METHOD AND PROCEDURE
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This chapter deals with the methodology used in the present study, details of the sample, the tool used for data collection, collection of the data for present study, the scoring and the statistical techniques used for the analysis of the data.

It has been done under the following heads:

3.1 Method of the study
3.2 Sample
3.3 Tools of the study
3.4 Administrations of the tools and collection of the data
3.5 Statistical procedures used in the study

3.1 Method of the study

The meaningful educational questions identified and formulated from any field of education and considered relevant to whatever research form-fundamental, applied or action research, may be answered in different ways. These differences in the procedures of obtaining an answer are known as methods of research. Their procedures are derived basically from the steps of reflective thinking or scientific method indicated in the proceeding chapter. A researcher has to make a careful choice of the research method in consonance with the nature of his inquiry.

There are usually five different ways or methods of conducting an inquiry in the field of educational research. These are:

1. Experimental Method - Where one or more independent variables are controlled and manipulated and the dependent variable or variables are
observed for variation concomitant to the manipulation of the independent variables. Its major purpose is to determine what may be, when we manipulate the independent variable. It involves control manipulation, observation and measurement of the relevant variables.

2. Ex-Post Facto Method - Where antecedents of the difference noted in existing groups are identified. The independent variable or variables in this method can not be manipulated by the investigator. They are already manipulated by nature and as such they are to be identified and selected. Its major purpose is to find out what has influenced the differences as seen and noted now?

3. Descriptive or Normative Survey Method - Where the researcher is concerned with describing the conditions or relationships that exist, practices that prevail, beliefs, points of views or attitudes that are held, processes that are going on effects that are being felt or trends that are developing. Its major purpose is to describe the status of 'what it is'. The descriptive survey method has various forms and they are quite popular in the field of social sciences and education. These forms are identified as sub categories of this method. There are six such sub categories:

(a) Case studies where the intensive or depth study of a case is made in very close terms. It is also treated as an example of qualitative inquiry.

(b) Surveys where the status of certain prevailing practices or conditions is ascertained.

(c) Developmental studies where the pattern or nature of development associated with different stages of an individual or institution is brought to focus.

(d) Follow-up studies where the after effect or impact of certain programme or intervention is assessed.
(e) **Documentary analysis** where the important documents are scrutinized with a view to focus on important events.

(f) **Trend studies** where the significant features or tendencies relating to individuals, groups or organizations are described.

4. **Historical Method** - Where the events and observations relating to the past are studied. This is done by examining the truthfulness or veracity of the reports of observations made by others. It is concerned with conditions or events, which are located in the past, and as such it is based on the primary and secondary sources of data and their criticism.

5. **Philosophical Method** - This involves analysis and criticism of educational thought introduced or advanced by a great thinker. It aims at formulating a consistent framework or perspective of ideas or thought from the concerned educator's writings, speeches and other contributions.

In the present study the descriptive survey method was adopted. Let us now examine the rational, the characteristic features, the precautions and limitations of each of the sub category of descriptive survey method.

3.1.1 **Descriptive or Normative Survey Method**

The descriptive or normative survey method is the most commonly used strategy in educational research. Its focus of concern is the description of the various aspects of reality. The intention in employing this strategy may be either to find out the nature of existing condition or to identify standards against which existing conditions can be compared or to determine the relationships that exist between specific events. It may, thus, be noted that descriptive survey method may change in its level of complexity from 'simple frequency counts to those which require relational analyses of a sophisticated type'.

69
The descriptive survey research, as John W. Best (1980) states that 'it involves events that have already taken place. The only elements that the researcher manipulates are his methods of observation and description in which he analyses relationship'. These events are related to objective conditions, beliefs, opinions, attitudes and values and are usually analyzed with the help of observation, questionnaire, interview and tests.

Descriptive survey method of research is also employed where problem solving is involved. In these context three sets of information are collected: the information based on present conditions, the information involving what we may want and the information concerning the tools and means to reach the appropriate goal. It may be observed that in certain descriptive studies where problem solving is the focus, only one set of information be required but there are examples of researches when all the three types of information may be deemed essential.

In a descriptive research with the exception of a case study the investigator usually deals with a larger sample than the one found in an experimental or ex-post facto research. The generalizations of such studies are therefore quite dependable and may even be the basis for experimental and ex post facto research.

3.1.2 The rational of descriptive survey method

The descriptive survey method is based on the reasoning that are a number of facts relating to conditions, events and their relationships which can be probed by adopting strategies of observations, reporting and recordings.

It also assumes that valid generalizations can be formulated by confining our observations on a large representative sample of population.
Another important rationale of the method is that findings obtainable through such a procedure may be the source of formulating hypothesis which can be verified even experimentally.

3.1.3 The Characteristic features of the procedure

The characteristic features of the descriptive survey method may be presented as follows:

1. Descriptive survey method involves the use of a ‘flow plan’ or a ‘chart’ to outline the design and subsequent implementation of a survey. Such a flow plan begins with the objective of the survey, lists each step to be taken and ends with the final report.

2. The survey may employ questionnaire, interview, case study, observation scales and tests as tools of data collection.

3. The sample, on which a survey is conducted, is carefully selected from the target population. Thus, the researcher has to define the population and the method of drawing the sample there from.

4. The generalizations in survey research are arrived at from the observation, measurement, and opinion or endorsement data collected from the sample depending upon the purpose of study. These generalizations therefore arise from both quantitative treatment data.

5. The survey research is known for extensive field work on the part of an investigator. In such a research the resources available for data are carefully identified and tapped.

3.1.4 The Sub-Categories of Descriptive survey research

We have indicated six sub categories of descriptive survey type of research. A brief discussion of each of them will now be attempted, so as to
emphasize their application with reference to specific research questions in the field of education.

3.1.4.1 Case Study

The case study research has become popular as a result of the dissatisfaction of researchers with the experimental statistical studies. It involves a close study of a case rather than a controlled or large scale survey. The case in a case study may be an individual, a group or organization or an institution. Thus in the field of education we may conduct case studies on 'delinquent children', 'truant', or 'backward children', 'sick colleges' or even a 'sick university' and so on.

This will require selecting the unit which is called the 'case' and then studying in entirely the various relevant features of the case, its background (past), its current behavior or trait (present) and its premonitions or forebodings (future).

Cohen and Manion (1980) observe that 'unlike the experimenter who manipulates variables to determine their causal significance or the surveyor who asks standardized questions of large representative samples of individuals the case study researcher typically observes the characteristics of an individual unit, a child, a clique, a class, a school, or a community'.

The purpose of such observation is to probe deeply and to analyze intensively the multifarious phenomena that constitute the life cycle of the wait with a view to establishing generalizations about whole population to which it belongs.
The Characteristic feature of the case study procedure

The following procedure is usually adopted in undertaking a case study:

1. The 'Case' is defined and identified in terms of certain criteria. Supposing we wish to study 'delinquent children', our first step would be to define the term 'delinquency' and the delinquent child' and then to identify such children in terms of the stipulated definition.

2. The sample of cases to be selected is kept small usually the number is restricted to ten.

3. A number of research tools for purposes of data collection may be employed. The question in this regard is contingent on the focus of concern. A questionnaire, an interview, an observation, a test or a scale may be used for eliciting or recording the facts relating to the past and present conditions and the future trend of the case. In all these situations whatever the problem or the approach at the heart of every case study lays a method of observation. There are two types of in vogue: the participant observation when the observer engages in the very activities he sets out to observe and the non participant observation where the observer stands aloof from the situation or the person being observed.

4. After collection of information about the case, a deeper probe is made into the circumstance and interaction between the factors that are associated with change or growth.

5. The case study method may extend to a longer span of time as it emphasizes the longitudinal or genetic approach.

6. In describing each case it is the uniqueness or typicality which is focused so as to highlight the factors that characterize the type.
7. A case study is different from a case history in the sense that in the latter a history sheet of the case is prepared with an exclusive concern of the past while in the former, the past, present and future of the case are considered significant.

Rationale of case study

The case study method is based on the logic that an intensive or depth study of a case may reveal useful facts about the case via which one may develop valuable insight into the dynamics of educational and social situations. It is therefore confined to a small sample and is directed at collecting facts or data pertaining to the past, present and the future situations relevant to the case. It is considered to be a very important example of qualitative research.

Precautions in undertaking case study

A case study is not directly aimed at formulation of generalizations. It intends to go into the deeper layer of facts as visible to the investigator. Hence the researcher is well advised to keep his ambit of approach a little narrower than the usual. The sample of cases constituting the study should be small and the tools employed must have the desired level of reliability and validity. A final precaution which is of great significance is that the case study reports are always presented with complete anonymity and objectivity of details.

Limitations of case study

The case study as method of research in education has serious limitations. Firstly, it is difficult to lay our hands on appropriate cases in adequate number. Secondly, even if we are successful in identifying and selecting a case, it is not possible to conduct a systematic probe in to the circumstances or the Functional qualities attached to the case. Thirdly, case
handling requires tact and rapport. Fourthly, case study is often overshadowed by personal preconceptions or bias about the case or the circumstances genuine to the case. Finally, it may be noted that case study is a delicate job and requires in the worker not only a lot of experience but also a fund of natural flair and aptitude.

3.1.4.2 Surveys

We have already indicated that survey involves quick appraisal of facts or depiction of the reality situation. It obtains data from a relatively large number of cases at a particular time. The concern of a Survey is not to focus on individuals as individuals. It is rather directed at procuring generalized observations or statistics and therefore it is cross-sectional.

According to Kerlinger, surveys can be conveniently classified by the methods of obtaining information or data: interview, mailed questionnaire panel, telephone and controlled observation, of these the interview overshadows the others, as perhaps the most powerful and useful tool of social scientific survey research.

In the interview the researcher collects facts by holding discussion or question-answer sessions with selected sample of respondents who can provide useful and relevant information pertaining to the inquiry. In the questionnaire research a properly developed instrument containing a large number of relevant questions (Called a questionnaire) is sent to the respondents by mail and the facts are tabulated and analyzed on the basis of returned questionnaires. In the panel technique a sample of respondents is selected and interviewed, and then re-interviewed and studied at later times.

This technique helps the researcher to identify and describe changes in behavior and attitudes. Telephone surveys are based on the availability of respondents through telephone. It elicits information quickly and at a low cost. But it cannot provide detail information especially when the
respondents are not personally known. In controlled observation the behaviors of respondents are observed either through live observers or by a recording through mechanical devices of audio or video tape.

3.1.4.3 Developmental Studies

Developmental studies focus not only on the existing status and interrelationships of phenomena but also on changes that occur as a function of time. The researcher describes variables in the course of their development over a period of months or years. The growth and development of pupils from early infancy to adolescence in respect of physical growth and social behavior, mental, moral and ethical, and personality traits have been studied mostly by adopting longitudinal and cross-sectional strategies.

3.1.4.4 Follow-Up Studies

The descriptive studies in education are also conducted through intensive or extensive follow-ups of certain educational experiments programmes or policies. In the British literature, it is also referred to as ‘cohort study’ and in American researches, it is called ‘panel study’.

The main concern of a follow-up study is with finding out the impact or effect of the programmes on the respondents. The tools used in such studies consist of interview, observation, opinionnaire and tests. In the Indian context a number of follow up studies have been completed under the aegis of the NCERT and UGC with regard to specific curriculum, 10+2+3 pattern of education and the improved methods of instruction and training such as the structural approach in teaching of languages, programmed instructional material in various subjects and microteaching.

3.1.4.5 Documentary Analysis

The documentary analysis is also known as content analysis. It is conducted by systematically examining the current records or documents
belonging to the fields of an enquiry. The documents may consist of written or printed words or figures and they may be even of the graphic types and may include paintings, drawings, cartoons and photographs.

The study is completed in two stages: establishing the authenticity and validity of documents and identifying the frequency and intensity of certain types of expressions, facts and figures. The main sources of data in such studies are official records and reports, printed forms, text books, reference books, letters, autobiographies, diaries, compositions, magazines, newspapers and school or college bulletins.

**John W. Best (1970)** has identified the following seven purposes with which a documentary or content analysis may be undertaken:

- To describe prevailing practices or conditions.
- To discover the relative importance of or interest in certain topics or problems.
- To discover level of difficulty of presentation in text books or in other publications.
- To evaluate bias, prejudice or propaganda in text book presentation.
- To analyses types of errors in students work.
- To analyses the use of symbols representing persons, political parties or institutions, countries or points of view.
- To identify the literary style, concepts or beliefs of a writer.

### 3.1.4.6 Trend Studies

In trend studies the researcher emphasizes making of predictions on the basis of the present information. The recorded data of the past and present are used to indicate or point out the possibilities for the future. Thus,
a researcher in education may be interested in finding out the trend with regard to the 'drop outs' or 'push outs' in the coming next ten or twenty years of the Indian society, so that educational facilities in the shape of part time or own time schooling may be created likewise, one may conduct trend studies with reference to the type of schooling, the teacher taught relationship, the job orientation of education, vocationalization, diversification of courses and so on.

3.1.5 When to use a specific sub-category of descriptive method

We have briefly indicated the form and focus of the six subcategories of descriptive type of research. It is now pertinent to ask about the relevance or appropriateness of a specific sub-category to a problem in educational research. It has been observed that case study is useful when the focus is on finding out the uniqueness, surveys are appropriate for a situation where even basic information and facts are unknown, development studies become significant for areas when our interest is in assessing the extent of growth or progress made, follow-up-studies are relevant for evaluation of impact or effect of certain programmes, documentary analysis is important when data are mostly found concealed in certain records and trend studies are pertinent for making predictions about the future course of events or phenomena in education. The choice of a subcategory should be guided mainly by the purpose of the study.

3.1.6 Precautions in using descriptive survey method

Some times researchers form a notion that descriptive survey type of research is the easiest to undertake. It may be noted at the very outset that this is an erroneous concept. In fact, descriptive survey research requires lot of alertness on the part of the investigator. He has to be very careful in the choice of his sample, the data collecting instruments or tools and the techniques of data tabulation and data analysis.
The findings of descriptive studies have to be evaluated in terms of the sampling error and the validity and reliability of tools used for collection of information.

3.1.7 Limitations of descriptive studies

The descriptive studies involve field work. As such unless a researcher is very resourceful, the study becomes laborious and even irksome. Another limitation in using this method is concerned with the cost. The use of questionnaire, interview, observation, case study or test involves huge expenditure in their handlings and in the absence of some research grant, the whole situation may become taxing for the investigator. Probably, it is in this context that the alleged bungling or concoction of data from field situations may be explained. Equally significant issue in the use of surveys is related to the cooperation and willingness of respondents in providing information to the investigators. In particular, questionnaire and interview studies are full of such hazards. The rate of return in respect of questionnaires and the number of respondents making themselves available for interview and observation are the frequently cited matters about which a beginner in research has to be extra cautious.

3.2 Sample

Sampling is a sine qua of research. Even in our day-to-day life we find the use of sampling prevalent in almost every sphere consciously or unconsciously. It implies the selection or drawing of a portion from the mass or whole of something. A housewife draws only two or three grains of rice to find out whether the pot is ready. A doctor takes only one or two drops of blood, urine or stool to estimate the kind of pathological symptom of the body. A judge or a lawyer in a court of law examines only one or two points as evidence of the case. A teacher asks only two or three of the students to know whether his class has grasped the idea. A researcher like
3.2.1 The rationale of sampling methods

The underlying logic of the sampling methods is that an observation or measurement made on a cross-section of a population may be extended to the whole of it, without any serious loss of truth.

These are two important laws, which explain this logic: the law of statistical regularity, and the law of inertia of large numbers. The law of statistical regularity is derived from the theory of probability and it lays down that a moderately large number of items chosen at random from a large group almost sure on the average to possess the characteristics of the large group. According to this law if a sample is taken at random from a population, it is likely to possess almost the same characteristics as are reflected in the population.

The second law is a corollary to the first one. In terms of this law other things being equal, larger the size of the sample, more accurate the results are likely to be. This is particularly because large numbers are more stable as compared to small ones and the difference in the aggregate result is likely to be insignificant.

3.2.2 The methods of sampling in educational research

There are various methods of drawing a sample. They can be broadly put under two heads: Probability and non-probability sampling procedures. The probability sampling methods are those where the units are drawn randomly by providing equal probability to all. The word ‘random’ should not be taken to mean ‘haphazard’ or ‘hit’ or, miss; rather it implies the operation of chance in the selection of a unit or a member of the sample.
The non-probability sampling methods are those where the units are selected on the considerations or convenience or judgment of the researcher. The most significant difference in the two methods is that in the former the pattern of sampling variability can be determined, while in the latter there is no way of knowing the pattern of variability in the process. The researchers are therefore advised to conduct 'parametric tests' in case of the samples belonging to the 'probability' group and 'non-parametric' or 'distribution free tests' to the samples of non-probability group. We will discuss these statistical techniques later.

3.2.2.1 The probability Sampling Methods

There are two types of probability sampling methods the: simple or unrestricted random sampling and the restricted random sampling consisting of stratified sampling, systematic sampling and cluster sampling. We will now describe their procedures, merits and limitations in some detail.

(A) Simple random sampling

The simple random sampling is the method where all members or units of the population have an equal and independent chance of being included in the sample. The choice of the unit is not contingent on the personal considerations, personal knowledge or acquaintance of the investigator. The term ‘equal’ here means that at each selection, all remaining units or members in the population have the same chance of being drawn. The term ‘independent’ means that all ‘n’ units of the sample are selected independently of one another and all N items in the population have the same chance of being included in the sample. It implies that, the selection of a particular unit in one draw has no influence on the probabilities of selection in any other draw.

For a random selection any of the following three methods may be used:
Lottery Method- Where all units of the population are numbered or named on separate slips of paper of identical shape and size. Their slips are then folded and mixed up in a drum or a container. A blindfolded person is then required to pick up the slips one by one either with or without replacement of slips. This is done till the desired number of units of the sample has been selected.

Coin Tossing Method is used when the population consists of small number of units. Here a coin is tossed and the unit is identified either by head or tail on each flip.

Table of random numbers such as those prepared by Fisher and Yates, Tippett, or Kendall all Babington Smith. After assigning consecutive numbers to units of the population one starts at any point on the table of random numbers and reads consecutive numbers in any direction (horizontally, vertically, or diagonally). When a number is read that corresponds with the one written on a unit card that unit is chosen for the sample. The investigator continues to read until a sample of the desired size is procured.

The merits of random sampling

The random sampling procedure implies a complete objectivity in the selection of the units. It banishes personal preconceptions bias predilections and interest of the investigator in entirety. Another merit of this method is that the investigator can easily assess the accuracy of the estimate because sampling errors follows the principle of chance. As the size of a random sample increases, the representativeness of the sample is ensured and as such it guarantees most reliable information at the minimum of cost.
Limitations

The following limitations of the random sampling in respect of educational research may be specially noted:

- In educational research, it is most often difficult to have a complete and update listing of all the units of the population, which is a basic requirement for using this method.

- In the practical situations of schools, it is not possible to select individuals or units by disturbing the groups or section to which they belong. No educational administrator, a school principal or headmaster for example, will permit such picks and choose of members for obvious reasons that it will disrupt the usual routine.

- The simple random sampling allows a blind operation of chance and as such at times it does not ensure representativeness of the population characteristic in the sample.

(B) Stratified Sampling

The method of stratified sampling is used when the population consists of a number of sub-groups or strata that may differ in the characteristics being studied. In other words, when the population is heterogeneous or composed of unlike units in terms of certain groups, the stratified sampling procedure is followed. It implies the identification, definition of a stratum and selection of the units or members there from proportionately. It is therefore also called proportional sampling.

While selecting units from each defined stratum of the population, it is of course not necessary to adhere to a proportional draw alone. It may even follow a disproportionate selection from the strata depending upon the judgment of the researcher.
The Merits of stratified sampling

The stratified sampling has its own merit. It is better than the simple random sampling in the sense that it ensures the representativeness of population characteristics in respect of its heterogeneous sub groups.

When the population consists of heterogeneous units or sub-groups which is usually the case in educational research. The stratified sampling method provides the best possible solution for drawing an efficient sample. It may be noted that the purpose of stratification is to add to the efficiency of sampling by dividing a heterogeneous population in such a way that there is a great homogeneity as possible within each stratum and as marked a difference as possible between the strata.

Another merit of this procedure is that it promises greater accuracy in the study. In fact, the accuracy is optimum if each stratum is so formed that it comprises uniform or homogenous units.

Limitations

The limitation of this method in educational research situation arises from the fact that there are hardly well defined populations available for studies. The stratification therefore may become the basis of importing elements of bias.

Another limiting feature of this procedure is linked with the skill in sampling itself. In case of inadequate handling of the operations involved in drawing the units, a random or for the matter, even a representative sample may not be ensured. The research is thus well advised to exercise utmost care in identifying and dividing the strata within the population.
(C) Systematic Sampling

A systematic sampling as the name implies is concerned with drawing the first unit randomly and the subsequent ones at evenly spaced intervals (also called K-interval which is the ratio of the population size to the size of the sample), until the sample has been formed. In other words, the sample is drawn systematically from the fixed intervals on the list. This of course assumes that a frame of a given population is available. The steps involved in constituting such a sample are as follows:

- Deciding the number of units desired for the sample (n).
- Identifying the number of units available in the population (N).
- Finding out the K-interval or the sampling ratio by dividing the total number of units or members in the population (N) by the number of desired units in the sample or the sample size (n). For determining the sampling ratio we have to find out $K = \frac{N}{n}$. The fractional value should be converted to a round number by omitting, if it is 0.5 or less then 0.5 and by taking it 01, if it is more than 0.5.
- Selecting the first unit or member randomly from the first K interval of the list and then drawing subsequent Kth unit from the list of population.

Merits of systematic sampling

It may be noted that the method of systematic sampling is quite simple and convenient to be adopted. It does not consume lot of time and ensures accurate results, provided care is taken to see that there are no periodic features associated with the sampling intervals. Most of the experts are of the opinion that if population is sufficiently large, the systematic
sampling method may often be expected to yield results similar to those obtained by proportional stratified sampling.

**Limitations**

One of the limitations of systematic sampling procedure is that it does not ensure representativeness if the population is made up of hidden periodicities. Another factor, which may adversely affect this quality, arises from the situation when the population frame is already ordered in a systematic way in respect of the characteristics the researcher is interested in. For example, in drawing a sample of students if the list is already ordered in terms of family background, the process of systematic selection would render it unrepresentative.

**(D) Cluster Sampling**

In the cluster sampling the unit chosen is not an individual but a group of individuals (Cluster) who are naturally together. There are two procedural requirements in selecting such a sample.

- The clusters actually included in the study are chosen at random from a population of clusters.

- Once a cluster is selected, the entire members belonging in the cluster are included in the sample.

**Merits of cluster sampling**

The cluster sampling has its own merits. In most of the educational research contexts, the population is available in groups rather than as individual units. The problem children, delinquent or truant children and even various categories of normal children when selected through random sampling technique may easily give a slip. Thus, to ensure representativeness in such situations, cluster sampling is the most suitable one.
Another merit of this method is that it introduces flexibility in the process of selection. It enables the existing divisions and sub divisions (Schools and class rooms for example) of the population to be used as units of various stages and allows the field works to be concentrated and yet ensuring a comprehensive coverage of the population.

**Limitations**

The cluster sampling method suffers from certain limitations. It is based on the assumption that units are available in groups. Some times we discern that they are not found in groups. In such situations choice of a cluster sampling may be erroneous. Another limitation of this method is that as compared to simple random sampling procedure, it yields a large sampling error.

In the present study random, cluster and stratified sampling technique was used to complete the research work. It involved the sample drawn from the Central Schools affiliated to CBSE and governed by Kendriya Vidyalaya Sangathan, New Delhi. The teachers of Central Schools of Eastern U.P were the respondents. The sample composition has been given in the following table:

**Table 3.1 Composition of the sample**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Category</th>
<th>No. of teachers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) Male</td>
<td>320</td>
<td>64%</td>
</tr>
<tr>
<td></td>
<td>(b) Female</td>
<td>180</td>
<td>36%</td>
</tr>
<tr>
<td>2.</td>
<td>Design.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) PGTs</td>
<td>100</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>(b) TGTs</td>
<td>160</td>
<td>32%</td>
</tr>
<tr>
<td></td>
<td>(c) PRTs</td>
<td>200</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>(d) Miscellaneous</td>
<td>40</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td><strong>Total=</strong></td>
<td><strong>500</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
3.3 Tools of the study

The questionnaires (Inventories) were used for the data collection from the sample selected for the present study. The data thus obtained, were subjected to various statistical techniques and the results were interpreted in the terms of objectives of the study. The following tools were employed for the data collection in the present study:

3.3.1 Mangal Teacher Adjustment Inventory by Dr. S.K.Mangal. (Appendix-I)

3.3.2 Teacher Attitude Inventory by Dr. S.P.Ahluwalia. (Appendix-II)

3.3.3 Job Satisfaction Inventory by Mishra, Tiwari, and Pandey. (Appendix-III)

3.3.4 Academic Record Proforma prepared by researcher. (Appendix-IV)

The key features and scoring methods of different inventories used for collection of data is described hereby in brief:

3.3.1 Mangal Teacher Adjustment Inventory

It is a short form of Teacher Adjustment Inventory Known as MTAI. It has been constructed and standardized by Dr. S.K. Mangal. The main features of this new form are as under:

1. It has very fewer items, 70 only in comparison to the long form containing 253 items.

2. The mode of response provides only two alternatives in the form of Yes or No (forced choice) instead of three as provided in the long form.

3. Scoring procedure is simplified.
4. The items have been arranged in a random order and thus possibility of hallo and echo effects etc. have been minimized.

5. Interpretation of the subject's scores has been very much simplified.

3.3.1.1 Standardization

The Teacher Adjustment Inventory (short form) so devised was put to standardization on the population of 728 high school teachers of Haryana state. It was obtained by stratifying proportionate cluster random sampling technique.

3.3.1.2 Reliability

Reliability of the Inventory was estimated through test-retest and split half methods. The reliability coefficients determined by test-retest method (N=100) was 969 and by split half method (N=100) was 983.

3.3.1.3 Validity

The validity for the Inventory has been established by adopting criterion related approach. Two different external measures used for this purpose were (i) Bell's Adjustment Inventory by Dr. I.B. Verma (ii) Teacher Adjustment Inventory (long form). The validity coefficients determined through these measures are 0.848 and 0.906 respectively.

3.3.1.4 Scoring

The mode of response to each item of the inventory is in the form of either yes or no. In the present Teacher Adjustment Inventory the 10 items are such where the response 'yes' shows adjustment. For the remaining 60 items, the response 'no' shows adjustment. The scoring is done on adjustment side by assigning 1 mark for the
response showing adjustment and 0 for response showing maladjustment. Serial No. of the items where response 'yes' shows adjustment are 7(a), 19, 21, 23, 31, 38, 47, 57, 63 and 70. For all the remaining 60 items the response 'no' shows adjustment. Thus, the total marks obtained by an individual may range from 0 to 70.

3.3.2 Teacher Attitude Inventory

This inventory is a 90-item likert instrument consisting of six sub scales. 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 Teachers professional attitudes. The six aspects dealt within the inventory are, attitude towards-

Teaching profession
Class room teaching
Child centered practices
Educational process
Pupils
Teachers

3.3.2.1 Standardization

The inventory has been constructed and standardized by Dr. S.P. Ahluwalia, Reader in Education, B.H.U. The items were selected from a longer list by a scientific statistical procedure. The items in the final sub scales were selected by item analysis. The preliminary form of the TAI was administered on 2169 pupil teachers studying in the secondary teacher training institutions having courses

3.3.2.2 Reliability

Reliability was estimated by the split half method and found to be 0.79. The test-retest reliability coefficients after the interval of 3 months and 9 months are found to be 0.59 (N=102) and 0.64 (N=290).

3.3.2.3 Validity

The inventory appears to have content validity, and the method of selecting items supports this supposition.

3.3.2.4 Scoring

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). Favorable items are at S.No. 1,8,20,33,41,66,85,2,9,14,17,42,47,53,67,3,11,16,27,37,39,49,62,64,80,15,28,36,43,50,55,71,87,5,44,81,82,89,6,23,40,52 & 88, total = 43 items, and unfavorable items are at S.No. 13,34,46,48,60,72,79,86,35,38,59,61,65,73,84,25,54,75,83,90,4,7,10,32,63,74,76,18,22,29,31,21,51,56,58,70,77,12,19,24,26,30,45,57,68,69 & 78, total = 47 items.
3.3.3 Job Satisfaction Inventory

This inventory includes 11 important areas which are relatively more prominent and found common in the literature. They are security, monetary remuneration, service conditions, future advancement, recognition of good work, social circle, working conditions, nature of job, supervision, accommodation and leave facilities. These eleven areas have been split into 41 statements. Both negative and positive statement have been included and were mixed to avoid hallow effect.

3.3.3.1 Reliability

The coefficient of reliability was determined by split half method and the test-retest method. The reliability coefficients obtained by split half method is 0.78(N=75) and by test-retest method is 0.69(N=50).

3.3.3.2 Validity

The validation criterion used for this test was to correlate the scores of present test with scores of rating by the head/supervisor of the workers. The correlation coefficient was found to be 0.68(N=50).

3.3.3.3 Scoring

The responses will be recorded against each statement under the five point scale-most unfavorable, unfavorable, neutral, favorable and most favorable. In case of positive statements most unfavorable will be given 1 marks and most favorable 5 marks and other marks will be adjusted within these two lower and upper limits. But in case of negative statements the scoring will be in reverse i.e. most unfavorable gets 5 marks and most favorable gets 1 mark. Positive
statements are at S.No. 2, 3, 4, 9, 15, 16, 18, 19, 22, 24, 26, 27, 30, 32, 35, 36, 40, 41, and Negative statements are at S.No. 1, 5, 6, 7, 8, 10, 11, 12, 13, 14, 17, 20, 21, 23, 25, 28, 29, 31, 33, 34, 37 and 38.

3.3.4 Academic Record Proforma

The proforma is developed by the researcher itself and in this proforma complete Bio-Data of the teachers was obtained (from high school to the highest qualification or degree achieved along with division and percentage of marks) through personal interview and school records.

3.3.4.1 Scoring

For scoring of academic record following weightage have been decided and assigned:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of Exam.</th>
<th>Weightage on Division</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I</td>
</tr>
<tr>
<td>1.</td>
<td>High School</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>Intermediate</td>
<td>7</td>
</tr>
<tr>
<td>3.</td>
<td>Graduation</td>
<td>10</td>
</tr>
<tr>
<td>4.</td>
<td>Post Graduation</td>
<td>15</td>
</tr>
<tr>
<td>5.</td>
<td>Ph.D</td>
<td></td>
</tr>
</tbody>
</table>

3.4 Administration of the tools and collection of the data

To achieve the objectives of the study, the data were collected from the sample specified with the help of inventories.

The 500 inventory forms were distributed randomly in the population of Central School Teachers of Eastern U.P and all 500 completely filled inventories were collected. This included responses from 320 male and 180 female Central School Teachers, which include 100 PGTs, 160 TGTs, 200 PRTs and 40 Miscellaneous teachers. Thus, these 500
individuals constituted the sample for the study. The scoring of the responses obtained was done according to the scoring method described previously for inventories. Scoring for all the three inventories and academic record was done separately.

3.5 Statistical procedure used in the study

3.5.1. The Mean

It is also called arithmetic mean or an 'average'. It is defined as the sum of a set of observations or measurements divided by the number of measurements in the set.

The arithmetic mean is calculated by the following formula:

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

(Formula for calculation of mean from raw data)

Where,

\( M \) = Mean

\( \sum \) = is the sum of

\( X \) = is the score or measurement

\( N \) = is the number of measurements of the sample size.

\[ \text{Mean} = \frac{\sum fx}{N} \]

(Formula for calculation of mean from grouped data)

Where, \( f \) = frequency

\( x \) = mid point
N= total frequency

Properties of arithmetic mean

The arithmetic mean has two important properties:

1. The sum of deviations of all the measurements in a set from their arithmetic mean is zero.

2. The sum of squares of deviations from the arithmetic mean is less than the sum of squares of deviations from any other value.

The two properties of arithmetic mean prove that mean is that measure of central tendency about which the sum of the squares is the minimum and that it satisfies the principle of least square.

3.5.2 The Median

The median is a point below which equal number of cases lie, as above.

The following formula was used

\[
\text{Median} = L + \left( \frac{N - F}{f_m} \right) \times c_i
\]

Where,

- \( L \) = Exact lower limit of the class - interval in which median lies
- \( F \) = Total frequency of class interval below median class interval
- \( f_m \) = Frequency of median class interval
- \( N \) = Total frequency
- \( c_i \) = Size of the class interval
Properties of median

The median has a similar property as that of a mean in the sense that the sum of absolute deviations (deviations without sign) about the median is less than the sum of absolute deviations about any value. Staving (1978) has, however observed that if a set of discrete values is treated as continuous the median so calculated may not satisfy this requirement.

3.5.3 The Mode

Mode is another measure of central tendency. It is the crudest but the quickest measure to obtain from any data. In situations where different values of $X$ occur more than once, the mode is the most frequently occurring value.

The following formula for the calculation of mode was used:

$$\text{Mode} = 3 \times \text{Median} - 2 \times \text{Mean}$$

3.5.4 Standard deviation

In order to overcome the problem of algebraic signs which appear in the deviations of scores from the mean the statisticians have devised the method of finding out the squares of deviations. By averaging them and then obtaining the square root we get a measure of variability called standard deviation. Like the mean it is the most commonly employed statistics. It is the stable measure or indicator of variation in a group.

The following formula for the calculation of S.D. was used

$$\text{S.D.} = \sqrt{\frac{\sum fx^2}{N}}$$

Where,

$f = \text{frequency}$
x = mid point of class interval

N = Total frequency

3.5.5 t-Test

In an experimental or any other kind of study, a researcher may be concerned with finding out the significance of difference between two independent or correlated samples. The statistics used for such a situation is known as 't' test. The 't' value gives a critical ratio of the difference of means and the standard error of difference of means. On the basis of 't' value we reject or retain the null hypothesis, which postulates that, the observed difference if attributable to chance fluctuation of the random sample.

The following steps were followed in calculation of 't' value:

Step 1- Finding out the standard error of means for the two groups.

Step 2- Estimating the standard error differences between the means by formula:

\[
S.E_{MD} = \sqrt{(S.E_{M1})^2 + (S.E_{M2})^2}
\]

\[
t = \frac{M_1 - M_2}{S.E_{MD}}
\]

Where,

S.E_{MD} = Standard Error of difference between means of two sample

S.E_{M1} = Standard Error of mean of first sample

S.E_{M2} = Standard Error of mean of second sample

M_1 = Mean of first sample

M_2 = Mean of second sample
Step 4- Finding out from ‘t’ table, whether the obtained value of ‘t’ exceeds the table value at 0.05 (5 percent) and 0.01 (1 percent) levels of significance. The ‘t’ values for different degrees of freedom are available in the table. For a sample size of more than 100, the ‘t’ value for 0.05 level of significance is 1.96 and for 0.01 levels, it is 2.58.

Step 5- Rejecting the null hypothesis – The null hypothesis is not accepted, if the obtained value of ‘t’ is greater than the table value at 0.05 level of significance, meaning thereby that there may be only 5 chances of error in doing so out of 100. If the obtained value of ‘t’ is greater than the table value at 0.01 level of significance, meaning that there may be just less than one chance of error in doing so out of 100. Hence, we may be quite confident in rejecting the null hypothesis and in making an assertion that the observed difference between the two means may not be attributed to chance.

3.5.6 Analysis of Variance (ANOVA)

The analysis of variance is commonly used for research situations where more than two groups are involved and the investigator is interested in knowing the overall significance of difference between the groups. It is also employed to examine the interaction and simple effects of more than one independent or moderator variables identified in a study. We have noted that a ‘t’ test is used to find out the significance of difference between two means. In a situation as above where more than two means are involved and the significance of differences is to be tested, we use ANOVA or analysis of variance. In this statistics we obtain ‘F’ value by finding out the ratio of ‘between variance’ over within variance. By referring to an F table with appropriate degrees of freedom the significance of the value is determined at 0.05 and 0.01 levels. In case the obtained value of ‘F’ ratio is not significant, the null hypothesis is accepted.
3.5.7 Correlation

Correlation is the relationship between two or more paired variables, that is, two or more sets of data. The degree of relationship may be measured and represented by the coefficient of correlation. This coefficient is identified by the Greek letter rho (ρ) or the symbol (r). A perfect positive coefficient of correlation is +1.00. A perfect negative coefficient of correlation is -1.00 and a pure chance relationship is zero (0).

In order to find out the correlation between different variables Karl Pearson Product Moment Coefficient of correlation was calculated. In calculating the correlation coefficient following formula was used:

\[
\text{Correlation coefficient (r)} = \frac{N \times \sum XY - (\sum X \times \sum Y)}{\sqrt{[N \times \sum X^2 - (\sum X)^2][N \times \sum Y^2 - (\sum Y)^2]}}
\]

Where,

\(N = \) Size of the sample
\(\sum X = \) Sum of the X scores
\(\sum Y = \) Sum of the Y scores
\(\sum X^2 = \) Sum of the squares of X scores
\(\sum Y^2 = \) Sum of the squares of Y scores
\(\sum XY = \) Sum of the product of X&Y scores