strongly agree) to 0 (strongly disagree) for favorable items. In the case of unfavorable items range of weights is reversed i.e. from 0 (strongly agree) to 4 (Strongly disagree).

The attitude score of a subject is the sum total of item scores of all the six subscales. The theoretical range of scores is from 0 to 360 with the higher score indicating the more favorable attitude towards teaching and allied aspects.

**RELIABILITY OF THE TEST**
Reliability was estimated by the split half (odd-even) method and found to be 0.79 (corrected to 0.88) for sample of 239 prospective teachers. The test retest reliability coefficients after the interval of 3 months and 9 months are found to be 0.69 (N=102) and 0.64 (=290). The details of reliability coefficient index of reliability, corrected reliability coefficients and standard errors of measurement are given in following table –
Table No.4.0

Reliability Coefficient, Index of Reliability ‘Corrected coefficients and scores of measurements.

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Method</th>
<th>Reliability obtained</th>
<th>Coefficients Corrected</th>
<th>Index of reliability 100</th>
<th>Standard error of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>split-half (Odd Even)</td>
<td>0.79</td>
<td>0.88</td>
<td>0.89</td>
<td>11.37</td>
</tr>
<tr>
<td>2.</td>
<td>Test-retest (3 months)</td>
<td>0.58</td>
<td>0.70</td>
<td>0.76</td>
<td>16.17</td>
</tr>
<tr>
<td>3.</td>
<td>Test-retest (9 months)</td>
<td>0.64</td>
<td>0.78</td>
<td>0.80</td>
<td>15.16</td>
</tr>
<tr>
<td>4.</td>
<td>Rational Equivalence (KR21)</td>
<td>0.51</td>
<td>0.70</td>
<td>0.73</td>
<td>20.10</td>
</tr>
</tbody>
</table>

Validity of the test -

The validity of the test was estimated as context validity and method of selecting items supports this supposition. Differences in mean scores were found among some selected, 'Known' groups. The mean scores for B.A. part 1 and II students offering and not offering Education as an elective Subject. B.Ed. trainees and practicing teachers were computed and compared. The observed differences were found in the expected direction. The table given below presents a summary of the results –

Table No.4.01
Means, Standard Deviation and Standard Error of Measurement of Some selected groups.

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>SEM</th>
<th>S.D.</th>
<th>S.E.S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>B.A. Part 1 (not offering education elective)</td>
<td>56</td>
<td>230.53</td>
<td>2.94</td>
<td>21.98</td>
<td>2.09</td>
</tr>
<tr>
<td>2.</td>
<td>B.A. Part II (not offering education elective)</td>
<td>53</td>
<td>230.73</td>
<td>3.44</td>
<td>28.74</td>
<td>2.44</td>
</tr>
<tr>
<td>3.</td>
<td>B.A. Part III (not offering education elective)</td>
<td>70</td>
<td>237.98</td>
<td>3.41</td>
<td>23.36</td>
<td>2.41</td>
</tr>
<tr>
<td>4.</td>
<td>B.A. Part II (not offering education elective)</td>
<td>47</td>
<td>252.91</td>
<td>4.65</td>
<td>33.91</td>
<td>3.30</td>
</tr>
<tr>
<td>5.</td>
<td>Practicing Teacher</td>
<td>122</td>
<td>251.41</td>
<td>2.78</td>
<td>30.70</td>
<td>1.97</td>
</tr>
<tr>
<td>6.</td>
<td>Prospective Teachers (At the time of B.Ed. Admission)</td>
<td>86</td>
<td>251.45</td>
<td>3.36</td>
<td>31.12</td>
<td>2.39</td>
</tr>
<tr>
<td>7.</td>
<td>Prospective Teachers (After 9 months of B.Ed. Training )</td>
<td>86</td>
<td>256.29</td>
<td>3.60</td>
<td>33.38</td>
<td>2.56</td>
</tr>
</tbody>
</table>

Concurrent validity was estimated on Comparison of TAI with the scores on the Hindi Adaptation of the MTAI (M.C. Joshi). The Coefficients of correlation were found positive
but low. This may be due to the fact that the MTAI is meant for elementary teachers, is largely culture based and has become perhaps out of date of some extent.

3.6 DATA

Educational research is based upon various types of Data. It is not possible without different kinds of data. Just as a building requires) brick and mortar for its construction, similarly education research requires concerned data. These data give knowledge concerning social phenomena. In order to carry on research successfully, data should be gathered from proper sources. The more valid is the source of data the more reliable will be the information received which in turn, will lead to correct and reliable conclusion. Therefore researcher presuppose a knowledge of kinds and sources of information. Different types of educational researcher required different types of data. This requires a wide knowledge of kinds and sources of data. Different kinds of data required in research can be classified into the following two type.

1. Primary Data – Primary date are the actual information which are received by the researcher for study from the actual field of research. These data are attained by means of questionnaires and scheduled. In some fields. Primary data are collected through interview and observation methods. The observation method. For collecting primary data may be both participant and non-participant. Such data are known as primary because they are attained by or the researcher from the field of research directly and for the first time primary data are generally attained through two sources. The primary sources of primary data are the facts of living person’s live. The other source is the connected events known through the observation such as the life of the group traditions and customs and different aspects of daily life. Participant observation sometimes. Unravels such primary data which cannot be known by known by any other means.

2. Secondary Data – Secondary data are the information which are attained indirectly. The researcher does not attained them himself or directly. Such data are gathered from information collected from the individuals and institutions through personal through two types and survey documents, etc. The secondary data again, are gathered through two type of sources. The first source are the personal documents such as diaries, letters, photographs, etc. The other sources are the public documents such as book manuscripts, record, census reports, report of surveys by private institutions and various
information published in newspaper and magazines. According to Lundberg, the information achieved from inscription on stones and objects of excavations may also be included in secondary data

**SOURCES OF INFORMATION**

**Classification –**

The sources of information are generally classified as primary and secondary. Different schools have classified the sources of information differently. Of these some more important views are as follows.

- **According to W.A. Bagley,** “The sources of information may be classified into primary sources and secondary sources. Primary sources included the actual information received from the individual directly concerned with the problems of study. It also included social phenomena by observing which some information and facts may be discovered. The secondary sources of information included all type of published and unpublished, public or private documents and other such types of the information."

- **According to P.Y. Young,** “The source of information cab be classified into documents source and field source. While the first included books. Manuscripts, diaries and letter, the second included the information given by the individual."

- **According t G.A. Lundberg,** the sources of information may be classified as historical sources and field sources, The historical sources included representing the past incidents for example, some inscription on stones, of the ages of Ashoka the great cab be authentic sources of information about, his time. Historical sources observation or any other means of information. Thus historical sources included documents, papers arid stone inscription concerning past, as well as the articles discovered through excavations, the field sourced include information received from concerned persons and also through the observation of there behavior.

**A. PRIMARY OR FIELD SOURCES**

On the basis of the above mentioned views the sources of information may be classified as primary or field sources and secondary or documentary sources, These sources may now be discussed in some more details. Primary sources are those from which information is gathered for the first time. This information is gathered by the
researcher himself. The sources of such information are the individual and the incidents around them. Generally primary information is gathered through direct observation questionnaire, schedule and interview method.

1. **Direct Observation** – the chief primary source of information concerning social phenomenon is direct observation. This method required that the social researcher should personally and directly observe the condition and incidents of his field of study. Direct observation is the most reliable method of gathering information concerning the life, status conduct, behavior, language festivals customs and traditions etc. In this observation the observer should be absolutely detached and objective in gathering facts. Direct observation again, have been classified into participant observation and nonparticipant observation, in participant observation, the observer lived in the group or community as a member of it and participate in their life, on the contrary in non-participant observation the researcher does not participate in the group life but only observes as an external spectator.

2. **Questionnaire** – Questionnaire included questions concerning different aspects of the subject of the study. It is used in such cases where the subject of study is very wide and direct observation is not possible. It is also used about such things which wide and direct observation is not possible. It is also used about such things which cannot be known through direct observation such as the ideas, intentioned and motives of the persona concerned. Sometimes the questionnaire are delivered by hand and at other time they are delivered through post. Questionnaires may be source of information only when the information are well educated and prepared to co-operate with the research worker.

3. **Schedule** – Schedules are a particular type of the questionnaire. The main distinction between questionnaire and schedule is that whereas in the former the information themselves reply to the questions, in schedule this is done by the researcher himself. He questions the information and records the replies in the proper place specified in the schedules. The main advantages of a schedule is that it may be used even in the case of uneducated informer. However as compared to the questionnaire method it can be used only in a limited field.

4. **Interview** – In an interview the researcher meet people and discusses his research problems with them. During the course of this discussion he gathers facts. An interview is different from a schedule. A schedule included some predetermined questions asked
by the researcher in a definite order without change, But the interviewer has no such define form or order of questions. The researcher may ask any question on the basis or his insight into the problem.

B. SECONDARY OR DOCUMENTARY SOURCES

The sources of information through documents concerning individual and institution are known as. secondary or documentary sources. The secondary source represent social incidents, conditions and systems. Information received through secondary sources are sufficient are sufficient and useful. They also provide interning the past which is not possible through any other sources. In order to gather complete information concerning some present social sector, it is generally to know its historical background. This historical background can be known through secondary sources, Beside, the secondary sources supply information concerning difficulties, precautions and methods of study documentary sources include book, survey scripts. Memories, letter and diaries along with historical and material published in newspapers and magazines from time to time. To facilitate study secondary sources have been further classified into personal documents and public documents.

1. **Personal Documents** – Personal documents include all the published and unpublished information documented by the individuals for different purpose. Personal documents are not written on scientific style nor have an objective basis. They generally represent some ideas, ideals, values and feelings, etc. Inspire of being subjective and unscientific personal documents have been very much useful in social research. They provide important information about contemporary social circumstances systems, customs, ways of life etc. The personal documents of notable persons are very useful sources of information.

2. **Public or Official Documents** – In the secondary sources of information in educational research the public or official documents occupy an important place. A public documents is the information gathered from some government or non-government institutions. Public documents are of two types. Some documents generally remain unpublished such as report of big companies. Some other public documents are published in the general interest of public. Such documents may be prepared by government or non-government department some more important public documents are as follows.
(i) **Records** – Records occupy the most important place among public documents. Most of the governmental and non-governmental and non-governmental departments preserve so many types of records consisting of important information. For the example, every police department keeps a record of its activity. Each police station keeps record of criminal living within its field. Besides, private companies keep different kinds of records. All these records are important sources of information for social research information received through them have a high degree of reliability. It is however, difficult to collect such records, particularly those which are never published.

(ii) **Published Data** – Public documents include data published by government and non-government institution from time to time. Such institutions conduct periodical survey concerning population rate, mortality, birth rate, annual production, average annual income, foreign trade, marriage and divorces etc. A very important example of published data in India is INDIA, a reference Annual published by government of India every year. It includes all types of data concerning almost all the departments of every part of the government of India and the states under it.

(iii) **Journals and Magazines** – Journal and magazines are important public document covering a wide variety of the information which can be usefully utilized in research. Most of these information are very much reliable. Letters to the editors published in various magazines and journals are an important source of information.

(iv) **Newspapers** – Newspapers published news, discussion on contemporary issues, reports of meetings and conferences, essays and articles on living controversies, and the letters of the readers to the editors. All this is an important source of information for different kinds of research. The reliability of such information is not very high, at least in the case of renowned newspapers, particularly those of different political parties who serve vested interest and therefore, have low reliability. A comparative study of several newspapers in the countries under rigorous government control and without much freedom of press, however, represent the views of party in power and therefore do not give much useful information. However, as the freedom of press in most of the democratic countries is respected, newspapers today supply quite reliable information to the investigator.

(v) **Other Documents** – Besides the above mentioned public documents, film, television, radio and public speeches etc, are other important sources of information they supply
useful information about contemporary issues. The investigator however should be capable of sorting out the reliable material and distinguishing it from the unreliable material advanced by these sources.

**DATA COLLECTION**

The data were collected during July to September, 2015 by visiting the centers personally. After selection of sample, the investigator met the B.Ed. teacher trainees after obtaining a permission of teaching practice in charge of respective centers. The B.Ed. teacher trainees were given the Teacher Attitude Inventory after demonstrating to them the manner in which the responses were to be marked. In this way every teacher–trainee required to fill-up two different questionnaire measuring attitude toward teaching and responsibility feeling. For making classroom observation the time table of the trainees were obtained from the supervisor of the respective centers. A lot of coordination was needed before the classes could be observed. In order to make the required observation the investigator sat through the whole period at the back corner of the class. Not more than 10 or 11 teacher trainees could be observed on a single day by the investigator. The observation was recorded on teacher effectiveness scale selected for the purpose. After collection of data scoring was made on the basis of scoring procedure given in the manuals of the Tests.

**3.7 DATA ORGANISATION:**

The mass of data collected through the use of various tools needs to be systematized and organized i.e. educated, clarified and tabulated before it can serve any worthwhile perform. Gathered data have been checked to see the accuracy after scoring all the tests the investigator organized the whole data.

**3.8 STATISTICAL TECHNIQUES USED:**

Good data are important but what is done with them is equally so. In the parents study, the Investigator has applied the most suitable statistical technique available in the treatment of data. The following statistical techniques have been used for the treatment and analysis of the data with the help of the computer:-

(A) Mean & Median
(B) Standard Deviations

(C) 't' value to find out the significant different between two groups.

(A) THE MEAN (M)

Arithmetic average or mean is the most popular and widely used measure of central
tendency. whenever we used the word ‘average’ or ‘mean ’in general sense it always
refer to arithmetic mean.

“arithmetic average is the quantity obtain by dividing the sum of the value of the item in
a series by their numbers.”

- Secrist

“The Arithmetic mean of a series of items is obtained by adding the value of the items
and dividing it by the numbers of items.”

-Croxton and Crowden

Mean value is computed by the following formula:

\[
M = \frac{\Sigma X}{N}
\]

Where

\[
M = \text{Mean} \\
\Sigma = \text{Sum of} \\
N = \text{Scores in the distribution} \\
N = \text{Number of scores}
\]

MEDIAN(MD)

According to Lindquist, “median is that point on the scale of score below which one half
the score (50%)lie and above which one half the score(50%)lie.”

In other word we can say that is it is that point which divides the whole
distribution in to two equal halves that is fifty percent above and fifty percent below. for
this reason it is called a balancing point of distribution. symbolically it is represented by
the symbol Md.

According to Connor “the median is that value of the variable which divide the group in
two equal parts –one part comprising all values greater and other all value less than the
median.
Median value is computed by the following formula-

$$\text{Md} = L + \left( \frac{N/2 - F}{F} \right) \times CI$$

Other formula for special cases-

$$\text{Md} = \frac{\text{Md}_1 + \text{Md}_2}{2}$$

Where

- $\text{Md} =$ Median
- $L =$ Exact lower limit of the class interval in which median lies.
- $N/2 =$ Half of the frequencies
- $F =$ Sum of all frequencies on all interval below the interval containing median.
- $F =$ frequencies of the interval containing median
- $CI =$ Size or length of CI

In special case-

- $\text{Md}_1 =$ median class when we count from upward to downward to get exactly $N/2$ cases
- $\text{Md}_2 =$ median class when we count from downward upward to upward to get exactly $N/2$ cases

(C) THE STANDARD DEVIATION ($\sigma$)

Standard deviation is the most popular and commonly used measure of dispersion. This concept was first used by Karl Pearson in 1893. The term standard deviation is defined as the square root of arithmetic mean of the squares of deviation of items from their
arithmetic mean it is also known as root mean of square deviation. It is generally denoted by small Greek letter called sigma (σ).

In other word, The standard deviation, the square root of the variance, is most frequently used as a measure of spread of score in a distribution. The S.D. is computed by following formula:

$$\sigma = \frac{\Sigma X^2 - (\Sigma X)^2}{N^2}$$

Where

- $$\Sigma X$$ = Sum of the x scores
- $$\Sigma X^2$$ = Sum of the squared x scores
- $$N$$ = Number of paired scores

't' TEST :-
't' is a statistical test that compares two means to determine probability that the difference between the means is the real differences, rather than a chance differences. It involves the computation of the ratio between observed variance (observed difference between two means) and error variance. The value of 't' ratio is computed by the formula-

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

Where

- $$M_1$$ = the mean of the first group
- $$M_2$$ = the mean of the second group
\[ \sigma_1 = \text{Standard deviation of the first group} \]
\[ \sigma_2 = \text{Standard deviation of the second group} \]
\[ N_1 = \text{Number of case in the first group} \]
\[ N_2 = \text{Number of ears in the second group} \]

The significance of the 't' ratio is found in the table of 't' value which indicates the critical values of 't' ratio necessary to reject the null hypothesis at selected level of significance.