CHAPTER – IV
RESEARCH METHODOLOGY

4.0.0 INTRODUCTION

A research designed can be defined as a formed, orderly, all-encompassing address of antic out the abstruse address of examination. It entails a added methodical appearance of invention, frequently after out in a few anatomy of formed certificate of approaches and a address of aftereffect of deductions. analysis always starts from a query or a problematic. Thus after the problematic is defined and objectives set out clearly, the investigator faces the significant task of adopting a method of research best suited to the given problem and the resources available. The methodology employed in this investigation is discussed in this chapter. Here the details are given with account to sample, design, tools, action of abstracts accumulating and statistical techniques acclimated for allegory the data. To make the investigation valid and reliable, data are of absolute necessity because the field investigation is based on data and they are “strong in realism, in significance, in strength and variables, in theory of orientation and in heuristic quality” Kelinger (1983). These studies are of social, psychological and Environment Education al significance. To ensure the scientific approach in field studies, collection of data is of great importance. Once philosopher Kant said “It would not be possible to have a science of psychology, because the basic data could not be observed and measured”

RESEARCH AND SOCIAL DEVELOPMENT

James Mason Wood says ‘training today, extra than ever earlier than, must see actually the dual objectives: training for residing and educating for creating a residing. ‘training isn’t always most effective for residing; it’s miles existence itself. this is the truth of the present state of affairs. according to the splendid truth seeker Bertrand Russell- ‘education taken into attention as a machine of forming our intellectual habits and our
outlook on the arena, is to be judged a success in percentage as its final results approximates to this pleasant; In percentage, that is to mention, as it offers us a real view of our region in society, of the relation of the whole human society to its non-human surroundings, and of the character of the non-human global as it's far in itself aside from our very personal dreams and hobbies. 'For the sake of society inter relation between the manufactured from understanding resources and it's applicability in exceptional situation compel to well known all the mind from basic to exercise taken from distinctive resources for the studies paintings.

You possibly can improve his/her nice of existence through studies activities and its application in their everyday lifestyles and conditions. through research and proper use of strategies to do research in medical way is simple need for their exploration knowledge with a purpose to solve our specific to educational problems and fashionable to social issues.

**Concepts and Boundary in Social Science Research**

Social problems, phenomena and social theory are studied by developing research proposal within the social setup. Any studies concept starts with the ideas concerned with the social technology phenomenon. The concepts are derived specifically from the simple situation discipline and maximum of the time those are properly described and down to earth within the concern. whilst attractive into a new studies problem, the understanding of conceptualizing and defining the boundary turns into essential components. The objective of the existing lecture is to assist the contributors to understand the use of standards and boundaries in Social technology studies. The lecture will cover following vast factors: 1. A clear know-how of the which means of principles. 2. basic rules to be accompanied even as getting ready for a concept. 3. Examples of principles from diverse disciplines. 4. importance and necessity of a boundary. 5. The research troubles required records and the usage of limitations.

In the process of research investigation one comes across various concepts that make together the subject of research. Most of the times, these are defined in the mother discipline of the researcher however: it becomes essential to understand them
threadbare before beginning to test any theoretical construct on, the basis of these. The theoretical construct usually employs the concepts in a given frame in which the original proposition was framed. In social sciences, any concept is not independent of time space and situation of its occurrence along-with/together with any social phenomenon. Therefore, while understanding a concept, it is necessary to keep in background the probable use.

Among the basic rules of preparing for the concept the first priority should be given to the clarity of the concept demanded in the Social Science research. If the concept is not clear to the readers and intended audience then the main points made utilising such concepts is usually not picked up, therefore, clarity becomes an important and first pre-requisite. This is followed by the objectivity required while defining a particular concept and hence it should not be value loaded and free of one's own views. It is difficult however to be completely objective in this process but the possibility that any subjective construct of a concept will lead to erroneous results. Among the other important aspects of conceptualizing in a process of Social Science research are the rigor, simplicity and stability of the concepts. Rigor implies the robustness of the defined concept to withstand the scrutiny of the fellow researchers. It also involves the amenability of the concept to an empirical analysis. But it is necessary to underscore that in the pursuit of robustness one should not sacrifice the canon of simplicity. After all a large part of Social Science research has an implicit policy orientation. Hence, the concepts used should be well understood. Lastly, the concept defined by the researcher should have a stack value. It must be constructed such that it can be amenable for the use by fellow researchers in the discipline.

It is important to define the boundaries in any social science research, as it is not universally applicable. The boundaries are conceptual demarcates inside which the system of social research functions. Therefore, this will be defined always in the context of the actual problem of research. Drawing boundaries is relevant to a researcher in different context. These component help to separate simplify and focus on the topic of research. They also assist in setting problem in a geographical locale, social group, and particular period. In a checklist of boundaries, one must include (i)Client. (ii) Purpose of
research, (iii). Measure of improvement over the earlier stock of knowledge, (iv). Decision taker, (v). Resources and social constraints. In the entire process, the flexibility of the boundaries has also to be kept in mind. Individual researcher’s perception also matters in the process. Boundaries help to simplify communication with the intended targets of the research. This also facilitates reaching the goal of an intended research.

RESEARCH PROCESS, RESEARCH DESIGN

A traditional method for reducing weight and at the same time cutting down on systems volume requirements is making things smaller. The missile-space era brought such great strides in this area that manufacturers call it microminiaturization. This type of research is continual, first because the trend in high-performance flight vehicles is generally toward more equipment and second because the initial version of a system, designed primarily for performance, usually leaves considerable room for later miniaturization. A large portion of general research and development work is devoted to research in new manufacturing processes in order to combat ever-mounting costs, reduce fabrication time, and assure greater product reliability. Additional effort goes into development of machines and techniques for shaping and forming the new materials being introduced to production status, which almost invariably are more difficult to handle than their predecessors.

The design of social science research describes the kind of process that the researcher goes through. This has a large number of questions and probably can be equated to a designer’s problem keeping in view the landscape, the resources, the techniques, the needs, and the time. Therefore, pre-requisite of a research design will involve the understanding of the researcher about his research problem, formulation of such problem and the information stock that the researcher gathers. There can be two bold types under which one can categorize the research viz., (i) A theoretical work based on pure logic and the concepts of the discipline involved, (ii) An empirical work keeping in view certain set of hypotheses. These can further be subdivided into their basic
components on the basis of theory, logic, data use, and end user. The important questions that crop up while preparing research design are:

1. Why study is being made? 
2. Who is the intended target for the information given by the study? 
3. What is the level and depth of understanding of the researcher? 
4. What are the expected answers that the researcher seeks? 
5. What is the stock of information that the researcher has? 
6. What is the technical capability of the researcher?

These questions need to be answered sequentially if a research design has to be perfect. In many a research enquiry, the researcher does not have a clear idea about the intended audience as well as the likely outcomes of his research. Similarly, the 'landscape or the existing knowledge bank of the subject discipline must be scanned thoroughly while preparing a perfect design. In absence of such step a researcher is likely to repeat the earlier research then elsewhere. In a descriptive study one needs to locate truthful information about the problem that is at the hand of researcher whereas in a diagnostic study the control of researcher on the causal factor is most important.

A research design essentially involves six important components: Firstly the understanding of concepts should be so clear that the process of weaving this into a theoretical construct should become an automatic process. The concepts can either be connected in a cause and effect relationship or in terms of understanding the quantum or classifying into meaningful groups. The interplay of the concepts indicates a probable theoretical framework and which throws open working hypotheses. Such working hypotheses have to be checked with the availability of data thereby confirming their amenability for empirical testing. The choice of technique, checking of the literature data and data problems naturally forms inherent ingredients of the process.

Research Process, Review of Literature

Seeking information from the earlier researches is an essential footstep for any research. While gathering the assimilating facts, evaluating and analyzing relationships
formulating arguments and putting forth a particular theoretical construct one must be aware of the earlier works done in that field. There are quite a few important aspects of the literature review. These can be grouped into two broad groups viz., (i) The Hardware Aspect and ii) The Software Aspect. In the hardware aspect we deal with the assembling of literature and plan of the study. Here, the practical aspects of making literature review cards taking down notes, assembling the notes and pinpointing the exact requirement in the process will be stressed. Whereas in Software we shall look into what exactly matters in the review of literature. A brief view of this can be had from four questions namely:

1. What is the key theoretical literature existing in the area of study?
2. What and where the information required for proof of the hypothesis can be searched.
3. What are the probable outcomes of the research?
4. In what groups are common typologies that we can group the literature into?

As important steps in the review of literature one can visualize five phases. In the first phase a thorough scan of literature with the least possible time should be done in order to locate and spot the literature availability. This step can be accomplished well with the help of a senior researcher. The second phase involves categorizing the short-listed literature from the first phase into three broad categories covering (i) the core important literature, (ii) the peripherally important literature, and (iii) the literature, which falls in the gray zone. The third phase involves a thorough reading of the literature from group I and making the detailed notes on the basis of the objectives of the information search. In the fourth phase, one needs to branch out to the literature indicated in the latest references. Such cross-references have to be, located and looked into. At this stage, one has to look into the empirical data carefully for formulating a complete research design. The fourth phase comes a little later wherein the researcher must look into some of the immediate observations from the empirical exercise (or theoretical construct) and trace back the roots of such constructs into the literature. This phase builds the arguments more logically. The last phase is a "Tap up phase wherein the researcher has to connect the entire framework with the evaluation of literature. The overview of literature is an essentially issue based exercise which needs to be
conducted keeping in view the core of the thesis. Here, the more often mistake that takes place relates to the placement of different studies brick by brick. Such review does not yield any information though it may contain a lot.

- Discussion about the themes prepared by the students and construction of hypotheses.
- Major problems confronted during the process.
- Some examples of research gaps in the field of look at of a number of the students.

The identification of research gaps is a pre-requisite of any research endeavour. The research gaps can be located in three components. Firstly a research gap can exist in the theoretical construction available in the literature wherein the researcher can locate some logical errors. Though it is a difficult task, it forms an important link in locating the research gaps. The second type of gap comes out of the conceptual errors that creep in a research work. Here, the researcher's main task is to locate such errors and correct them. In addition to this, the onus of interpreting the new results also falls on the researcher. The third type of research gap exists in the style of interpretation. Many times facts and results can be interpreted in different ways. Such interpretations are open for re-examination and re-testing of the hypotheses. These types of gaps require a careful scrutiny of the existing literature and the data involved.

Hypothesis is an informed guess about the social phenomenon to be taken into consideration. It is sometimes described as a proposition, which is assumed with sufficient information in order to test for purpose of falsification. Any hypothesis therefore presumes sufficient information with the researcher and thus the process of hypothesis formulation has a positive relationship with the stock of information. The hypothesis can be obtained from: (i) Theoretical Construct. (ii) Historical Evidence, (iii) Experience of the Researcher, and (iv). the research gaps identified. In the literature on research methodology one comes across working hypothesis. Null hypothesis- and alternative hypothesis. The working hypothesis is the initial stage of the research work whereas the null hypothesis unci the alternative hypothesis are two sides of the testing of hypothesis.
Overview of Social Sciences Methodology

In social sciences the pursuit of knowledge covers description, explanation, evaluation, and prediction. There are two types of logical reasons, which are used while interpreting and enriching the horizons of knowledge. However, subtle differences exist in the components of social sciences viz., in Economics, Sociology, and Political Science. Each of these disciplines has developed a method of seeking and transferring the knowledge in the general pool. These methods are developed over the years and therefore continue to be the vanguards of knowledge seeking. In an important essay on financial method: heterogeneity and relevance Prof. Amartya Sen argued that the narrow structure of human motivation assumed inside the economic technique gives very little of rationalization. In that context, he argues for inter-disciplinary work even from the view of an economist. In the core economics methodology the hypothetico-deductive model, an empirical inductive model and Poppers falsification model assumed importance for quite sometime. In this framework itself, we had the emerging new heterodoxy that originated from Kuhn's study on the structure of scientific development. Kulm's history of science is marked by long periods of status quo interrupted by discontinuous jumps from one paradigm to another. On the background of poppers normative methodology, this was a shift. The lecture thus will cover a history of philosophy in research methodology of economics, sociology, and political science. Within the methodology of economics the following aspects will be dealt with:

1. The hypothetico-deductive model.
2. The problem of induction.
3. Popper and Kuhn's contribution.
4. Verification is it's and falsification is it's views.
5. Positive and normative economics.

In the domain of methodology in other social sciences, we shall try to involve some of the faculty members from the respective disciplines to participate in the discussion sessions. Among the aspects that will be considered in discussion will be (i)
nomological proposition, (ii) political theory and political philosophy, (iii) social vis-a-vis natural science methodology, (iv) positivist and empiricist approaches.

An investigation should be orderly in order to avoid confusion. For being orderly, prior planning is required. An investigator has to plan the techniques and tools to use for collecting, organizing, analyzing and interpreting data. Planning helps to explain the Environment of the Colleges al process used for the investigation sources of data tapped, the channels prepared or adopted and utilized the nature of the data collected and its velocity and reliability. All there should be given in a clear and adequate manner. Planning and procedure also helps in replicating and reproducing the investigation.

A well thought out plan of action in advance followed by a orderly execution brings out fruitful results. Keeping in mind the importance of this idea, the process adopted to tackle the present problem was decided in advance. It describes simply what must be completed, will need to be executed, which facts will be wanted, what statistics collecting devices might be used, what sources of records will be selected and how the statistics may be analyzed and concluded.

Following are the various aspects of the research design which have been used in the present investigation.

1) Method used.
2) Population.
3) Sample
4) Tool used.
5) Data Collection and
6) Statistical Techniques Used.

4.1.0 METHOD

Keeping in view a number of considerations such as nature of problem, objectives of the investigation and resource fullness of the investigator etc. the
researcher decided to use survey method. In the present investigation all the steps and physiognomies have been used which are essential for survey method.

According to nature and purpose of investigation the method of investigation varies. Most of authors agree that there are three basic classifications of research methods.

1. The Historical Method.
2. The Experimental Method.
3. The Survey Method.

The Historical Method studies the past and attempts to understand the present and predicts the future in the light of past Value of Teachers and B.Ed. Teachers Trainees of the Colleges. The survey method is involved with the prevailing and objectives at decisive the status and marvels beneath research. However the experimental method is orientated toward the detection of basic dating among phenomena as a way of forecasting and ultimately controlling their incidence.

4.2.0 THE PRESENT STUDY

The study is primarily a survey on Teachers Trainees B.Ed. Colleges of Indore District of Madhya Pradesh as investigation. The variables An attempt has been made to examine the Teaching competency, Quality trades and data Teaching competency, Personality trades and values, Irrespective of Colleges categories, social, economic and biological differences. Values among B.Ed. Teachers Trainees has been examined with standard test and developed questionnaire related to different dimensions of vale related to different conditions applications with situations were educations in this era.

4.3.0 DETAILS OF STUDY

Personality trades and Teaching competency, Personality trades and values of B.Ed. Teachers Trainees. In this chapter the methods and procedures of this investigation are discussed under the following heads. In this chapter description of Profile of the investigation area related to the geographical conditions and B.Ed.
Teachers Trainees Teaching competency, Personality trades and Teaching competency, Personality trades and values according to their Educational establishment by the government and socio economic situations. Other variable were also considered in the objectives which are influence the Teaching competency.

### 4.4.0 UNIVERSE OF THE STUDY:

The totality of the study have an impact on and as the arena of the place which considered or undertaken for the examine. instructors trainees enrolled within the B.Ed. schools, teachers Trainees, of Indore District were the universe of the investigation.

### 4.4.1 AREA OF THE STUDY:

Area of the study always confined towards the data collected from the sample must have direct influence. For this study Indore District is purposively selected for area of the investigation.

### 4.4.2 UNIT OF THE STUDY:

The unit of the study represents always a key for the study and the unit always referee to the information collection. Each respondent was the units of the investigation are considered as unit of the study.

### 4.5.0 SAMPLING DESIGN:

Seven clusters were formed from each block. One B.Ed. Colleges was selected from random clusters with 20 B.Ed. colleges were selected. There are seven blocks in the district Indore. All the Teachers Trainees B.Ed. Colleges were grouped into a cluster. From each College thus selected 20 Teachers Trainees Indore District of M.P. state.
4.6.0 SOURCES

The wide nature of the investigation is wide in nature and information is diverse so to arrive at a viable conclusion various sources were explored for obtaining data, the facts and the classes consulted were:

4.6.1 APPROACH

As per decided objectives of the study by considering the goals of the existing investigation, a aggregate of each quantitative and qualitative processes were followed within the context of schools teachers trainees groups who have precise contribution closer to cost of the lecturers Trainees' education machine.

4.6.2 TOOLS AND TECHNIQUES

For uncomplicated depth the presumed variables of the interpret design were tackle and questionnaire enthusiastic by the researcher either possible proposeto for habit merit and power antidote to able advice webogus for the scrutiny.

For calculation principles room, distinction and thoughtfulness of the B.Ed. teacher’s trainee’s leading panoply were old and textadjacent to the utensils are ready farther down than.

4.6.4 TEACHING COMPETENCY

For measuring teaching competency of the teacher’s trainees standard tool made by Prof. B.K. Passi’s popular teaching Competence Scale the overall teaching Competence Scale is generally used by measuring teaching competency of a teacher individually by a reliable observer or a group of reliable observers making direct observations of his classroom behaviour for the entire teaching period. As the teacher teaches, the observer sits at the back for observation. To facilitate this process she may
either mark frequencies or write verbal descriptions against each item which would help her in giving rating more objectively. At the end of the teaching period, she gives her ratings on the General Teaching Competence Scale against all the items.

✓ Planning (Pre-instructional). Objectives of the lesson have been appropriate: truly stated applicable to the content material, ok and practicable.

✓ Content decided on became suitable: relevant and ok with respect to the goals of the lesson, and accurate.

✓ Ideas and principles were defined (knowledge added about) with the assist of clean, interrelated and significant statements: statements to create set, to conclude, statements which had relevancy, continuity suitable vocabulary explaining links, fluency and had no vague phrases and phrases.

✓ The concepts and concepts have been illustrated with the assist of appropriate examples although suitable media (verbal and non verbal): simple, pertinent to content material and interest stage of scholars.

✓ Scholars’ interest became secured and upheld with the resource of diverse stimuli like movements, gestures, changing speech pattern, focusing, changing interaction patterns, pausing, and oral-visible switching: pupils’ postures, and listening, searching at and responding behaviour of scholars.

✓ Planned silence and nonverbal cues had been used to boom student participation.

✓ Students’ participation (responding and initiating) was recommended using verbal and nonverbal reinforces.

✓ Pace of presentation of thoughts changed into suitable: matched with the rate of students’ information and there was appropriate budgeting of time.

✓ Students’ participated in the lecture room and responded to the teacher and initiated with the aid of giving their personal idea and reacting to others’ thoughts.

✓ The blackboard paintings turned into appropriate: legible, neat, appropriateness of the content material written and adequate. Content selected changed into nicely organized: Logical continuity and mental agency.

✓ Audio-visual cloth selected were appropriate: ideal to the scholars and content, good enough and essential for attaining the objectives.
✓ Presentation (educational) Lesson changed into introduced efficaciously and pupils were made geared up emotionally and from know-how point of view to get hold of the new lesson: continuity in statements or questions, relevance, use of preceding understanding and use of suitable device/method

✓ Questions had been suitable: well based, properly placed, ok in quantity and made pupils take part.

✓ crucial cognizance become added approximately in scholars with the assist of probing questions: encouragement, looking for similarly data, refocusing, redirection and growing risky consciousness.

✓ closing. The closure turned into achieved accurately: primary factors of the lesson had been consolidated, present expertise turned into related with the past understanding, possibilities were provided for applying present 103 expertise, and gift information became connected with destiny getting to know (assignment).

✓ The mission given to the students became suitable: suited to person differences, relevant to the content taught, and ok.

✓ assessment. scholars’ development towards the capabilities of the lesson come to be checked and the events of evaluation have been suitable: relevant to the targets, legitimate, dependable and intention.

✓ students’ issues in information a concept or precept had been diagnosed with the useful resource of step-thru-step wondering and appropriate remedial measures have been undertaken.

✓ Managerial. each attending and non-attending behaviours of the scholars have been diagnosed: attending behaviour became rewarded, instructions were given to do away with non-attending behaviours, questions were requested to check students’ attending behaviour, students’ emotions and ideas were widely wide-spread, and nonverbal cues had been used to understand scholars’ attending and no attending behaviours.

✓ school room area turned into maintained inside the elegance: students’ accompanied instructor’s commands that have been no longer associated with the content.
SCORING PROCEDURE

The sum of the ratings against at the 21 items constitutes the score on General Teaching Competency (GTC Scale) of the teacher being observed. The maximum score possible is 147 and the minimum is 21.

• RELIABILITY OF THE SCALE.

The inter-observer reliability constants range from 0.85 to 0.91.

• VALIDITY OF THE SCALE.

The scale has factorial validity. Scott’s coefficient of inter-observer ranging from 0.78 to 0.82. 3.2.3 Observation schedule for selected skills were used The first part records the bio-data about the prospective teachers who is to be tested on this schedule.

• Name of the prospective teachers.
• Roll No.
• Topic
• Class
• Name of the Supervisor
• Date
• Time duration
• Teach/Re-teach The scale value 0 indicates that the prospective teachers did no longer use the constituent in any respect. the scale price six designates that the prospective instructors used the aspect very an awful lot. (Appendix- I).

4.6.4 PERSONALITY TEST
The test objectivity are;

- update, improve, and abbreviate the linguistic acclimated in the analysis items;
- simplify the acknowledgment format;
- develop new authority scales;

They reliably found that the primary ancestry themselves came calm in particular, allusive groupings to anatomy broader accessory or all-around traits, anniversary with its own accurate focus and action aural personality (Cattell & Schuerger, 2003). For example, the aboriginal all-around affection they begin was Extraversion-Introversion.

Acclimated apparatus for appraisal personality alleged as 16 PF agency barometer sixteen factors of personality. Improve the psychometric backdrop of the test, including new believability and authority data; and Management of the analysis takes about 35–50 account for the paper-and-pencil adaptation and about 30 account by computer. The analysis instructions are simple and aboveboard and the analysis is un-timed; thus, the analysis is about self-administrable and can be acclimated in either an alone or a accumulation setting.

4.6.4.1 16PF

For the collection of data related to personality of the teachers used test was developed by S. D. Kapoor (1970). It is an objectively scorable test with standard key. There are 186 items in all the test, and the responses are categories under three heads, 1. Yes, 2. Doubtful and 3. No. The time limit for completion of test is 45 minutes. It measures 16 factors of personality, named as A, B, C, E, F, G, H, I, L, M, N, O, Q.1, Q.2, Q.3 and this autumn. The description of symbols are given below:

A  -  Reserved / Out going.
B  -  Less Intelligence / High Intelligence.
C  -  Affected by Feelings / Emotionally stable.
E  -  Submissiveness / Dominance.
F  -  Sober / Happy – go – lucky.
G  -  Weaker Superego strength / stronger highegostyle.
H  -  Shy / Bold.
Test Retest reliability coefficient ranged from .76 to .90. The Spearman Brown coefficient ranges from .10 to .78. The equivalence coefficient ranges from .34 to .76. Validity coefficients range from .74 to .92. (Appendix - I).

4.6.5 VALUE QUESTIONNAIRE

For measuring values of the teachers trainees' tool developed by Sherry and Verma was used. The test presenting more popular Indian condition and situation as required. Ten comprehensively measures relative strength of Teaching competency, Personality trades and values listed as follows for measuring the values of age group. Spiritual value; Social price; Democratic fee; Aesthetic fee; Financial cost; Expertise price; Hedonistic cost; Strength cost; Family status fee; Fitness price.

All the above ten Teaching competency, Personality trades and values are measured through 40 questions with 3 alternatives (Appendix - I).

4.6.5.1 Administration of the Tool

Before administrating of the tools the researcher adopted techniques for reliving any doubts of the testiest. This instrument is easy to administer individually as well as in
a group. Though there is no time limit yet it can be completed within 25-30 minutes. Instructions and examples have been given on the First page and thus it is easier to administer even by the beginners.

**SCORING**

The scoring has been done in the following manner: The scoring of the test was made according to the guideline and instructions given in the key of the test. The follow of action are in the test there were three alternatives in each question and the scoring key define as under; Two (2) marks have been given to every (~) mark which showed the most preferred value under the stem. 2) Zero (0) has been given to every (X) mark, which showed the least preferred value under the stem. 3) One (1) mark has been given for the blank (   ) or unmarked item showing the intermediate preference for the value. The questionnaire was disqualified in case, when 5 or more items were left unanswered.

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<thead>
<tr>
<th>Categories</th>
<th>Area Nominated</th>
<th>Specific</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Stands for the</td>
<td>Religious value</td>
</tr>
<tr>
<td>B</td>
<td>Stands for the</td>
<td>Social value</td>
</tr>
<tr>
<td>C</td>
<td>Stands for the</td>
<td>Democratic value</td>
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<tr>
<td>D</td>
<td>Stands for the</td>
<td>Aesthetic value</td>
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<td>E</td>
<td>Stands for the</td>
<td>Economic value</td>
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<td>F</td>
<td>Stands for the</td>
<td>Understanding value</td>
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<td>G</td>
<td>Stands for the</td>
<td>Hedonistic value</td>
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<td>H</td>
<td>Stands for the</td>
<td>Power value</td>
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<td>I</td>
<td>Stands for the</td>
<td>Family prestige value</td>
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<tr>
<td>T</td>
<td>Stands for the</td>
<td>Health value</td>
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**RELIABILITY**
The reliability of the P.V.Q. was found by Hoyt's method using, analysis of variance. Test-Retest was done two times one at the interval of 11 months and the other at that of months. The established test reliability was according to the standard of test meant for.

**NORMS**

The manual of the questionnaire has mentioned the norms in the form of ‘T’ scores and standard scores.

**VALIDITY OF PVQ**

The key factor of the test is its validity and the validity of a tool is generally defined as its capacity of measure what it purports to measure. The PVQ is designed to measure the personal Teaching competency, Personality trades and values. Hence, the evidence of validity of PVQ lies in the fact that an individual's is score on a value e.g. religious value, as found by means of it, is truly the index of his conception of 'desirability of religious motivation in making choices from among the available alternatives in relevant situations.

It may be stated that the evidences of validity of a tool accumulate in the course of its usage in different studies. Several concurrent evidences of validity of a tool are necessary to justify the claim of it. As yet only the following empirical evidence of the validity of PVQ has accumulated. It is also followed by the researcher at the time of test administered.

**4.7.0 DEVELOPMENT OF REACTION SCALE TOWARDS TEACHING COMPETENCY**
Under the guideline of Reaction Scale developed by Mahapatra and Joshi (1993) for assessing the reactions of the Teacher Trainees exposed to the different methods of teaching developed by the researcher. The Teacher Trainees of experimental groups reactions were taken separately as before and after the experiment. Therefore, the Reaction scale was constructed to assess the reactions of the Teacher Trainees towards the different aspects of the methods of teaching. All the statements were verified with the expert opinion. Against each statement, a five point scale was given. The three points were, Strongly Agree (SA), Agree (A) and Disagree (D). Teachers Trainees were asked to read each statement carefully and put a tick mark on appropriate alternative amongst the given five alternatives which best described their reaction. Details of the four reaction scales are given in (Appendix-I).

The details regarding its development are given below. The reaction scale mainly consisted of Teaching Competency supported with three components namely Teaching competency from the willing of the teachers or forcefully no choice of alternative for teaching competency. For measuring the reaction of the Teacher Trainees towards developed Teaching Competency, mainly the five aspects of the Teaching Competency viz. (i) Instruction (ii) Presentation of the content. (iii) Available technical Facilities. (iv) Evaluation and feedback (v) Follow-up activities were focused in reaction scale. There were 10 items in all aspect. In order to know the reactions of the Teacher Trainees the reaction scale was divided into of teaching competency point scale. For avoiding the questing, some items were written in negative form and some in positive form. The items mainly measured the reactions towards the factors like motivation, learning environment, time factors and suitability of teaching and instructional process. In the five areas of the reaction scale it was also pointed out as “Presentation of the content” measured the reactions towards sequence of presentation of the content, language used, explanation of technical terms, relevant examples, graphics used. “Technical facility” measured the reactions towards the use of different color, musical facility. Inbuilt mechanism for shifting, concrete presentation of abstract ideas, animation and self-paced learning etc. “Evaluation and feedback facility“ measured the reactions towards types of questions asked, the quality of explanation given for wrong answer, use of prompts for initiating current responses. Reasoning
based questioning, and inbuilt evaluation facility. In “follow-up activities” the reactions were taken towards the activities performed with Teaching Competency like discussion, assignments and library references. “Suggestion” Lastly an opportunity was given to the Teacher Trainees to express their Frank opinion about the Teaching Competency. Under this head they were requested to write five proposals for development of the Teaching Competency.

4.8.0. COLLECTION OF DATA

Before collection of data according to objectives of the study the field work conducted for collection of data was carried out in two phases. The investigator had to visit the seven blocks of the district from 2015 to 2016. Since most of the areas under investigation were not approachable with good roads, the investigator had to move on foot in order to update the qualitative data. The phase-wise field work completed twice between November 2015 and December 2015 has been presented below.

PHASE I

In the first phase of the field work the information schedule prepared for the Headmasters of the Colleges children Teachers Trainees B.Ed. Colleges were filled up with the help of the teachers attached to the Teachers Trainees B.Ed. Colleges. On the basis of their responses, the tools were again modified and final sets of tools were prepared for administration.

PHASE II

According to the objective of the investigation, designated twenty Teachers Trainees B.Ed. Colleges secondary children were taken for the investigation. Both the standard tools and developed questionnaire were administered among the selected secondary Colleges children in Indore city. (Annex-II, List of the Colleges)
4.8.1 SCHEME OF DATA ANALYSIS

Data collected through Secondary and Secondary sources were analyzed by using both qualitative and quantitative techniques. Information collected through interview schedule from the beneficiaries of formal Value of Teachers and B.Ed. Teachers Trainees Education programmes had been analyzed in descriptive form. Information obtained through observation, field notes, and formal discussion had been analyzed both qualitatively and quantitatively. These data have been used to cross check and substantiate some of the facts obtained from the records and responses of the subjects.

NATIONAL AND INTERNATIONAL STATISTICS:

In the national systems of statistical data there are some of important groups, which convey out regularly the publications pertaining to their respective fields. We have Central Statistical Organisation, which publishes every year National Accounts Statistics as well as the other important statistical information. Similarly, the Office of Economic Advisers of various ministries publishes the data pertaining to those ministries. The trade related data are published regularly by the Director General of Commercial Intelligence and Statistics, Calcutta. The Accounts and Audit division of Ministry of Finance collects and provides the data on external assistance and India's external debts. Before the central budget every year Indian Economic Survey is published which covers the major data sources and the data pertaining to Indian economy. In the International statistical systems, two sources assume importance. Various components of United Nations bring out data on a number of international parameters. The most important of these are The Human Development Report and 'the World Development Report incorporating a large number of development parameter across the countries. The United nations development Programme publishes the Human improvement record whereas: the World Bank publishes the planet Development Report. The world organisation applied math Division publishes sizable amount of volumes on completely different aspects across the countries. With the exception of this the
Students' exercise: Students will be asked to collect some of the data from the sources indicated, tabulate them, and interpret these tables.

Introduction to Research and Research Methods: The Course Research is the continuous search for truth and factual knowledge through a scientific method. Methodology thus becomes an vital thing of the research work. It helps in generating the necessary information through the use of established, time-tested methodologies and tools. This course has the objective of providing the Ph.D. students the necessary exposure in the fundamentals of research methodology. It aims to sensitize them to the various stages and processes involved in research the essential aspects of research design selection of kinds of data types of data collection techniques of data analysis drawing statistical tables and drafting of the thesis.

In the following pages is given one or two pages of 'note' on each of the topics of lectures under three components, viz.. A. Band C. The reason for this is 10 provide background information to students about the lecture in brief so that they can generate interest in the lecture classes. The note is expected to help them in obtaining orientation towards themes of an interdisciplinary nature and emphasis. The references offered at the end also serve the same purpose.

UNDERSTANDING SOCIAL SCIENCE: LOGIC OF SCIENTIFIC INVESTIGATION

Research is generally defined as a systematic inquiry into knowledge. Although there are various definitions of what science is, two broad approaches to science can be stated. One is its organized accumulation of knowledge and the other is the process or method leading to knowledge. Both the processes are important since the former speak
of the static nature of science and the latter as dynamic. Conservation and transmission both are necessary for science for accumulation and proper usage of knowledge. Secondly, science is also understood as having the fundamental objective of establishing scientific laws. While performing this job of establishing laws, science attempts to predict the future course of events in a logical manner. Thus, science is different from common sense. This is so because detachment, continuity and accuracy have been rightly claimed to be the three marks of any science. We are concerned in this Module with an understanding of the meaning of science and the various approaches. Logic as an indispensable support base of any scientific investigation is upheld here.

An essential trait of any scientific inquiry is its preparedness to be tested and verified for discovering the truth. It is in essence a method for discovery of truth through critical thinking. The scientific method incorporates defining and redefining issues, formulating hypotheses or cautioned solutions, amassing, setting up and evaluating information, deriving logical conclusions, or deductions and lastly, testing carefully the conclusions to test whether they fit into the hypotheses formulated through logical sequencing.

This establishes the importance of logical thinking in scientific investigation. This is a basic component of science. In other words, research in any discipline has some broad features. Scholars have classified these as falling into the permanent and variable framework. Logical processes fall under the former kind along with the use of mathematical symbols. Logical application of thought into scientific research facilitates standardizing and systematizing the thinking process, which underlies all research. Is all research amenable to the application of the logical method? What are the constraints encountered by social scientists in undertaking qualitative research with application of logical postulates? This lecture attempts to discuss issues relating to the application of logic in scientific investigation, drawing from insights and examples across a cross section of research issues.
Research to be more and more scientific needs "to be broad based. It combines in itself both quantitative and experimental techniques for a systematic study of problems. This helps in the gradual generation of facts, accumulated, checked and empirically verified over a period of time to formulate plausible evidence and demonstrable relation of facts consistent with generalizations or logical principles. It is here that we discuss basic and applied research as the two broad categories of" research. Basic research leads to a search of broad principles and synthesizes them without any immediate utilitarian objective. Applied research on the other hand is associated with particular problems and has a lot of practical value. Such research being of practical value may relate to current activity or immediate practical situation. The two types of research are not different from one another. They are interrelated and not mutually exclusive. They are applied to economic and social problems since the main task of economics and other social sciences consists in discovering directly or indirectly the solutions to social science research.

The two types are also defined as following the paths of divergence and convergence. Sometimes a third is added viz. that of policy, which tries to apply the research findings specifically to a particular case. Formulation of policy is common in social science research in India today. This is necessitated by the multitude of problems facing the community.

The changing emphasis on research in social sciences is traceable to the following factors:

1. The need and desire by social scientists to catch up with developments in methods as well as in the techniques of precision of generalizations and predictions.
2. The second is related to the recent trends in understanding social reality. Being a complex entity society and its problems are varied and are qualitative.
3. As a result of the above two, there is the need for standardization of techniques, problems and approaches.
The complexity of societal problems that the social scientists, to adopt a multiple methodological approach to the take a look at of the equal. At the same time research has diversified to be carried on in the un-disciplinary, multi-disciplinary and interdisciplinary methods. Such a variety in approach only justifies the fact that social Phenomena cannot be captured in isolation from each other. No discipline can attempt to resolve the problems created by the interplay of socio-economic and political factors single-handedly. Therefore uni-disciplinary studies seem to have a limited utility particularly in the applicability of their findings as problem solving strategies. Inter-disciplinary methodologies tend to rely upon qualitative insights in as much as they would upon quantitative ones. We find greater emphasis upon studies of this kind when people's problems are tested against the existing social, economic and political processes. Here the barriers of disciplines are overlooked with importance laid upon issues than discipline-based methodologies. Similarly in multi-disciplinary methodologies, the issues are tested against application in different social science settings. It signifies the elasticity of the issue itself, which enables detailed testing and analysis. The lectures under this heading facilitate understanding of the utility of these three types of methodologies. Their importance lies in their relevance to present-day social problems, which require such an integrated, holistic perspective.

Sample Surveys are popular in carrying out research on various socioeconomic issues of importance for which explanations and if possible solutions should emerge out of research. Study of multi-faceted problems of society which are complex in them, cannot be substantially carried out with the techniques of observation questionnaires and the interview guide. Secondly, study of social problems in an underdeveloped setting with the application of purely statistical tools would be of a lesser value. Regional surveys and case studies would be of more value in studying developmental issues. A social survey is useful in the above context because it is a fact-finding research applicable to the problems to certain sections of society. It is generally used over a large geographical area. In other words, a social survey is primarily concerned with the making of an accurate and impartial collection and preservation of facts. Like any other method, the survey also attempts to discover facts. This will be with a scientific purpose with constructive programs for social advancement. This lecture examines the nature of
sample surveys, the tools it uses, like the schedule or the questionnaire. Sample Surveys may also be preceded by a pilot survey. The nature of study may be such that it requires some participant observation or case study also. This tool thus has links with social work, since the former also leads to application of findings of research. Sample surveys are believed to be particularly useful in countries like India where application of research findings are of utmost utility in resolving long-standing problems and issues of common socio-economic improvement.

The lecture intends to support the importance of sample surveys by raising some questions and providing examples from many studies.

THE SCHEDULE AND THE QUESTIONNAIRE

One of the tools of gathering information about various socio-economic issues in research is the schedule or its counterpart, the questionnaire. A number of inquiries use these as effective tools of data collection. The details of information to be elicited from the respondents are they rural; urban agricultural or industrial are written down as a list of questions. This is the questionnaire. Generally a questionnaire has closed ended questions, while the schedule is an exhaustive list of questions both open-ended and closed ended. The latter is a detailed, classified planned and seriated list of items or topics on which information is needed. It aims to collect quantifiable concrete, objective information from direct sources. It may also be the initiating of a pilot study. It is an inventory and a systematically drawn up checklist.

A SCHEDULE IS CONSTRUCTED KEEPING THE OBJECTIVE OF RESPONDENT IN MIND.

However, the crucial role of eliciting the correct information is that of the investigator. He/she is an essential component of the interviewing process. His/ her skills and capabilities of eliciting information, imagination efficiency in filling the questionnaires/ schedules and the amount of patience and perseverance that he/she requires help in making questionnaire or schedule far more useful.
The most significant aspect of this tool lies in the effort involved in designing it. A lot of care in understanding the form, content utility and accuracy of these tools needs to be taken. In fact the degree and reliability of responses depends on the design of the questionnaire. Since the questions would include factual information and attitudes/perceptions of people, the extent of reliability of information varies from high to low.

Exercise: Prepare a schedule about the problems of landless agricultural laborers in a backward district of your state, or about the socio-economic profile of panchayat members in a block/district.

Observation - Structured and Unstructured, Recording and Interpretations of Observation, Ethnography

The lecture intends to support the importance of sample surveys by raising some questions and providing examples from many studies.

Another significant mode of acquiring knowledge in social sciences is observation. It is the only tool used in social sciences, which is also used by physical sciences. It is highly qualitative and informal in character. Experimentation is also considered to be another facet of the "same process, but in the latter, the researcher actively creates the situation and relationships to study causal relationships and effects.

The researcher has a great role to play when he selects this as his/her method of eliciting information. Sensation, attention and perception are its three components. Correlating the various facts observed is most useful in their interpretation. But chances of personal views, prejudices and attitudes creeping into the observed facts or knowledge are high. There is the need for objectivity, which cannot be complete. But it can be achieved through proper training and being a dispassionate researcher.

There are types of observation. Controlled and the Non-controlled refer to the use of precision instruments to measure and record facts and to check their accuracy. Absence of these is the non-controlled observation. There are also the participant and the non-participant observation types. Participant observation is one where the researcher becomes a part of his situation of study but tries to maintain objectivity in evaluating it. It is a tool that requires a lot of time. Accuracy, objectivity and reliability of data thus collected are often questioned. Quality of observation is derived from the
extent of freedom from bias moral judgment and the capacity to listen and to understand.

**Data Use in Social sciences:**

Data, on the other hand are nothing but empirical evidences which a researcher collects either for testing a new hypothesis or for verifying 'the existing conclusions. In social science research we come across different types of data which may be useful at different stages of research and also a wide variety of data depending on the discipline of study.

The collection of the data for a research begins from the day 1 when a researcher sets upon the task of identifying the very research problem. The initial reading, that is the bibliographical data that the researcher collects in the preliminary stage of research throws up a vast amount of data that can be used for theorizing, conceptualizing, verifying and checking postulates. Thereafter, when the researcher gathers data for his/her own once a research problem is identified, these data help him/her to realize the 'specific objectives intended in the study and arrive at generalizations. However some of the use of data in social science research could be identified as:

- To gather evidences for substantiating and verifying the truth;
- To work out a broad research plan;
- To check and verify the existing perspective of enquiry;
- To indicate new perspective of enquiry;
- To relate the existing research efforts to contemplated research;
- To avoid duplication effort use of out dated methodological instruments;
- To answer the issued raised.
As against the use of bibliographical data, we also have factual data collected from primary and secondary sources. These data are essentially useful in testing the hypotheses postulated in the study.

The field data play a definite and significant role in research. They not only help the researcher in understanding complex and interwoven relationships but also to study the total situation in a problem.

FIELD DATA ARE ALSO USEFUL FOR CHECKING AND VERIFYING EXISTING KNOWLEDGE.

DATA TYPES, QUALITY AND SOURCE:

Data can be classified into different types depending on the nature and source. When data are in numerical figures statistics and other quantifiable units, they are termed as quantitative data. Similarly, when data are in descriptive verbal written or oral form, then they are called as qualitative data.

When first-hand information (data) are collected either from the field, subjects of study or from the original bibliographical source, they are termed as primary data. Thus primary data are considered to be those that are assembled for the specific purpose of solving a particular research problem (Robertson & Wright, 1970).

Secondary data are those kinds of data that are already recorded for some other purpose but used in the research project. For instance, the annual reports and brochures, which collect and compile statistics from various departments, are one kind of secondary data.

There are efforts to further classify secondary data into tertiary data. These data may be collected from secondary source and compiled into various supplementary reports. Even books by individual authors, which use secondary data, also form tertiary data.

The data gathered from these sources play a significant role in research. The primary data, which are normally facts opinions, judgments, policies etc, help the researcher to use them for research manipulation. The data gathered from secondary
sources from the first working base with which a researcher attempts to outline the problem. Analyse, compare etc. The tertiary source data are not only useful in raising issues and identifying related problems, but also help in enriching the hypotheses and locating new sources of information. However, one should be extremely cautious not to depend upon tertiary source for building up research.

Data are also classified in terms of the source from where data are drawn. They are the bibliographical data and the field data. Bibliographical source is basically the recorded materials which are commonly used in all kinds of research. Generally one may find these in the library archives offices or with some individuals etc. Further they may be printed or manuscript official or non-official. Greatest importance is attached to bibliographical data in any research. Therefore it is necessary that a researcher makes maximum use of this source to gain complete feel of the problem and to set the research in motion.

Bibliographical data are classified into two types - statistical compilations and narrative material. Some of the problems associated with this type of data are consistent availability reliability and validity. The quantitative data are often found to lack comparability. These data even when officially compiled are found to suffer from three defects: distortion lack of depth, lack of professional touch.

**DOCUMENTARY SOURCES:**

Documents are but any other source of information in social research, which may either be used in exclusive form or in conjunction with other methods. Further, they are used in all types of research- quantitative qualitative case study etc. documents are referred to as secondary fabric because they're not usually advanced for the take a look at. Some of the common documents which contain secondary data are:

- Public files- census, statistical yr books, court documents, jail data, mass media etc..
- Archival records- hospital records, organizational records etc.,
Personal discernments- life histories, diaries, autobiographies, memoranda, letters etc.;

Administrative documents- annual/progress reports, minutes of the meetings;

Formal studies and reports- regarding precise research topic.

One should note that the personal documents which forms an important bibliographical source also suffer from possible distortions, subjectivity, exaggeration, biases, prejudices etc., Therefore it is very necessary that the researcher checks for validity and objectivity of the data in these sources.

The field information, alternatively are the ones kinds of statistics, that are accrued from direct field surveys of various types or through experimentation in laboratory setting or in simulation. Some of the features of field data are: they are currently unknown or unavailable facts; which have not been adequately enquired into; they may be even verification of known facts and conclusions. As these data are collected from primary source, they include direct contact between the researcher and the subject to be researched.

INTEGRATING SECONDARY AND PRIMARY DATA:

Having understood the type, nature and quality of data from primary and secondary source, it now becomes very clear that no research can use primary data exclusively ignoring the secondary source. In fact secondary data happens to be an essential source of information for any type of research. However considering the limitations of this source, it becomes necessary that this data need validation to confirm its reliability, objectivity and consistency. Most researches which rely exclusively on secondary data try to supplement the same with primary data gathered from appropriate source. However, there cannot be any primary data research which does not use secondary source information. Thus these two types of information by and large playa complementary role.

Introductory Analyses and Interpretation of Data:
Quantitative and Qualitative Data

Introduction

Objectives

What is analysis and interpretation of data?

Analysis and interpretation of quantitative data

How should one present data in Quantitative research?

Analyses and interpretation of data in qualitative research methods

How should one present qualitative data?

Choice of Statistical and Processing Techniques

Theory of Testing of Hypotheses

Interpretive and narrative methods

By research we mean the following:

The term "research" is a combination of words "Re" and "seek". "Re" manner again and again, and "seek" refers to explore something new. Hence, research is a process of observing the phenomenon (i.e. any event, anything, any process etc.) again and again, collecting the data and drawing some scientific conclusion on the basis of those data. In simple words, research refers to a search for knowledge. The superior Learner's Dictionary of contemporary English (1952) defines research as "a cautious investigation or inquiry specially via look for new information in any department of knowledge". In very concise words, Redman and Mory (1923) outline research as a "systematized effort to benefit know-how".

“Clinical estimate of carnal caper behavior, as the assay of kinfolk in their usual aspect, sociology is ardent less roughly determine sports–monetary, romp, factious and friar. Review of relationship adjacent to its niggardly listing is liaison relative to sociological estimate and those wants to evaluate about league is styled as sociologist. Sociologists come forth at such areas as paper work, unharmonious, unnatural performance, grounding, yield b set forth suggestion, trip the light fantastic toe additional, the carriage, leap status,
and such solitarily adversity as horror, sever, babe reproach, and fullness domain. Sociology tries to arrange the in force guidelines way imaginable fray in hoof it contexts; It's surrounding on struggle successfully as a well known sashay technology detach from the boobs gambol sciences, vibrate on the same frequency yonwherewithal and national technology, which caper them to a alexipharmic settle of trip the light fantastic toe pointer or knack of the training”.

From the primitive society to the modern age social evolution started with the cultural assimilation, re-creation of geographical structure and timely changes of human thinking process. a expanse of Relationship public theorists and philosophers, as well Plato, Polybius, Machiavelli, Vico, Hobbes, Locke, Montesquieu, and Rousseau, crack handled state issues in a broader romp frame of reference. calculation Montesquieu appeared the factional kinds of perfume states fit of the nimble of bottomless gulf key climatic, geographic, foresee, and unearthly extras. in the 18th cent., Scottish thinkers obliged envision into the character of intimacy; pupils make public Adam Smith explored the fiscal causes of caper combat and romp trade, sedate as Adam Ferguson confident the particle commercial rationale of gambol polite dote on.

It is difficult to find out sociological and philosophical root of sociological researches in world sociological studies. Taking this unanimity in view we put in your hands an account of the status of sociological foundation researches and the methods and techniques to be used in social science researches. In Unit III you will find a brief history of the status of Qualitative Methods and Survey Research. It is the one of the method in social science research generally used for study social problem. We will also discuss about the process of research along with suitable statistical techniques used for drawing conclusion against the row data collected from the field. In this unit we provide you with approaches, methods and techniques of sociological Researches.

In this Unit we are also going to expose concepts related, Assumptions of quantification and size, Survey strategies, Operationalisation and research design, Sampling layout, Questionnaire construction, interview schedule, dimension and
Scaling, Reliability and Validity, boundaries of Survey, The use of computer for social analysis. Along with Statistics in social research other unit which cleared concept of measures of treasured tendency. mean, median, mode; measures of dispersion: favored/quartile deviation; correlational assessment, assessments of importance and covarance; regression evaluation.

SURVEY TECHNIQUES

In the general place of man or woman, thoughts, and individual, the writings of sigmund freud have had have an effect on on twentieth-century life-style and thought scarcely much less than marx's. his fundamental theories of the location of the subconscious mind, of the lasting outcomes of infantile sexuality, and of the oedipus complicated have long beyond beyond the place of psychoanalysis or even the bigger area of psychiatry to areas of numerous of the social sciences. anthropologists have applied freudian standards to their research of primitive cultures, in search of to assess relatively the universality of states of the subconscious that freud and his followers held to lie within the whole human race. a few political scientists have used freudian ideas to mild up the character of authority generally, and political electricity particularly, seeing in totalitarianism, as an example, the thrust of a yearning for the safety that universal power can supply. sociology and social psychology were stimulated by means of way of freudian thoughts of their studies of social interaction and motivation. from freud got here the fruitful angle that sees social behaviour and attitudes as generated no longer simply with the aid of the outdoor scenario however additionally thru internal emotional needs springing from formative years—desires for recognition, authority, self-expression. a few element can be the area right now interested in the useful resource of freud's mind within the social sciences nowadays, his have an impact on upon 20th-century notion and tradition usually, not except for the social sciences, has been rarely much less than marx's.

SPECIALIZATION AND CROSS-DISCIPLINARY APPROACHES
A primary factor to make approximately the social sciences of the 20th century is the remarkable growth in the variety of social scientists worried, inside the extensive kind of academic and other centres of teaching and research within the social sciences, and in their degree of each comprehensiveness and specialization. The explosion of the sciences generally inside the twentieth century—an explosion answerable for the truth that a majority of all scientists who've ever lived in human records are certainly alive—has had, as one in every of its sign elements, the explosion of the social sciences. Not only has there been development and proliferation but there has also been a wonderful diffusion of the social sciences. Starting in some locations in western Europe and the United States inside the nineteenth century, the social sciences, as our bodies of ongoing research and centres of coaching, are these days to be observed almost anywhere in the international. In large element this has accompanied the spread of universities from the west to different parts of the sector and, inside universities, the very particular shift away from the hegemony once held via humanities on my own to the close to-hegemony held these days via the usage of the sciences, physical and social.

Specialization has been as tremendous a dishonest within the social sciences as inside the natural and physical sciences. This is contemplated now not satisfactory in sorts of studies but additionally in course services in instructional departments. At the same time as not very a few years ago, more than one dozen advanced guides in a social technology pondered the specialization and variety of the area even in primary universities with graduate schools, these days a hundred such courses are discovered to be no longer enough.

Facet with the aid of way of side with this sturdy fashion inside the route of specialization, however, is each different, countering style: that of move-fertilization and interdisciplinary cooperation. At the beginning of the century, down in fact till worldwide war ii, the numerous disciplines existed every in a type of first rate isolation from the others. That historians and sociologists, as an example, might ever artwork collectively in curricula and studies duties would possibly had been scarcely workable preceding to about 1945. Every social technological information tended to conform with the path that emerged in the 19th century: to be restricted to a unmarried, distinguishable, if
synthetic, place of social reality. in recent times, evidences are all spherical of move-disciplinary paintings and of fusion interior a unmarried social technology of factors drawn from other social sciences. for this reason there are such essential regions of exertions as political sociology, economic anthropology, psychology of balloting, and industrial sociology. single principles together with “form,” “feature,” “alienation,” and “motivation” can be visible employed variously to useful impact in numerous social sciences. the techniques of one social science may be seen consciously protected into every other or into numerous social sciences. if history has provided a bargain within the manner of attitude to sociology or anthropology, every of those has provided mindset, and also entire techniques, which encompass statistics and survey, to records. in quick, specialization is never with out some diploma as a minimum of countertendencies which consist of fusion and synthesis.

Each other first rate feature of each of the social sciences in the 20th century is its professionalization. without exception, the social sciences have become bodies of not merely studies and teaching however additionally exercise, in the feel that this phrase has in treatment or engineering. down until approximately international conflict ii, it come to be an extraordinary sociologist or political scientist or anthropologist who changed into not a holder of instructional role. there have been economists and psychologists to be determined in banks, industries, government, even in non-public consultant deliver, but the numbers were exceptionally tiny. overwhelmingly the social sciences had visibility by myself as academic disciplines, concerned essentially with teaching and with greater or less primary, person research. all this has modified profoundly, and on a extensive scale, in the course of the beyond three decades. these days there are as many economists and psychologists outdoor instructional departments as inner, if not greater. the range of sociologists, political scientists, and demographers to be located in authorities, enterprise, and private exercise rises continuously. further crucial is the changed concept or image of the social sciences. these days, to a point unknown before international war ii, the social sciences are conceived as coverage-making disciplines, worried with topics of national welfare of their professional capacities in only as certain a experience as any of the physical sciences. necessarily, tensions have arisen in the social sciences because the stop end
result of strategies of professionalization. Those individuals who're typically academic can all too resultseasily sense that those who are in standard professional have precise and competing identifications of themselves and their disciplines.

4.8.2 STATISTICAL TECHNIQUES

The statistical methods used in the present investigation for analyzing the data are given here objective wise. For analyzing the data Percentage, Mean, S.D. `t'- test and chi-square test.

Analysis of Data:

After editing the response sheets, the suitable statistical techniques were employed for describing the data, analyzing the same and indoor for testing the hypothesis.

Two types of statistical applications are relevant:

a) Evocative analysis of data
b) Inferential analysis of data

For the present work both the methods are applied.

4.8.3 DESCRIPTIVE ANALYSIS OF DATA

The following statistical measures were used depending upon the purpose of descriptive analysis of the data.

a) Frequency Distribution
b) Measures of Central Tendency; Mean, Median and Mode.
c) Percentiles with Percentile ranks.
d) Measures of variability: Standard Deviation
f) Analysis of Co-variances.

4.8.4 INFERENTIAL ANALYSIS OF DATA
For the inferential analysis of data the following techniques were used.

a) **Critical ratio or 't' test**: which was used to compare the means of the group.
b) **Analysis of variance**: which was used to compare more than two means?
c) **Percentiles and Percentile Ranks**: To find out the position of the Teachers Trainees in the class.

i. **Critical Ratio: ('t' test):**

The test of meaning between two incomes is known as 't' test. It involves the computation of the ratios between observed difference between the two samples means and sampling error factor. The significance of 't' is resolved by likening the obtained value of ‘t’ with the critical value of ‘t’ at 0.05 level for respective degree of liberty.

Research work consists of orderly observation and account of the qualityistics or properties of objects or events for the purpose of discovering association between variables. The final cause of the studies is to expand a generalization that can be used to give an explanation for phenomena and to predict future trends. Statistical method serves the important purposes of description an analysis of the data. Description of data is necessary for establishing the normality of the description. The data are gathered with a view to justify the sample selected because any generalization of the total population can be inwards at only if the sample selected is representative of the populace.

**Procedure of Descriptive Analysis**

As quantity is the most precise and universally accepted process of description, the researcher has adopted several basic types of statistical measures for the purpose of the investigation.

i. The frequency delivery tables were prepared and the frequency polygons were plotted.

ii. The tables showing the events of Central Tendency and variability are given
iii. The table displaying the usual error of suggest and preferred blunders of wellknown Nonconformity and fiduciary limits of imply and general deviation and a brief be aware on the level of significance of mean and standard deviation are given by the investigator.

THE PROCEDURE OF EACH MEASURE IS GIVEN BELOW:

a) Frequency Distribution

Data Together from tests may have little meaning to the investigator until they have been arranged or classified in some orderly way. The first task, therefore, is to organise our manorial and this lead obviously to a alliance of the source under sub heads or in to courses.

b) Frequency Polygon

A arithmetical diagram is an aid to visualize and comprehend the delivery of scores. The incidence polygon is a image representation of frequency supply in which the mid-points of sophistication intervals are plotted against the incidences. Polygon is a many sided closed figure. A frequency polygon is smoothed to change irregularities and to get a better belief of the way the discern may look if the data happens to be more numerous. Percentage frequency polygon for the scores that is divided into sub group and drawn to represent the data graphically. This is aimed at giving a better understanding of similarities or difference between groups.

c) Measures of Central Tendencies

There are three events of central tendency 1) the mean, 2) the median and 3) the mode. The mean is commonly understood as the arithmetic mean of the scores. The mean is the most useful of all statistical measures because the base from which many
significant measures are calculated. The mode is the midpoint of the scores below and above which fifty percent scores lie. When the mean, median and mode of a supply of the scores are very close to each other, the delivery is said to be very near to normal delivery.

d) Measures of variability

The alteration is the value that describes how all the scores in a delivery are dispersed or spread about the mean. A score is expressed as its distance from the mean is called a deviation score. The sum of the squared deviations from the suggest divided by using the entire number of items is the variance. The measure of variability calculated in the present investigation is the Standard Deviation (S.D.) which is nothing but the rectangular root of the variance. the usual Deviation is the most stable index of variability.

e) Measures of Divergence from Normality

There are two kinds of measures of deviation from the normal supply, they are i) Skewness (SK) and ii) Kurtosis (KU). The skewness can be negative, positive or zero. When skewness is zero, mean and median are equal. When skewness is positive then mean is more than median and it is said that the supply is positively skewed and scores are more on left side (give up) of the dimensions. but when the skewness is terrible, the imply is less than the median and the supply is said to be negatively skewed. In these case scores are cluster at the advanced end of the scale.

The kurtosis (Ku) refers to the peakedness or the Flatness of a frequency supply curve as compared with the normal curve that represents normal supply. If Kurtosis (Ku) is more than 0.263 then the curve is said to be platy kurtic and if kurtosis (Ku) is less than 0.263 then the curve is said to be leptokurtic.

f) The significance of the Mean and the Standard Deviation
The primary objective of statistical implications is to enable the researcher to generalise from a sample to some larger population of which the population is a part. Means and other measures computed from samples are called statistics and are subjected to ‘Fluctuations of Sampling’. Descriptive measures of the population are called parameters. The degree to which a sample mean signifies its parameter is an index of the significance or trustworthiness of the computed sample mean. A better approach to the problems of approximating the measure of the population is through setting up of limits which for a given degree of confidence, will cover the population mean. And these limits are called Fiduciary Limits.

4.9.0 INFERENTIAL ANALYSIS

To infer means to estimate, through the observations and analysis of sample data, the qualityistics of the population can be inferred statistically, when the sample is chosen as a random sample. The sample statistics give more or less an unbiased estimate of the population parameter. There are two concepts to be considered for testing the significance of parameters.

1. The Null Hypothesis
2. The level of significance.

1. The Null Hypothesis

The null hypothesis is a useful tool in testing of the reliability of difference between the different statistics. A null hypothesis assumes that there is no difference between two populations means and that the difference found between the sample means is therefore accidental, sinsignificant or occasional. In order to accept or reject a
hypothesis it requires a crucial test, which enables one to draw a statistical inference which in turn helps to draw conclusion.

**Data in Social studies Measures of critical Tendency, Imply, Median, Mode**

If you arrange the achievement scores of Hindi class into a frequency distribution, you may discover that there are very few students who both rating very excessive or very low however maximum of the scores of the scholars are clustering closer to the centre of the frequency distribution. it is known as a degree of valuable Tendency.

The three maximum common measures of critical tendency are the suggest, Median and Mode. The computations of these three measures are described in the next section.

**The Mean**

The mean of the distribution is the arithmetic average. it is the handiest and the maximum useful degree of central of significant tendency. The mean of the set of scores or values is received via dividing the sum of all ratings or values with the aid of the entire variety of cases. it is the measure of the significance ratings or values.

**Calculation of suggest From Ungrouped records :**

The formula used for finding the mean from a set of ungrouped scores is

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

Where
- \( M \) = Mean of scores
- \( \sum \) = Sum of all scores
- \( X \) = Score in the distribution
N = Total number of scores.

The use of this formula is illustrated with a set of scores of five students:

The scores are 25, 24, 14, 17 and 20

\[ M = \frac{\sum X}{N} = \frac{25 + 24 + 14 + 17 + 20}{5} = \frac{100}{5} = 20.00 \]

**Calculation of Mean from Grouped Data**: When the number of scores is large, it becomes difficult to make the computation. In such a situation, it is better to arrange the scores in a suitable frequency distribution before computing the mean.

The formula used for computing mean from grouped data is:

\[ M = AM + \frac{\sum fx}{N} \times i \]

Where,
- \( M \) = Mean of scores
- \( f \) = Frequency distribution of class interval
- \( x \) = Deviation of the score from the assumed Mean
- \( AM \) = Assumed Mean of the distribution
- \( i \) = Width of the class interval
- \( N \) = Total number of cases

The application of this formula is illustrated by the following example:

Example: The scores of 50 students are given in the following Table. Compute Mean.

**Table No. 1 : Frequency Distribution of Test Scores of 50 Students**

<table>
<thead>
<tr>
<th>Scores</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 - 64</td>
<td>3</td>
</tr>
<tr>
<td>55 - 59</td>
<td>4</td>
</tr>
<tr>
<td>50 - 54</td>
<td>6</td>
</tr>
<tr>
<td>45 - 49</td>
<td>8</td>
</tr>
<tr>
<td>40 - 44</td>
<td>10</td>
</tr>
</tbody>
</table>
**Computation Steps:**

**Step - I** : Prepare the worksheet

**Step - II** : Find out the assumed mean (AM)

**Step - III** : Find out the deviation from the assumed mean

**Step - IV** : Find out the fx for each class interval

**Step - V** : Find out the sum of all fx

**Step - VI** : Apply the formula.

<table>
<thead>
<tr>
<th>Scores</th>
<th>Frequency</th>
<th>Deviation From Assumed Mean (x)</th>
<th>fx</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 - 64</td>
<td>3</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>55 - 59</td>
<td>4</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>50 - 54</td>
<td>6</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>45 - 49</td>
<td>8</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>40 - 44</td>
<td>10</td>
<td>AM = 42</td>
<td>0</td>
</tr>
<tr>
<td>35 - 39</td>
<td>7</td>
<td>-1</td>
<td>-7</td>
</tr>
<tr>
<td>30 - 34</td>
<td>6</td>
<td>-2</td>
<td>-12</td>
</tr>
<tr>
<td>25 - 29</td>
<td>3</td>
<td>-3</td>
<td>-9</td>
</tr>
<tr>
<td>20 - 24</td>
<td>2</td>
<td>-4</td>
<td>-8</td>
</tr>
<tr>
<td>15 - 19</td>
<td>1</td>
<td>-5</td>
<td>-5</td>
</tr>
</tbody>
</table>

N = 50

\[ \Sigma fx = 3 \]
Assumed Mean (AM) = \(40 + 44\) = \(42\)

\[\sum fx = \frac{44}{41} = 3\]

\(i = 5; \quad N = 50\)

Formula \(M = \frac{AM + \sum fx \times i}{N}\)

\[= 42 + \frac{3}{50} \times 5\]

\[= 42 + 0.3 = 42.30\]

**THE MEDIAN (MD)**

The median is the point of the distribution above and below which one half of the scores lie. Median is the measure of middle position in the distribution.

**Computation of Median for Ungrouped Data**:

When the scores are small in number, we arrange the scores in ascending and descending order of magnitude and find out the middle term. This is the median of the given scores.

When the number of scores (N) is odd, the middle term is the median. For example, the scores are 8, 6, 10, 12, 16, 13, 9. After arranging these in descending order we get the scores: 16, 13, 12, 10, 9, 8, 6

Here the middle term is 10. Therefore, the median in this case is 10.

When the number of scores (N) is even, the median is the mid point of the two middle terms. For example, the scores are: 12, 18, 24, 16, 30, 36. After arranging in the descending order of magnitude the scores are 36, 30, 24, 18, 16, 12.

Here the middle terms are 24 and 18.

Therefore, the median in this case is equal to \(24 + 18 = 21\)

\[\frac{21}{2}\]

**Computation of Median for Grouped Data**:
When the number of scores is large, it always advisable to prepare the frequency distribution before computing the median.

The formula for computing median in this case is

\[
Md = L + \frac{N/2 - F}{fm} \times i
\]

Where,
- \( L \) = exact lower limit of the interval in which the median lies.
- \( F \) = the sum of the frequencies of all class interval just below the interval in which the median lies.
- \( fm \) = frequency of the class interval in which the median lies.
- \( i \) = width of class interval
- \( N \) = Number of scores.

The application of this formula is illustrated by the following example:

**Example**: Calculate Median from the following distribution Table:

<table>
<thead>
<tr>
<th>Scores</th>
<th>Frequency (f)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 54</td>
<td>1</td>
</tr>
<tr>
<td>45 - 49</td>
<td>3</td>
</tr>
<tr>
<td>40 - 44</td>
<td>6</td>
</tr>
<tr>
<td>35 - 39</td>
<td>8</td>
</tr>
<tr>
<td>30 - 34</td>
<td>7</td>
</tr>
<tr>
<td>25 - 29</td>
<td>6</td>
</tr>
<tr>
<td>20 - 24</td>
<td>4</td>
</tr>
<tr>
<td>15 - 19</td>
<td>3</td>
</tr>
<tr>
<td>10 - 14</td>
<td>2</td>
</tr>
</tbody>
</table>

\[ N = 40 \]

**Steps of Computation:**
Step - I : Prepare the worksheet
Step - II : Find out the cumulative frequency for each interval
Step - III : Find out the interval in which the median lies
Step - IV : Find out exact lower limit
Step - V : Apply the formula.

Worksheet :

<table>
<thead>
<tr>
<th>Scores</th>
<th>Frequency (f)</th>
<th>Cumulative Frequency (Cf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 54</td>
<td>1</td>
<td>39 + 1 = 40</td>
</tr>
<tr>
<td>45 - 49</td>
<td>3</td>
<td>36 + 3 = 39</td>
</tr>
<tr>
<td>40 - 44</td>
<td>6</td>
<td>30 + 6 = 36</td>
</tr>
<tr>
<td>35 - 39</td>
<td>8</td>
<td>22 + 8 = 30</td>
</tr>
<tr>
<td>30 - 34</td>
<td>7</td>
<td>15 + 7 = 22</td>
</tr>
<tr>
<td>25 - 29</td>
<td>6</td>
<td>9 + 6 = 15</td>
</tr>
<tr>
<td>20 - 24</td>
<td>4</td>
<td>5 + 4 = 9</td>
</tr>
<tr>
<td>15 - 19</td>
<td>3</td>
<td>2 + 3 = 5</td>
</tr>
<tr>
<td>10 - 14</td>
<td>2</td>
<td>0 + 2 = 2</td>
</tr>
</tbody>
</table>

\[ N = 40 \]

Here \( \frac{N}{2} = \frac{40}{2} = 20 \). Therefore, the median lies in the class interval of 30 - 34. The lower limit of this interval is 29.5 and \( F = 15 \); \( fm = 7 \) and \( i = 5 \)

Formula \[ Md = L + \frac{N/2 - F}{Fm} \times I \]

\[ 29.5 + \frac{20}{15} \times 5 \]

\[ 29.5 + \frac{20}{15} \times 5 \]

\[ \frac{29.5 + 20}{7} \times 5 \]
The Mode

The mode is the most frequently occurring score in a distribution. If there is only one such score in the frequency distribution, the frequency distribution is called uni-modal. If there are two such scores which frequently occur in the frequency distribution, then such a frequency distribution is called bi-modal. If such scores in the frequency distribution are more than two then the distribution is multi-modal.

Mode for Ungrouped Data: In the ungrouped scores, the mode is the single measure which occurs most frequently. For example, the mode among the scores 18, 25, 30, 25, 35, 20, 25. Here the most frequently occurring score is 25. This is very crude form of the mode.

Mode for Grouped Data: When the data are in frequency distribution, the crude mode is taken as the mid-point of that class interval which contains the largest frequency. When the mean and median of a frequency distribution are known, the mode is computed by the formula \( \text{Mode} = 3 \times \text{Median} - 2 \times \text{Mean} \). The mode found by this formula is also crude. The true mode which is the point of greatest concentration in the frequency distribution may be computed by the formula.

\[
\text{Formula} \quad \text{Mode} = \frac{L + \frac{fm}{f_1} \times i}{\frac{2fm}{f_2}}
\]

Where

- \( L \) = The lower limit of the class interval having the maximum frequency.
- \( fm \) = Frequency of modal class
- \( f_1 \) = Frequency of class interval preceding the modal
class interval

\[ f_2 = \text{Frequency of class interval following the modal class} \]

\[ i = \text{Width of the class interval.} \]

The use of this formula is illustrated by the following example.

Example: Compute the mode from the following frequency distribution:

<table>
<thead>
<tr>
<th>Scores</th>
<th>Frequency (f)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 - 64</td>
<td>1</td>
</tr>
<tr>
<td>55 - 59</td>
<td>4</td>
</tr>
<tr>
<td>50 - 54</td>
<td>6</td>
</tr>
<tr>
<td>45 - 49</td>
<td>8</td>
</tr>
<tr>
<td>40 - 44</td>
<td>10</td>
</tr>
<tr>
<td>35 - 39</td>
<td>8</td>
</tr>
<tr>
<td>30 - 34</td>
<td>3</td>
</tr>
<tr>
<td>25 - 29</td>
<td>4</td>
</tr>
<tr>
<td>20 - 24</td>
<td>2</td>
</tr>
</tbody>
</table>

\[ N = 46 \]

Steps of computation of True Mode from the given frequency distribution.

**Step - I**: Find out the class interval of greatest frequency

**Step - II**: Find out the lower limit of the modal class interval

**Step - III**: Find out the frequency \( f_1 \) and \( f_2 \) of the proceeding and succeeding class intervals of modal class.

**Step - IV**: Apply the formula.

Here the example above the modal class is 40 - 44

\[ L = \text{Lower limit of modal class is 39.5} \]

\[ f_1 = 8 \text{ and } f_2 = 8, \text{ } fm = 10, \text{ } i = 5 \]
Formula is \[ \text{Mode} = L + \frac{fm_{1} x i}{2 fm_{1} f_{2}} \]

\[ = 39.5 + \frac{10 \times 5}{20} \]

\[ = 39.5 + 2 \times 5 \]

\[ = 42.00 \]

4.10.0 Uses of the Measures of Central Tendency

**Mean**
1. It is used when the frequency distribution is symmetrical
2. When the most stable measure of central tendency is desired.
3. When the centre of gravity of the frequency distribution is desired.
4. When it is to be used in other tests such as t test.

**Median**
1. When the exact mid-point of the frequency distribution is required.
2. When the extreme scores marked by affect the mean.
3. When there is no time to find out mean.
4. When incomplete distribution is given.
5. When it is to be find whether the cases fall within the upper or lower halves of the distribution.

**Mode**
1. It is used when the quickest estimate of central tendency is required.
2. When a rough estimate of the central tendency is needed.
3. When a most typical case is to be studied.
CORRELATION

Introduction: You have seen children growing. Have you ever marked that their increasing height and weight? These are continuously increasing with the increase in age. You are right if your answer is in the affirmative. This means that the height and the weight of the children are inter-related with each other. In the same way you might have observed that the intelligent students secure higher marks than the less intelligent students. This also means that the intelligence and achievement are inter-related. This inter-relationship between the two variables is called Correlation.

Coefficient of Correlation

When this inter-relation between the two variables is quantitative, it can be analysed and determined by the statistical methods. This index of relationship between the two variables is called the coefficient of correlation. Thus the coefficient of correlation indicates the degree of linear relationship between the two variables. The magnitude of the coefficient of correlation ranges between -1.00 to +1.00. The value of -1.00 describes a perfect negative correlation and +1.00 describes perfect positive correlation. A zero value describes complete lack of correlation between two variables.

Methods of Correlation

There are various methods of finding the coefficient of correlation but we shall illustrate only two methods namely,

1. Method of Product Moment Correlation
2. Method of Rank Order Correlation

The Product Moment Method of Correlation
This method was developed by Karl Pearson for determining the coefficient of correlation between two variables $X$ and $Y$. In this method it is assumed that the distributions of the two variables are unimodal and the variances are also approximately equal.

The formula for determining the coefficient of correlation is:

$$ r = \frac{\sum xy}{\sqrt{\sum x^2 \times \sum y^2}} $$

Where $r$ = The coefficient of correlation between the variables $x$ and $y$
$x$ = The deviation of the $X$ score from the mean $M_x$
$y$ = The deviation of the $Y$ score from the mean $M_y$
$\sum$ = Summation

The use of this formula is illustrated by the example given below.

**Example**: Find the coefficient of correlation between the two sets of scores - $X$ and $Y$

Set - I ($X$)  10, 8, 7, 6, 5, 12, 4, 3, 7 and 10
Set - II ($Y$)  12, 7, 10, 5, 4, 13, 8, 6, 9 and 6

**Steps of Computation**:

Step - I  : Prepare the worksheet
Step - II : Find out the mean of each set of scores
Step - III : Find out the deviation of each score from the mean in each set of scores.
Step - IV  : Obtain the square of the deviations and the product of the deviations.
Step - V  : Apply the formula.

**Worksheet**:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>X</th>
<th>Y</th>
<th>x</th>
<th>y</th>
<th>x²</th>
<th>y²</th>
<th>xy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>12</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td>16</td>
<td>12</td>
</tr>
</tbody>
</table>
\[
\begin{align*}
2 & 8 7 1 & -1 & 1 & 1 & -1 \\
3 & 7 10 0 & 2 & 0 & 4 & 0 \\
4 & 6 5 -1 & -3 & 1 & 9 & 3 \\
5 & 5 4 -2 & -4 & 4 & 16 & 8 \\
6 & 12 13 5 & 5 & 25 & 25 & 25 \\
7 & 4 8 -3 & 0 & 0 & 0 & 0 \\
8 & 3 6 -4 & -2 & 16 & 4 & 8 \\
9 & 5 9 -2 & 1 & 4 & 1 & -2 \\
10 & 10 6 3 & -2 & 9 & 4 & -6 \\
\end{align*}
\]

\[\sum x^2 = 69 \quad \sum y^2 = 80 \quad \sum xy = 47\]

\[
\begin{align*}
\text{Mx} & = 7 \\
\text{My} & = 8 \\
\text{Formula} \quad r & = \frac{\sum xy}{\sqrt{\sum x^2 \times \sum y^2}} \\
& = \frac{47}{\sqrt{69 \times 80}} = \frac{47}{47} = \frac{47}{5520} = \frac{47}{74.296} = 0.632
\end{align*}
\]

### 4.10.1 The Interpretation of ‘r’

The coefficient of correlation ‘r’ in terms of its magnitude is interpreted as follows:

<table>
<thead>
<tr>
<th>Value of 'r'</th>
<th>Verbal description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 ± 0.20</td>
<td>indifferent or negligible relationship</td>
</tr>
</tbody>
</table>
± 0.20 to ± 0.40 - Low correlation
± 0.40 to ± 0.70 - Substantial or marked
± 0.70 to ± 1.00 - High to very high

Spearman's Rank Differences Method of Correlation

This method is applied when the assumptions underlying the Pearson's Product Moment Method are not satisfied. The coefficient of correlation computed by this method is denoted by P (Rho)

The formula used is

\[
P = 1 - \frac{\sum D^2}{N(N^2 - 1)}
\]

Where
- \( P \) = Coefficient of correlation between the two variables
- \( D \) = Difference of Ranks of the two variables
- \( \sum \) = Summation
- \( N \) = Total number of cases.

The use of this formula is illustrated by the following example.

**Example**: Find out the coefficient of correlation by the rank difference method of correlation between the two sets of scores.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>27</td>
</tr>
</tbody>
</table>
Steps of Computation:

Step - I : Prepare the worksheet
Step - II : Rank the two sets of scores in the descending order
Step - III : Find out the difference between Ranks
Step - IV : Find out the square of the difference of Ranks
Step - V : Apply the formula.

Worksheet:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>X</th>
<th>Y</th>
<th>R₁</th>
<th>R₂</th>
<th>D</th>
<th>D²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>10</td>
<td>8</td>
<td>10</td>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>15</td>
<td>9</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>25</td>
<td>10</td>
<td>2</td>
<td>8</td>
<td>64</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>18</td>
<td>6</td>
<td>7.5</td>
<td>-1.5</td>
<td>2.25</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>27</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>35</td>
<td>21</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>45</td>
<td>20</td>
<td>3</td>
<td>5</td>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>43</td>
<td>18</td>
<td>4</td>
<td>7.5</td>
<td>3.5</td>
<td>12.25</td>
</tr>
<tr>
<td>9</td>
<td>42</td>
<td>19</td>
<td>5</td>
<td>6</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>48</td>
<td>22</td>
<td>2</td>
<td>3</td>
<td>-1</td>
<td>1</td>
</tr>
</tbody>
</table>

\[ \sum D^2 = 97.5 \]

Formula

\[ P = 1 - \frac{6 \sum D^2}{\sum D^2} \]
\[ N (N^2 - 1) \]
\[ = 1 - 6 \times 97.5 \]
\[ \frac{10 \times (100 - 1)}{990} \]
\[ = 1 - \frac{585}{990} = 1 - 0.590 \]
\[ = 0.41 \]

2. **Level of Significance**

Usually two levels of significance are used. One is known as the five percent level or 0.05 level and the other one is known as one percent level of significance that is 0.01 level. At the level of 0.05 level, there is a deviation that leaves 5% of the total area of the normal supply. The confidence with which the test rejects or accepts a null hypothesis depends upon the level of significance adopted. For the purpose of testing the above hypothesis, parametric techniques are adopted considering the following conditions.

Conditions for using Parametric Techniques:

1. When a data follow a normal or a very normal supply.
2. When a sample size is very large that is \((N > 30)\)
3. When the sample have equal or nearly equal variances.
4. When the sample selected is a random sample.
5. When the data are either in internal scale from or the ratio scale form.

Since many of the above conditions are satisfied in the present investigation, parametric techniques can be used to compare the means of the test score and to find the relationship between variables in the investigation.

For comparative investigation, the techniques are used as follows.

a. The critical Ratio or the 't' test.
For correlation the techniques are used are called correlation techniques.

**Critical Ratio ('t' test):** The test of meaning of difference between two means is known as 't' test. It involves the contrast of the ratio of observed difference between sample means to the sampling error factor. The significance of 't' is determined by comparing the gotten value 't' with the established critical value of 't' at 0.05 level of respective degree of liberty. 't' is calculated by using the following formula

$$ t = \frac{|M_1 - M_2|}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}} $$

Where,
- M1 is the mean of Group I
- M2 is the mean of Group II
- s1 is the standard deviation of Group I
- s2 is the standard deviation of Group II
- N1 is the size of the sample of Group I
- N2 is the size of the sample of Group II

If the calculated 't' is reindeer than the tabulated 't' then the null hypothesis is rejected at the respective levels of significance, otherwise it is accepted.

**Correlation Techniques:** Another interpretative approach is a test of statistical significance of correlation’s. Correlation is a relationship between two or more sets of data. The correlation between two variables may be measured and represented by the co-efficient of correlation that is indicated by the letter 'r'. The most often used and the most precise co-efficient of correlation is known as Karl Pearson's product movement correlation co-efficient (r). Null hypothesis formed on the relationship between the two methods of teaching differently at different time and their achievement.

'r' is calculated from a correlation able prepared by the scores in two variables, using the following formula.
Where $X'Y' = \text{product of deviation } X' \text{ and } Y' \text{ from the assumed means.}$

$N = \text{is the size of the Group.}$

\[
 r = \frac{\sum \frac{x^1 y^1}{N} - c_x c_y}{\sigma^1_x \cdot \sigma^1_y}
\]

Values of 'r' vary within the range of -1 to +1. The significance of an obtained 'r' is tested against the hypothesis that the population 'r' is in fact zero. If the computed 'r' is large enough to indicate serious doubt upon the null hypothesis, we accept 'r' as indicating the presence of at least some degree of correlation. The obtained 'r' is compared with the 'r' from table for $(N-2)$ degrees of liberty at 0.05 level of meaning. And then accordingly the null hypothesis is disallowed or accepted. The value of 'r' that varies between -1 to +1 that denotes the direction of association between two variables. The direction of relationship is indicated by the sign + ve or -ve before the magnitude of 'r'.

**Chi-square technique**

Pearson’s traditional goodness-of-fit test profits by dividing the range of the variable into $k$ mutually exclusive classes and likening the expected frequencies of outcomes falling in these classes given by the hypothesised supply with the observed class frequencies.
Chi-Square Test for Independence

Conduct a chi-square test for independence. The take a look at is realistic if you have variables from a single population. It is used to govern whether or not there may be a significant relationship among the 2 variables. The manner of analysis by the usage of this strategy in particular observed the non-parametric facts. As an example, in an election survey, voters might be categorized with the aid of gender (male or woman) and balloting preference (Democrat, Republican, or independent). We could use a chi-rectangular test for independence to decide whether or not sex is related to vote casting preference.

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