Chapter 3

RESEARCH DESIGN AND METHODOLOGY
3.1 **Method of Study**

The quality of any study is reflected by its design and methodology. A description of the design and strategy applies in the conducting the study given below. It includes the method of selecting the sample, kinds of research, selection development and description of tools, collection of data and statistical techniques employed for analysis and interpretation of data.

The investigator adopts the suitable one method or multiple methods of study and solve the problem of this research. To provide solution of the problem, the investigator is expected to go through many different steps of research. Some investigator become occupied with one method of inquiry and neglected the potential at others. Examinations of the publications of some authors shows that many studies use same method to many different problems possibly indicating that the authors have become attached to one particular
method and choose problems which are at appropriate. There is probably too much depends upon single method of inquiry. Because each data gathering procedure or device has its own particular weakness or bias, there is merit in using multiple methods supplementing one with others to counter bias and generate more adequate data.

3.2  **Kinds of Educational Research**

Research which are conducted in the field of education area of different from and nature. The most suitable method of study is determined on their specific nature. Therefore to determine the different steps and specific methods to be used. It is essential and adequate to study different kinds of researches.

3.2.1  **Classification of Research by purpose**

Classification of research by purpose is based primarily on the degree to which findings have direct educational application and degree to which they are generatizable. Both of these criteria are function of Research control exercised during the conduction of the study.
3.2.1.1 Basic Versus Applied Research

In its purest form, basic research is conducted solely for the purpose of applying, are testing theory and evaluating its usefulness in solving educational problems.

3.2.1.2 Research and Development

The major purpose of the Research and development is not to be formulated or start theory but to develop effective produces for use in schools.

3.2.1.3 Action Research

The purpose of action research is to solve the classroom problem through the application of scientific method.

3.2.2 Classification of Research by Method

While there is sometimes a degree of over lap most research studies represent a readily identifiable method or strategy. All studies have certain procedures in common statement of a problem collection of data analysis of data, analysis of data and drawing at conduction, beyond these, specific procedure or to high degree determined by the research method.
3.2.2.1 Historical Research

Historical research describes what the processes involve investigating analyzing and interpreting the events of the past for the purpose of discovering generalizations that are helpful in understanding the past and present and to a limited extent in anticipating the future. Admittedly, the nature of historical research precludes exercise of many of the control procedures characteristic of other methods, if well done however, historical research also involves systematic objectives, data collection and analysis, and the confirmation or disconfirmation.

3.2.2.1.1 Definition and purpose

Historical Research is the systematic collection and objective evaluation of data related to past occurrences in order to test hypothesis, converting causes, effects, or trends of those events which may help to explain present events and anticipate further events. Many current educational practices, theories, and issues can be better understood in light of past experience. The grading issue, for example,
is not a new one in education or in individualized instruction, and invocation of the sixties knowledge of the history of the education can yield insight into the circumstances involved in the evolution of the current educational system as well as practices and approaches which have been found to be ineffective or infeasible.

For over 150 years for example individualized instruction have seemingly taken turn being the favoured approach of the day. Michl, however, does not view this constant shifting as the proverbial pendulum, which swing to one approach to another and backwash no progress being made also the way. Instead she seas education change as spiral phenomenon with each ascending loop, profiting from the forever, As Michel's position indicates knowledge of the History of education can not only increase understanding of present but also facilities anticipation of future trends.

3.2.2.1.2 The Historical Research Processes

The steps involved in conducting a historical research study are essentially the same as for other types of Research definition of problem, formulation of hypothesis (or question to be answered)
systematic collection of data, objective evaluation of data and confirmation or disconfirmation of hypothesis. In conducting a historical study the researcher can neither manipulate nor control any of the variables. On the other hands, there is no way the research can affect events of the past. What is happened/Research can, however, apply scientific objectivity in attempting to determine exactly what did happen in the past.

3.2.2.1.3 Hypothesis in Educational Historical Research

Hypothesis may be formulated in historical investigation at education, several example area listed:

i) The educational innovation of 1050's and 1060s were based upon practices that previously have been tried and discarded.

ii) Christian countries whose educational system required religious instruction was not provided in the schools.

iii) The observations of European school system by American educator due to nineteenth century had an important effect upon American educational.
Although hypothesis is not always explicitly started in historical investigations, they are usually implied. The historians gather evidence and carefully evaluate its trustworthiness. If the evidences is not compatible on negative, the hypothesis through such synthesis that historical generations are established.

3.2.2.2 Descriptive Research

The studies have all of the following characteristic researchers:

i) Descriptive research involves collecting data to test hypothesis or to answer question concerning the current status of the subject of the study.

ii) The researcher must give carefully through a sample selection and data collection, which population has desired information is not always readily apparent.

iii) Frequently, since one is generally asking questions which have not been asked before or seeking information which not already available a description study requires the
development of an instrument appropriate for obtaining the desired information.

iv) A logical to categories description is in terms of how data are collected through self reports study, information is solicited from the individuals using for example questionnaire, interview or standardized attitude scales. In an observation study individuals are not asked for information rather the researcher obtains the desired data through other means such as direct observation.

Survey Research:

Survey research is a significant made of attack in any field of knowledge where geographic is involved or where, the objects of any clears very among themselves e.g. in studying the climate conditions of various part of the world or the distribution of natural resources, Survey research is a method for collecting and analysing data obtained from large number of respondent representing a specific population collected thoroughly highly structured and detailed questionnaires or interviews. The researcher is usually interested in describing the
population he is studying. Some characteristics of Survey research below:

1. A Survey is an attempt to collect data from members of a population in order to determine the current status of the population with respect to one or more variables.

2. In a Sample Survey, the researcher informs the information about a population of interest based on the responses of a selected sample drawn from that population preferably, the sample is either a sample random or stratified random sample.

3. In census Survey attempt is made to acquire data from each and every member of a population, a census Survey is usually conducted when a population is relatively small and readily accessible.

4. Sample Survey's are sometimes referred to as collected at some points in time from a sample which hopes fully represent all relevant sub groups in the population.
5. one type of Survey, which unique to education is the school, Survey which may involve the study of an individual, school or of all schools in particular system.

6. School Surveys are generally conducted for the purpose of internal or external evaluation or for assessment and projection of needs and usually are conducted as a cooperative between local, personal and a visiting team experts, typically from local educational agencies and instructions.

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Method used in Present Study:

Seeing the nature of the problem Survey method was used to study the problem.

3.2. 2.4 Experimental Research Definition & Purpose -

Experimental Research provides systematic and logical method for answering the question, this is done under carefully controlled condition what will happen? experimenters manipulate certain stimulate, treat means or environmental conditions and observe law.
The condition of behaviour of the subject is affected or changed. There manipulation is deliberating systematic. They must be aware of other factors that could influence. The outcome and remove or control them so that they can establish a logical association between manipulated factors and observed effect. Some important points of experimental method are given below -

1. In the experimental study the researcher manipulate at least one independent variable control other relevant variable and observe the effect on one or more dependent variables.

2. The dependent variable also referred to as the experimental variable, the cause or the treatment, is that activity or characteristics is believed to make differences.

3. The dependent variables are so referred to as the criterions variable, effort or past-test is the outcome in groups which occurs as a result of manipulation of independent variable.

4. When all conducted, experimental studies produce the soundest evidence concerning hypothesized cause effect relationship.
5. Predictions based on experimental finding (In contrast to these based on correlation studies) are more global and take the form if you use approach X, you will probably get better result than if you use approach Y,

3.2.2.4.1. The Experimental Process

The step is an experimental study are basically the same as for another types of research, selection and definition of a problem, selection of subjects and measuring instruments, selection of design, execution of procedures, analysis of data and formulation of conclusions. An experimental study is guided by a least one hypothesis, which states an expected casual relationship between two variables.

In an experimental study the researcher is on the action from very beginning. The researcher forms or selects the groups, decides what is going to happen to each group, tries to control all other relevant factors, besides the change which she or he has introduced an observes or measure the effect on the group at the end of the study. an experiment typically involves two groups. An experimental group and
control group & although there may be only one group or there may be three or more groups.)

The experimental groups typically receive a new or novel treatment, a treatment under investigation while the control group either receives a different treatment or is equated on all other variables which might be related to performance on the dependent variables. After the groups have been exposed to the treatment for some period of time, the researcher administers a test of the department variables or otherwise measures it and then determines whether there is a significant difference between two groups.

3.2.2.5 The Casual Comparative Research X.

The casual comparative research which the researcher attempts to determine the causes or reason for existing differences in the behaviour or status of groups of individuals. The basic, casual comparative approach involves starting with an effect and seeking possible causes. A variation of the basic approach involves starting with the cause and investigating its effect on some variables. The casual comparative studies attempt to identify correlation studies do not. The
major difference between experimental research and the causal comparative research is that in experimental research, the causal comparative research, the casual research, it is not, it has already occurred. In experimental research, the researcher can randomly form groups and manipulate a variable can determine, who is going to get what's what being the independent variables. Casual comparative studies to identify relationship, which may lead to experimental studies. As with a correlation only a relationship is established not necessarily a casual one.

The alleged cause of an observed effect may infect, be, or there may be a third variable which has caused both the identical cause and effect. Cause effect relationship established through comparative research are at best tenus and tentative. Only experimental research, guarantees that the alleged cause, are independent variable, does come before the observed effect or dependent variable can truly established cause effect relationship.

In the present study the investigator adopted the survey method of research.
3.3.1. Definition and purpose:

Sampling is the process of selecting a number of individuals for a study in such a way that the individual represent the larger group from which they were selected. The purpose of sampling is used to a sample to gain information about population selected to the observation and analysis. By observing the characteristics of a sample, one can make certain influences about the characteristics of the population from which it is drawn. Contrary to some popular opinion, samples are not selected haphazardly. They are chosen in a systematically random way, so that change or the operation of probability can be utilized.

3.3.2. Methods of Selecting a Sample

Regardless of the specific technique used, the steps in sampling include identification of the population determination of required sample size and selection of sample. The degree to which the selected sample represent the population is the degree to which results are generalizable. In the present study the combination of random sampling stratified sampling and cluster sampling was adopted. The
main objective of the study "A study of teacher effectiveness in relation to socio Demographic variables teachers working in higher secondary schools."

The sample was limited to Bamgarh district it was not possible to conduct the study covering all the schools. Hence it was decided to select only some schools randomly for the reflection and representation of the whole population in this regard 500 teachers from the schools of Azamgarh district out of 500 teachers of both male and female teachers of both rural and urban areas were well selected. The selected teachers of where from both private and government managed schools. Schools of different teaching experiences. An account of teachers and schools selected in the sampling has been mentioned on table 3.1

The name of the schools from where teachers were selected have been given below Table No.
### Table 3.1

**List of Government Managed Schools**

<table>
<thead>
<tr>
<th>Name of the schools</th>
<th>Nature of the School Rural/Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Girls Inter College, Azamgarh</td>
<td>Urban</td>
</tr>
<tr>
<td>Central School, Azamgarh</td>
<td>Urban</td>
</tr>
<tr>
<td>Captan Ganj Inter College Azamgarh</td>
<td>Rural</td>
</tr>
<tr>
<td>G.G.H. Sazmat garh, Azamgarh</td>
<td>Rural</td>
</tr>
<tr>
<td>Janta Inter College</td>
<td>Rural</td>
</tr>
<tr>
<td>Gosai Bazar Haraiya Azamgarh</td>
<td></td>
</tr>
<tr>
<td>Madan Mohan Malviya Inter College</td>
<td>Rural</td>
</tr>
<tr>
<td>Kandharapur, Azamgarh</td>
<td></td>
</tr>
<tr>
<td>Balkrishn Das Inter College</td>
<td>Rural</td>
</tr>
<tr>
<td>Terahi, Azamgarh</td>
<td></td>
</tr>
<tr>
<td>Gandhi Inter College Maltari Azam</td>
<td>Rural</td>
</tr>
<tr>
<td>Saiseva Inter College</td>
<td>Rural</td>
</tr>
<tr>
<td>Maltari Azamgarh</td>
<td></td>
</tr>
<tr>
<td>Smith Inter College, Azamgarh</td>
<td>Rural</td>
</tr>
</tbody>
</table>
Table 3.2
List of Private Managed School

<table>
<thead>
<tr>
<th>Name of the schools</th>
<th>Nature of the School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children Higher Secondary School Azamgarh</td>
<td>Urban</td>
</tr>
<tr>
<td>Central Public School Azamgarh</td>
<td>Urban</td>
</tr>
<tr>
<td>Krishna Inter College Azamgarh</td>
<td>Urban</td>
</tr>
<tr>
<td>Ma Sharda Inter College, Gahaji Azamgarh</td>
<td>Rural</td>
</tr>
<tr>
<td>B.B.S. Inter College, Saidvara, Azamgarh</td>
<td>Rural</td>
</tr>
<tr>
<td>Baba Bechandas Inter College, Ghoruoh, Azamgarh</td>
<td>Rural</td>
</tr>
<tr>
<td>Jyoti Niketes Inter College, Azamgarh</td>
<td>Urban</td>
</tr>
<tr>
<td>Parvati Inter College, Dhoharighat, Azamgarh</td>
<td>Urban</td>
</tr>
<tr>
<td>Sat Seva Inter College, Maltari, Azamgarh</td>
<td>Rural</td>
</tr>
<tr>
<td>Vikram Inter College, Mohammedpur Azamgarh</td>
<td>Rural</td>
</tr>
<tr>
<td>Smith Inter College, Azamgarh</td>
<td>Rural</td>
</tr>
<tr>
<td>Balika Inter College, Roshanpur, Azamgarh</td>
<td>Rural</td>
</tr>
<tr>
<td>Jamia Islamia Inter College, Hara Ki Chungi, Azamgarh</td>
<td>Urban</td>
</tr>
</tbody>
</table>
3.3.3 Kinds of Sampling Used

3.3.3.1 Random Sampling

Random sampling is the process of selecting a sample in such a way that each individual in the population has an equal and independent chance of being selected for the sample. It is the best single way to obtain a representative sample. Random sampling involves defining the population and selecting individuals for the sample. Generally, individuals for the sample are selected using a table of random numbers.

3.3.3.2 Stratified Sampling

Stratified sampling is the process of selecting a sample in such a way that identified sub-groups have the same proportion as they exist in the population. Stratified sampling can also be used to select equal sized samples from each of a number of sub-groups. If sub-groups comparisons are desired. The steps in stratified sampling are very similar to those in random sampling except that selection is from sub-groups in the population rather than the population.
3.3.3.3 Cluster Sampling

Cluster Sampling is sampling in which groups not individual are randomly selected. An intact group of similar characteristics is a cluster. The steps in cluster sampling area similar to those in random sampling except that the random selection of groups (Cluster) is involved, not individuals.

3.3.3.4 Systematic Sampling

Systematic Sampling in which individual are selected from a list by taking every Kth name, where K equals the number of individuals on the list divided by the number of subjects desired for the sample. Even though choice are not independent, a systematic can be considered a random sample if the list of population randomly, ordered.

3.3.4 Determination of Sample Size

Sample should be as large as possible in general, the larger the sample. The more representative it is likely to be, and the more, generalizable the results of the study, are likely to be minimum expectable sample sizes depend on the type of research Descriptive
research 10% of the population correlation research, 30% casual comparative research 15% and experiment research 15% per group. Even large sample can lead to erroneous conclusions if they are not well selected.

3.3.5 Avoidance of Sampling Bias

Sampling bias does not result from random chance difference between samples and population, sampling bias is systematic and is generally the fault of Researcher too major sources of bias are the use of volunteers and the use of available groups. Any sampling bias present in a study should be fully described in final research report.

Sampling Procedure used in the present study

3.4.1. Teacher Effectiveness Scale (TES):

The present Sikert type Scale has been developed and standardized by Promod Kumar and D.N. Mutha. To provide a handy instrument for identifying effective/ineffective teacher both for applied and research objectives. According to this and effective teacher may be understood as one who helps development of basic scale, understanding proper work habits desirable attitudes, value Judgment
and adequate personal adjustment of the students. (Ryvan 1959)

Teacher effectiveness Scale has 69 items of positively worded. Items are given a Score of 5432 and 1 for strongly agree, undecided, disagree, and strongly disagree, respectively. The sum of these values gives the teacher effectiveness score for the subject. The total score varies from 59 to 345 Swing least teacher effectiveness highest teacher effectiveness. Reliability of the scale is found to be .75 with ad index of reliability .8 and the validity value was found to be .77 with an Index of reliability of .87

3.4.2 Standard Progressive Matrices:

The tool was developed and standardized by J.C. Raven it is the scale which is world by used to measure the general intelligence ability. problems salving ability. This tools may be used for all age group of the population. It can be used in home, schools and work places. As well as in laboratories. It has therefore to be Simultaneously short, attractive, robust and valid. The test is made of 5 seats or series change in tow dimensions Simultaneously. Each puzzle has a part missing, which the person taking the test has to fined among the
options provided The test consist of 60 problems divided into 5 sets A, B, C, D, and E each may up of 12 problems. In each set the first problem is as nearly as possible self-evident. The problems which follow build on the argument of those that have gone before and become progressively more difficult. The order of the items provides the standard training in the method of working. The five sets provide 5 opportunities to grasp the method of thought required to solve the problems and 5 progressive assessments of a person's Capacity for intellectual activity. To ensure sustained interest and freedom from fatigue, each problem is boldly presented, accurately drawn, and as far as possible, pleasing the look at. All subjects, whatever their age, are given exactly the same series of the problems in the same order and asked to work at their own speed, without interruption, from the begging to the end of the test. A person's total score provides an index of intellectual capacity. Marking is done by the scoring key or all the sets ABCD and the minimum score of each set is 12 and the maximum total score is 60. The total obtained score is divided into 5 grade that is intellectually superior definitely above the average intellectual
capacity, intellectually average, definitely below average in intellectual capacity and intellectually impaired.

3.4.3. Introversion Extroversion Inventory (IEI)

The used IEI test was developed and standardized by Dr. P.F. Aziz and Dr. Rekha Gupta. The present inventory therefore aims at studying whether an individual is predominately extroverted or predominantly introverted or falls somewhere in the middle of the continuum. The inventory has been designed for application Hindi knowing adults. It inventory has 60 items. There is no fixed time limit. Items have to be answered in the positive negative in 'yes' or 'No' extrovert. Responses are considered to be correct one mark awarded for each correct Response. After checking the responses of the subject from the table given subjects scores is calculated by the following formula.-

\[
\text{Score obtained} = \frac{\text{Number of correct response}}{\text{Number of incorrect response}}.
\]

The subject obtains a plus score when the No. of correct responses exceeds that of the incorrect ones., he gets a minus score when the No. of incorrect responses exceeds that of the correct ones. If
the subject's score ranges between -15 and +15 he is said to be an ambivert. If the score is above +15 he is said to be an extrovert; and if the score is below -15 he is said to be an introvert.  

3.5 Collection of Data

The investigator administered the achievement test by visiting various schools and collected the responses of the students. In order to avoid the problem of non-return of the instrument. The data were collected personally from the students of different schools of Azamgarh district. The head masters and teachers were requested to co-operate for the conducting of the test before administering the tools. The student were directed to give the answers of all questions and to complete responses to the items. They were taken into confidence and were told that information form them was required only for research purpose and will be strictly kept confidential. The responses and other related information were collected on the day of administration of the tools for avoiding the problem of non-response.
3.6 Uses Statistical Method

The present study has been conducted by using following statistical method.

3.6.1 Mean

Mean is also called arithmetic mean or an average. It is defined, as the same of set of observations are measurements divided by the number of measurement inset. The arithmetic is calculated by the following formula.

\[ M = - \frac{\sum x}{N} \]

Where -

\( M = \) Mean
\( \Sigma = \) is the some of
\( X = \) is the score of measurement
\( N = \) is the number of measurement of or the sample size.

The formula is adopted to calculate mean from raw data.

Long method is also adapted for calculation of mean.

\[ Mean = \frac{\sum fx}{N} \]
3.6.2 Median

Median is a point above below which equal number of cases lie. The median has the 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 deviation about any other values. Staring (1978) has observed that if a set of discrete values is treated as continuous, the median so calculated may not satisfy this requirement. The following formula is used in order to find out median from grouped data.

\[
\text{Median} = L + \left( \frac{N}{2} - F_b \right) \times \frac{c_i}{F}
\]

Where
- \( L \) = Exact Lower limit of the class interval in which median lies.
- \( F_b \) = All the frequencies below the lower limit of the class-interval in which median lies.
- \( F \) = Frequencies with in the class interval in which median lies.
- \( c_i \) = Size of the class interval
- \( N \) = Number of the cases in the sample
One more formula is used for calculation of median.

\[ \text{MEDIAN} = U \left( \frac{N/2 - f_a}{f} \right) \]

Where

\[ U = \text{Exact upper limit of the class interval in which median lies.} \]

\[ f_a = \text{All the frequencies above the exact upper limit of the class interval in which median lies.} \]

### 3.6.3 MODE

Mode is another measure of central tendency. It is the crudest but the quickest measure to obtain from any data. In the situation where different value of X occurs more than once, the mode is the most frequency occurring the value. The value of mode in a grounded data may be calculated by using any of three formula -

**Formula (1)**

\[ \text{Mode} = 3 \text{ Median} - 2 \text{ Mean} \]

**Formula (2)**

\[ \text{Mode} = L_{mo} + \left( \frac{f_a}{f_a - f_b} \right) \times c_i \]
Where

$LMO = \text{The exact lower limit of the class - interval in which the largest number of frequencies (mode) lie.}$

$Fa = \text{The number of frequencies in the class-interval just above the one where largest number of frequencies lies.}$

$Fb = \text{The number of frequencies in the class-interval just below the one where largest number of frequencies lies.}$

$Ci = \text{Size of class interval.}$

Formula (3)

$$\text{Mode} = Umo + \left(\frac{Fb}{Fa - Fb}\right) \times ci$$

$Umo = \text{The exact upper limit of the class - interval in which the largest number frequencies (Mode) lie.}$

3.6.4. Standard Deviation

Like the mean, the standard deviation is the most commonly employed statistics. It is the stable measure variation in a group. In order to overcome the problem of algebraic signs, which appears in the deviation of scores from the mean, the statisticians have devised
the method of finding out the square root the measure of variability can be got and it is called standard Deviation. The following formula can be used for the calculation of standard deviation from ungrouped data.

Where -

\[ SD = \text{Standard Deviation} \]
\[ \Sigma d^2 = \text{Sum of squared deviation} \]
\[ N = \text{Number of cases in the sample.} \]

The steps for the finding out the standard deviation from the grouped data using the short method may be indicated as follows.-

Step 1 = Assuming the mean to lie in any class interval.
Step 2 = Finding out deviations (d) from the class interval in which mean is assumed to lie.
Step 3 = Finding out the product of each deviation from its corresponding frequencies. (fd)
Step 4 = Multiplying the product by f by its corresponding deviation to get \( fd^2 \).
Step 5 = Using the following formula for obtaining the value of standard deviation.

\[ SD = \sqrt{\frac{\Sigma d^2}{N}} \]
Where, -

\[ \text{SD} = \sqrt{\frac{\sum fd}{N} - \left(\frac{\sum fd}{N}\right)^2} \]

\( ci = \text{Size of class interval} \)
\( = \text{Sum of the product of multiplied by the corresponding deviations.} \)
\( N = \text{Total number of cases in the sample.} \)

3.6.5 't' test

In an experiment of study or any kind of study the statistics for finding out the significance of differences between two independent or correlated samples is called as 't' test. The 't' value gives a critical ration of the difference at means, and the standard error of differences of means. On the basis of 't' value one can reject or retain the null hypothesis, which postulates that the observed difference is attributable to chance fluctuation of the random sample

't' value is found out by adopting following formula

\[ t = \frac{M1 - M2}{S.E.D.M.(SD)} \]