RESEARCH METHODS IN GEOGRAPHY

CODE - 18KP3G09

CIA - II

UNIT III: Research design: Meaning - need - Features of Good design - Important concepts relating to research design - Steps involved in research design - Time Schedule- Literary survey - Review of literature- need for review of literature.

Research design definition

Research design is the framework of research methods and techniques chosen by a researcher. The design allows researchers to hone in on research methods that are suitable for the subject matter and set up their studies up for success.

There are three main types of research design: Data collection, measurement, and analysis.

An impactful research design usually creates a minimum bias in data and increases trust in the accuracy of collected data. A design that produces the least margin of error in experimental research is generally considered the desired outcome.

The essential elements of the research design are:

1. Accurate purpose statement
2. Techniques to be implemented for collecting and analyzing research
3. The method applied for analyzing collected details
4. Type of research methodology
5. Probable objections for research
6. Settings for the research study
7. Timeline
8. Measurement of analysis

Proper research design sets your study up for success. Successful research studies provide insights that are accurate and unbiased. You'll need to create a survey that meets all of the main characteristics of a design.

Need for Research design

Research design is needed because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money. Research design has a significant impact on the reliability of the results obtained.

The Importance of good Research design is needed because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of effort, time and money. Just as for better, economical and attractive construction of a house, we need a blueprint well thought out and prepared by an expert architect, similarly we need a research design or a plan in advance of data collection and analysis for our research project.

Research design stands for advance planning of the methods to be adopted for collecting the relevant data and the techniques to be used in their analysis, keeping in view the objective of the research and the availability of staff, time and money. Preparation of the research design should be done with great care as any error in it may upset the entire project. Research design, in fact, has a great bearing on the reliability of the results arrived at and as such constitutes the firm foundation of the entire edifice of the research work.

The **importance of research design in research methodology** is due to the following:

- It may result in the preferred kind of study with helpful conclusion.
- It cuts down on inaccuracy.
- Allows you get optimum efficiency and reliability.
- Reduce wastage of time.
- Reduce uncertainty, confusion and practical haphazard related to any research problem.
- Of great help for collection of research material and testing of hypothesis.
- It is a guide for giving research the right path.
- Gets rid of bias and marginal errors.

- Provides an idea concerning the type of resources needed in terms of money, effort, time, and manpower.
- Smooth & efficient sailing
- Maximizes reliability of results.
- Provides firm foundation to the endeavor.
- Averts misleading conclusions & thoughtless useless exercise.
- Provides opportunity to anticipate flaws & inadequacies (anticipates problems).
- Incorporates by learning from other people's critical comments & evaluations.

Features of good research design

There are four key characteristics of research design:

Objectivity:

The findings are said to be objective when they pertain to the method of data collection and the scoring of the responses. The objectivity in respect of the procedure may be judged by the degree of agreement between the final scores assigned to various persons by more than one independent observer. The more the agreement among the observers the more objective are the observation, recording and evaluation of the responses. Therefore, a good research design should permit fairly objective measuring instruments in which every observer visualizing a performance comes to the same conclusion.

Reliability: With regularly conducted research, the researcher involved expects similar results every time. Your design should indicate how to form research questions to ensure the standard of results. You'll only be able to reach the expected results if your design is reliable.

Validity: There are multiple measuring tools available. However, the only correct measuring tools are those which help a researcher in gauging results according to the objective of the research. The questionnaire developed from this design will then be valid.

Generalization: The outcome of your design should apply to a population and not just a restricted sample. A generalized design implies that your survey can be conducted on any part of a population with similar accuracy.

A researcher must have a clear understanding of the various types of research design to select which model to implement for a study. Like research itself, the design of your study can be broadly classified into quantitative and qualitative.

Qualitative research design: Qualitative research determines relationships between collected data and observations based on mathematical calculations. Theories related to a naturally existing phenomenon can be proved or disproved using statistical methods. Researchers rely on qualitative research design methods that conclude “why” a particular theory exists along with “what” respondents have to say about it.

Quantitative research design: Quantitative research is for cases where statistical conclusions to collect actionable insights are essential. Numbers provide a better perspective to make critical business decisions. Quantitative research design methods are necessary for the growth of any organization. Insights drawn from hard numerical data and analysis prove to be highly effective when making decisions related to the future of the business.

Concepts related to Research design

1. Dependent and independent variables:

A concept which can take on different quantitative values is called a variable. As such the concepts like weight, height, income are all examples of variables. If one variable depends upon or is a consequence of the other variable, it is termed as a dependent variable, and the variable that is antecedent to the dependent variable is termed as an independent variable.

2. Extraneous variable:

Independent variables that are not related to the purpose of the study, but may affect the dependent variable are termed as extraneous variables. Suppose the researcher wants to test the hypothesis that there is a relationship between children's gains in social studies achievement and their self-concepts. In this case self-concept is an independent variable and social studies achievement is a dependent variable. Intelligence may as well affect the social studies achievement, but since it is not related to the purpose of the study undertaken by the researcher, it will be termed as an extraneous variable. Whatever effect is noticed on dependent variable as a result of extraneous variable(s) is technically described as an 'experimental error'. A study must

always be so designed that the effect upon the dependent variable is attributed entirely to the independent variable(s), and not to some extraneous variable or variables.

3. Control:

One important characteristic of a good research design is to minimise the influence or effect of extraneous variable(s). The technical term 'control' is used when we design the study minimising the effects of extraneous independent variables. In experimental researches, the term 'control' is used to refer to restrain experimental conditions.

4. Confounded Relationship:

When the dependent variable is not free from the influence of extraneous variable(s), the relationship between the dependent and independent variables is said to be confounded by an extraneous variable(s).

5. Research:

hypothesis when a prediction or a hypothesized relationship is to be tested by scientific methods, it is termed as research hypothesis. The research hypothesis is a predictive statement that relates an independent variable to a dependent variable. Usually a research hypothesis must contain, at least, one independent and one dependent variable. Predictive statements which are not to be objectively verified or the relationships that are assumed but not to be tested are not termed research hypotheses.

6. Experimental and non experimental hypothesis testing research:

When the purpose of research is to test a research hypothesis, it is termed as hypothesis-testing research. It can be of the experimental design or of the non-experimental design. Research in which the independent variable is manipulated is termed 'experimental hypothesis-testing research' and a research in which an independent variable is not manipulated is called 'non experimental hypothesis testing research'. For instance, suppose a researcher wants to study whether intelligence affects reading ability for a group

1) A continuous variable is that which can assume any numerical value within a specific range.

2) A variable for which the individual values fall on the scale only with distinct gaps is called a discrete variable.

7. Experimental and control groups:

In an experimental hypothesis-testing research when a group is exposed to usual conditions, it is termed a 'control group', but when the group is exposed to some novel or special condition, it is termed an 'experimental group'. In the above illustration, the Group A can be called a control group and the Group Ban experimental group. If both groups A and B are exposed to special studies programmes, then both groups would be termed 'experimental groups.' It is possible to design studies which include only experimental groups or studies which include both experimental and control groups.

8. Treatments:

The different conditions under which experimental and control groups are put are usually referred to as 'treatments'. In the illustration taken above, the two treatments are the usual studies programme and the special studies programme. Similarly, if we want to determine through an experiment the comparative impact of three varieties of fertilizers on the yield of wheat, in that case the three varieties of fertilizers will be treated as three treatments.

9. Experiment:

The process of examining the truth of a statistical hypothesis, relating to some research problem, is known as an experiment. For example, we can conduct an experiment to examine the usefulness of a certain newly developed drug. Experiments can be of two types viz., absolute experiment and comparative experiment. If we want to determine the impact of a fertilizer on the yield of a crop, it is a case of absolute experiment; but if we want to determine the impact of one fertilizer as compared to the impact of some other fertilizer, our experiment then will be termed as a comparative experiment. Often, we undertake comparative experiments when we talk of designs of experiments.

10. Experimental Unit(s):

The pre-determined plots or the blocks, where different treatments are Ed, are known as experimental units. Such experimental units must be selected (defined) very carefully.

Time schedule

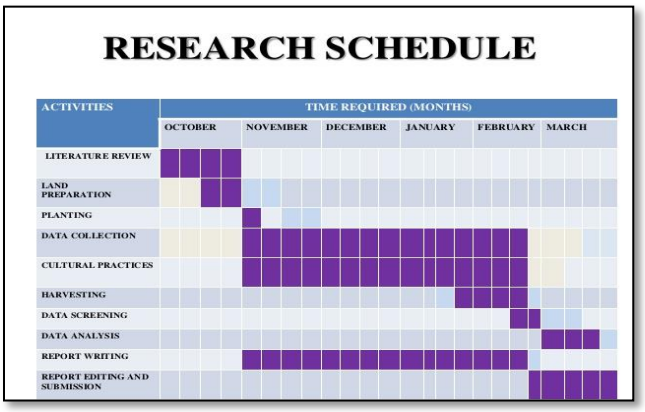
A **schedule** or a timetable, as a basic **time** management tool, consists of a list of **times** at which possible tasks, events, or actions are intended to take place, or of a sequence of events in the chronological order in which such things are intended to take place.

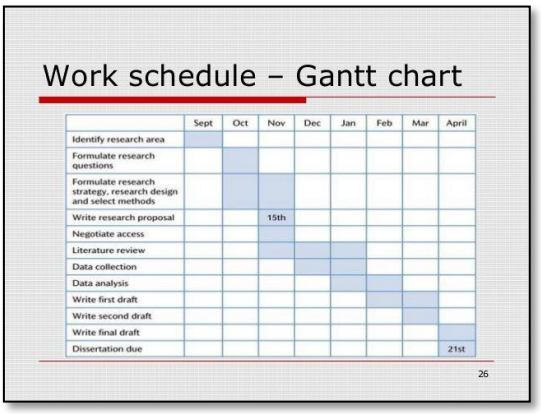
Step 1: Identify Available **Time**. Start by establishing the **time** to make available for your work.

Step 2: **Schedule** Essential Actions.

Step 3: **Schedule** High-Priority Activities.

Step 4: **Schedule** Contingency **Time**.





Literary survey

A literature review surveys books, scholarly articles, and any other sources relevant to a particular issue, area of research, or theory, and by so doing, provides a description, summary and critical evaluation of these works in relation to the research problem being investigated. Literature reviews are designed to provide an overview of sources you have explored while researching a particular topic and to demonstrate to your readers how your research fits within a larger field of study.

Development of the Literature Review

1. Problem formulation -- which topic or field is being examined and what are its component issues?
2. Literature search -- finding materials relevant to the subject being explored.
3. Data evaluation -- determining which literature makes a significant contribution to the

understanding of the topic.

4. Analysis and interpretation -- discussing the findings and conclusions of pertinent literature.

Review of literature

The analytical features of a literature review might:

- Give a new interpretation of old material or combine new with old interpretations,
- Trace the intellectual progression of the field, including major debates,
- Depending on the situation, evaluate the sources and advise the reader on the most pertinent or relevant research, or
- Usually in the conclusion of a literature review, identify where gaps exist in how a problem has been researched to date.

The structure of a literature review should include the following:

- An overview of the subject, issue, or theory under consideration, along with the objectives of the literature review,
- Division of works under review into themes or categories [e.g. works that support a particular position, those against, and those offering alternative approaches entirely],
- An explanation of how each work is similar to and how it varies from the others,
- Conclusions as to which pieces are best considered in their argument, are most convincing of their opinions, and make the greatest contribution to the understanding and development of their area of research.

Importance of a Good Literature Review

A literature review may consist of simply a summary of key sources, but in the social sciences, a literature review usually has an organizational pattern and combines both summary and synthesis, often within specific conceptual categories. A summary is a recap of the important information of the source, but a synthesis is a re-organization, or a reshuffling, of that information in a way that informs how you are planning to investigate a research problem. The analytical features of a literature review might:

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Need for review of literature

- Provide foundation of knowledge on topic
- Identify areas of prior scholarship to prevent duplication and give credit to other researchers
- Identify inconstancies: gaps in research, conflicts in previous studies, open questions left from other research
- Identify need for additional research (justifying your research)
- Identify the relationship of works in context of its contribution to the topic and to other works
- Place your own research within the context of existing literature making a case for why further study is needed.

UNIT IV

Sources of Data: Primary and Secondary - Methods of Data Collection - - Sampling Techniques and Fundamentals Processing and Analysis of Data: Preparation- Editing – Coding – Tabulation – Classification - Interpretation of Data - Construction of Hypothesis and their testing.

Sources of Data

Data: Data is a collection of facts, figures, objects, symbols, and events gathered from different sources. 'Data' is basically unorganized statistical facts and figures collected for some specific

purposes, such as analysis. The bedrock of data analysis and interpretation is formed by the **collection of data**. There can be different **sources** of data, such as statistical and non-statistical sources.

Also, there are different **methods of data collection**, depending on the type of data. There are two main types of data: primary and secondary. Understanding the difference between the two is important in deciding which method of data collection to use. Tremendous amounts of statistical analyses are carried out continuously in countries for publication purposes or even for policy framing.

Types of Data

There are two types of data: **primary** and **secondary**.

Primary data

As the name suggests, are first-hand information collected by the surveyor. The data so collected are pure and original and collected for a specific purpose. They have never undergone any statistical treatment before. The collected data may be published as well. The Census is an example of primary data.

Secondary data

Secondary data are opposite to primary data. They are collected and published already (by some organization, for instance). They can be used as a source of data and used by surveyors to collect data from and conduct the analysis. Secondary data are impure in the sense that they have undergone statistical treatment at least once.

Sources of Data

There are two sources of data in Statistics. **Statistical sources** refer to data that are collected for some official purposes and include censuses and officially conducted surveys. **Non-statistical sources** refer to the data that are collected for other administrative purposes or for the private sector. Primary **data sources** include information **collected** and processed directly by the researcher, such as observations, surveys, interviews, and focus groups. Secondary **data sources** include information retrieved through pre existing **sources**: **research** articles, Internet or library searches, etc.

Statistical Survey

A statistical Survey is normally conducted using a **sample**. It is also called **Sample Survey**. It is the method of collecting sample data and analyzing it using statistical methods. This is done to make estimations about population characteristics. The advantage is that it gives you full control over the data.

But, the disadvantage is that there is a chance of sample error creeping up. This is because a sample is chosen and the entire population is not studied, leaving out some units of the population while choosing the sample causes this error to arise.

Census

Opposite to a sample survey, a census is based on **all items of the population** and then data are analyzed. Data collection happens for a specific reference period. For example, the Census of India is conducted every 10 years. Other censuses are conducted roughly every 5-10 years. Data is collected using questionnaires that may be mailed to the respondents.

Responses can also be collected over other modes of communication like the telephone. An advantage is that even the most remote of the units of the population get included in the census method. The major disadvantage lies in the high cost of data collection and that it is a time consuming process.

Register

Registers are basically storehouses of statistical information from which data can be collected and analysis can be made. Registers tend to be detailed and extensive. It is beneficial to use data from here as it is reliable. Two or more registers can be linked together based on common information for even more relevant data collection.

From agriculture to business, all industries maintain registers for record-keeping. Some administrative registers also serve the purpose of acting as a repository of data for other statistical bodies in a country.

Methods of Data Collection We can categorize Data collection methods into primary methods of data collection and secondary methods of data collection.

Primary Data Collection Methods

Primary data is collected from the first-hand experience and is not used in the past. The data gathered by primary data collection methods are specific to the research's motive and highly accurate.

Primary data collection methods can be divided into two categories: quantitative methods and qualitative methods.

Quantitative Methods:

Quantitative techniques for market research and demand forecasting usually make use of statistical tools. In these techniques, demand is forecast based on historical data. These methods of primary data collection are generally used to make long-term forecasts. Statistical methods are highly reliable as the element of subjectivity is minimum in these methods.

Time Series Analysis

The term time series refers to a sequential order of values of a variable, known as a trend, at equal time intervals. Using patterns, an organization can predict the demand for its products and services for the projected time.

Smoothing Techniques

In cases where the time series lacks significant trends, smoothing techniques can be used. They eliminate a random variation from the historical demand. It helps in identifying patterns and demand levels to estimate future demand. The most common methods used in smoothing demand forecasting techniques are the simple moving average method and the weighted moving average method.

Barometric Method

Also known as the leading indicators approach, researchers use this method to speculate future trends based on current developments. When the past events are considered to predict future events, they act as leading indicators.

Qualitative Methods:

Qualitative methods are especially useful in situations when historical data is not available. Or there is no need of numbers or mathematical calculations. Qualitative research is closely

associated with words, sounds, feeling, emotions, colors, and other elements that are non-quantifiable. These techniques are based on experience, judgment, intuition, conjecture, emotion, etc.

Quantitative methods do not provide the motive behind participants' responses; often don't reach under represented populations, and span long periods to collect the data. Hence, it is best to combine quantitative methods with qualitative methods.

Surveys:

Surveys are used to collect data from the target population and gather insights into their preferences, opinions, choices, and feedback related to their products and services. Most survey maker software often a wide range of question types to select.

You can also use a ready-made survey template to save on time and effort. Online surveys can be customized. Nowadays they can be distributed through several distribution channels such as email, website, offline app, QR code, social media, etc.

Once the data is collected, survey software can generate various reports and run analytics algorithms to discover hidden insights. A survey dashboard can give you the statistics related to response rate, completion rate, filters based on demographics, export and sharing options, etc. You can maximize the effort spent on online data collection by integrating survey builder with third-party apps.

Polls

Polls comprise of one single or multiple choice question. When it is required to have a quick pulse of the people's sentiments, you can go for polls. Because they are short in length, it is easier to get responses from the people.

Similar to surveys, online polls, too, can be embedded into various platforms. Once the respondents answer the question, they can also be shown how they stand compared to others' responses.

Interviews

In this method, the interviewer asks questions either face-to-face or through telephone to the respondents. In face-to-face interviews, the interviewer asks a series of questions to the

interviewee in person and notes down responses. In case it is not feasible to meet the person, the interviewer can go for a telephonic interview. This form of data collection is suitable when there are only a few respondents. It is too time-consuming and tedious to repeat the same process if there are many participants.

Focus Groups

A small group of people, around 8-10 members, discuss the common areas of the problem. Each individual provides his insights on the issue concerned. A moderator regulates the discussion among the group members. At the end of the discussion, the group reaches a consensus.

Questionnaire

A questionnaire is a printed set of questions, either open-ended or closed-ended. The respondents are required to answer based on their knowledge and experience with the issue concerned. The questionnaire is a part of the survey, whereas the questionnaire's end-goal may or may not be a survey.

Secondary Data Collection Methods

Secondary data is the data that has been used in the past. The researcher can obtain data from the sources, both internal and external.

Internal sources of secondary data:

- Organization's health and safety records
- Mission and vision statements
- Financial Statements
- Magazines
- Sales Report
- CRM Software
- Executive summaries

External sources of secondary data:

- Government reports

- Press releases
- Business journals
- Libraries
- Internet

The secondary data collection methods, too, can involve both quantitative and qualitative techniques. Secondary data is easily available and hence, less time-consuming and expensive as compared to the primary data. However, with the secondary data collection methods, the authenticity of the data gathered cannot be verified.

SAMPLING TECHNIQUES

Probability Sampling Methods

1. Simple random sampling

In this case each individual is chosen entirely by chance and each member of the population has an equal chance, or probability, of being selected. One way of obtaining a random sample is to give each individual in a population a number, and then use a table of random numbers to decide which individuals to include. For example, if you have a sampling frame of 1000 individuals, labeled 0 to 999, use groups of three digits from the random number table to pick your sample. So, if the first three numbers from the random number table were 094, select the individual labeled "94", and so on.

As with all probability sampling methods, simple random sampling allows the sampling error to be calculated and reduces selection bias. A specific advantage is that it is the most straightforward method of probability sampling. A disadvantage of simple random sampling is that you may not select enough individuals with your characteristic of interest, especially if that characteristic is uncommon. It may also be difficult to define a complete sampling frame and inconvenient to contact them, especially if different forms of contact are required (email, phone, post) and your sample units are scattered over a wide geographical area.

2. Systematic sampling

Individuals are selected at regular intervals from the sampling frame. The intervals are chosen to ensure an adequate sample size. If you need a sample size *n* from a population of

size x, you should select every x/n^{th} individual for the sample. For example, if you wanted a sample size of 100 from a population of 1000, select every 1000/100 = 10^{th} member of the sampling frame.

Systematic sampling is often more convenient than simple random sampling, and it is easy to administer. However, it may also lead to bias, for example if there are underlying patterns in the order of the individuals in the sampling frame, such that the sampling technique coincides with the periodicity of the underlying pattern.

As a hypothetical example, if a group of students were being sampled to gain their opinions on college facilities, but the Student Record Department's central list of all students was arranged such that the sex of students alternated between male and female, choosing an even interval (e.g. every 20^{th} student) would result in a sample of all males or all females.

3. Stratified sampling

In this method, the population is first divided into subgroups (or strata) who all share a similar characteristic. It is used when we might reasonably expect the measurement of interest to vary between the different subgroups, and we want to ensure representation from all the subgroups. For example, in a study of stroke outcomes, we may stratify the population by sex, to ensure equal representation of men and women. The study sample is then obtained by taking equal sample sizes from each stratum. In stratified sampling, it may also be appropriate to choose non equal sample sizes from each stratum.

For example, in a study of the health outcomes of nursing staff in a county, if there are three hospitals each with different numbers of nursing staff (hospital A has 500 nurses, hospital B has 1000 and hospital C has 2000), then it would be appropriate to choose the sample numbers from each hospital proportionally *(*e.g. 10 from hospital A, 20 from hospital B and 40 from hospital C). This ensures a more realistic and accurate estimation of the health outcomes of nurses across the county, whereas simple random sampling would over represent nurses from hospitals A and B. The fact that the sample was stratified should be taken into account at the analysis stage.

4. Clustered sampling

In a clustered sample, subgroups of the population are used as the sampling unit, rather than individuals. The population is divided into subgroups, known as clusters, which are randomly selected to be included in the study. Clusters are usually already defined, for example individual GP practices or towns could be identified as clusters. In single stage cluster sampling, all members of the chosen clusters are then included in the study. In two stage cluster sampling, a selection of individuals from each cluster is then randomly selected for inclusion. Clustering should be taken into account in the analysis. The General Household survey, which is undertaken annually in England, is a good example of a (one stage) cluster sample. All members of the selected households (clusters) are included in the survey.

Cluster sampling can be more efficient that simple random sampling, especially where a study takes place over a wide geographical region. For instance, it is easier to contact lots of individuals in a few GP practices than a few individuals in many different GP practices.

Disadvantages include an increased risk of bias, if the chosen clusters are not representative of the population, resulting in an increased sampling error.

Non-Probability Sampling Methods

1. Convenience sampling

Convenience sampling is perhaps the easiest method of sampling, because participants are selected based on availability and willingness to take part. Useful results can be obtained, but the results are prone to significant bias, because those who volunteer to take part may be different from those who choose not to (volunteer bias), and the sample may not be representative of other characteristics, such as age or sex.

2. Quota sampling

This method of sampling is often used by market researchers. Interviewers are given a quota of subjects of a specified type to attempt to recruit. For example, an interviewer might be told to go out and select 20 adult men, 20 adult women, 10 teenage girls and 10 teenage boys so that they could interview them about their television viewing. Ideally the quotas chosen would proportionally represent the characteristics of the underlying population.

Whilst this has the advantage of being relatively straight forward and potentially representative, the chosen sample may not be representative of other characteristics that weren't considered.

3. Judgement (or Purposive) Sampling

Also known as selective, or subjective, sampling, this technique relies on the judgement of the researcher when choosing who to ask to participate. Researchers may implicitly thus choose a "representative" sample to suit their needs, or specifically approach individuals with certain characteristics. This approach is often used by the media when canvassing the public for opinions and in qualitative research.

Judgement sampling has the advantage of being time and cost effective to perform whilst resulting in a range of responses (particularly useful in qualitative research). However, in addition to volunteer bias, it is also prone to errors of judgement by the researcher and the findings, whilst being potentially broad, will not necessarily be representative.

4. Snowball sampling

This method is commonly used in social sciences when investigating hard to reach groups. Existing subjects are asked to nominate further subjects known to them, so the sample increases in size like a rolling snowball. For example, when carrying out a survey of risk behaviours amongst intravenous drug users, participants may be asked to nominate other users to be interviewed.

Snowball sampling can be effective when a sampling frame is difficult to identify. However, by selecting friends and acquaintances of subjects already investigated, there is a significant risk of selection bias.

Bias in sampling

There are five important potential sources of bias that should be considered when selecting a sample irrespective of the methods used. Sampling bias may be introduced when:

1. Any pre agreed sampling rules are deviated from
2. People in hard to reach groups are omitted
3. Selected individuals are replaced with others, for example if they are difficult to contact

4. There are low response rates
5. An out of date list is used as the sample frame

Data Analysis Process

The **Data Analysis Process** is nothing but gathering information by using a proper application or tool which allows you to explore the data and find a pattern in it. Based on that information and data, you can make decisions, or you can get ultimate conclusions.

Data Analysis consists of the following phases:

- Data Requirement Gathering
- Data Collection
- Data Cleaning
- Data Analysis
- Data Interpretation
- Data Visualization

Data Requirement Gathering

First of all, you have to think about why do you want to do this data analysis? All you need to find out the purpose or aim of doing the Analysis. You have to decide which type of data analysis you wanted to do! In this phase, you have to decide what to analyze and how to measure it, you have to understand why you are investigating and what measures you have to use to do this Analysis.

Data Collection

After requirement gathering, you will get a clear idea about what things you have to measure and what should be your findings. Now it's time to collect your data based on requirements. Once you collect your data, remember that the collected data must be processed or organized for Analysis. As you collected data from various sources, you must have to keep a log with a collection date and source of the data.

Data Cleaning

Now whatever data is collected may not be useful or irrelevant to your aim of Analysis, hence it should be cleaned. The data which is collected may contain duplicate records, white spaces or errors. The data should be cleaned and error free. This phase must be done before Analysis because based on data cleaning, your output of Analysis will be closer to your expected outcome.

Data Analysis

Once the data is collected, cleaned, and processed, it is ready for Analysis. As you manipulate data, you may find you have the exact information you need, or you might need to collect more data. During this phase, you can use data analysis tools and software which will help you to understand, interpret, and derive conclusions based on the requirements.

Data Interpretation

After analyzing your data, it's finally time to interpret your results. You can choose the way to express or communicate your data analysis either you can use simply in words or maybe a table or chart. Then use the results of your data analysis process to decide your best course of action.

Data Visualization

Data visualization is very common in your day to day life; they often appear in the form of charts and graphs. In other words, data shown graphically so that it will be easier for the human brain to understand and process it. Data visualization often used to discover unknown facts and trends. By observing relationships and comparing datasets, you can find a way to find out meaningful information.

Data Processing: Editing, Coding, Tabulating

After collecting data, the method of converting raw data into meaningful statement; includes data processing, data analysis, and data interpretation and presentation.

Data reduction or processing mainly involves various manipulations necessary for preparing the data for analysis. The process (of manipulation) could be manual or electronic. It involves

editing, categorizing the open-ended questions, coding, computerization and preparation of tables and diagrams.

Editing data:

Information gathered during data collection may lack uniformity. Example: Data collected through questionnaire and schedules may have answers which may not be ticked at proper places, or some questions may be left unanswered. Sometimes information may be given in a form which needs reconstruction in a category designed for analysis, e.g., converting daily/monthly income in annual income and so on. The researcher has to take a decision as to how to edit it.

Editing also needs that data are relevant and appropriate and errors are modified. Occasionally, the investigator makes a mistake and records and impossible answer. "How much red chilies do you use in a month" The answer is written as "4 kilos". Can a family of three members use four kilo chilies in a month? The correct answer could be "0.4 kilo".

Care should be taken in editing (re-arranging) answers to open-ended questions. Example: Sometimes "don't know" answer is edited as "no response". This is wrong. "Don't know" means that the respondent is not sure and is in a double mind about his reaction or considers the questions personal and does not want to answer it. "No response" means that the respondent is not familiar with the situation/object/event/individual about which he is asked.

Coding of data:

Coding is translating answers into numerical values or assigning numbers to the various categories of a variable to be used in data analysis. Coding is done by using a code book, code sheet, and a computer card. Coding is done on the basis of the instructions given in the codebook. The code book gives a numerical code for each variable.

Nowadays, codes are assigned before going to the field while constructing the questionnaire/schedule. Pose data collection; pre-coded items are fed to the computer for processing and analysis. For open-ended questions, however, post-coding is necessary. In such

cases, all answers to open-ended questions are placed in categories and each category is assigned a code.

Manual processing is employed when qualitative methods are used or when in quantitative studies, a small sample is used, or when the questionnaire/schedule has a large number of open-ended questions, or when accessibility to computers is difficult or inappropriate. However, coding is done in manual processing also.

Data classification/distribution:

Distribution of data as a form of classification of scores obtained for the various categories or a particular variable. There are four types of distributions:

1. Frequency distribution
2. Percentage distribution
3. Cumulative distribution
4. Statistical distributions

Frequency distribution:

In social science research, frequency distribution is very common. It presents the frequency of occurrences of certain categories. This distribution appears in two forms:

Ungrouped: Here, the scores are not collapsed into categories, e.g., distribution of ages of the students of a BJ (MC) class, each age value (e.g., 18, 19, 20, and so on) will be presented separately in the distribution.

Grouped: Here, the scores are collapsed into categories, so that 2 or 3 scores are presented together as a group. For example, in the above age distribution groups like 18-20, 21-22 etc., can be formed)

2. Percentage distribution:

It is also possible to give frequencies not in absolute numbers but in percentages. For instance instead of saying 200 respondents of total 2000 had a monthly income of less than Rs. 500, we can say 10% of the respondents have a monthly income of less than Rs. 500.

3. Cumulative distribution:

It tells how often the value of the random variable is less than or equal to a particular reference value.

4. Statistical data distribution:

In this type of data distribution, some measure of average is found out of a sample of respondents. Several kind of averages are available (mean, median, mode) and the researcher must decide which is most suitable to his purpose. Once the average has been calculated, the question arises: how representative a figure it is, i.e., how closely the answers are bunched around it. Are most of them very close to it or is there a wide range of variation?

Tabulation of data:

After editing, which ensures that the information on the schedule is accurate and categorized in a suitable form, the data are put together in some kinds of tables and may also undergo some other forms of statistical analysis.

Table can be prepared manually and/or by computers. For a small study of 100 to 200 persons, there may be little point in tabulating by computer since this necessitates putting the data on punched cards. But for a survey analysis involving a large number of respondents and requiring cross tabulation involving more than two variables, hand tabulation will be inappropriate and time consuming.

Usefulness of tables:

Tables are useful to the researchers and the readers in three ways:

1. The present an overall view of findings in a simpler way.
2. They identify trends.
3. They display relationships in a comparable way between parts of the findings.

By convention, the dependent variable is presented in the rows and the independent variable in the columns.

Data interpretation

Data interpretation is the process of reviewing **data** through some predefined processes which will help assign some meaning to the **data** and arrive at a relevant conclusion. It involves taking the result of **data** analysis, making inferences on the relations studied, and using them to conclude.

Data interpretation refers to the implementation of processes through which data is reviewed for the purpose of arriving at an informed conclusion. The interpretation of data assigns a meaning to the information analyzed and determines its signification and implications.

The importance of data interpretation is evident and this is why it needs to be done properly. Data is very likely to arrive from multiple sources and has a tendency to enter the analysis process with haphazard ordering. Data analysis tends to be extremely subjective. That is to say, the nature and goal of interpretation will vary from research to research, likely correlating to the type of data being analyzed. While there are several different types of processes that are implemented based on individual data nature, the two broadest and most common categories are “quantitative analysis” and “qualitative analysis”.

Yet, before any serious data interpretation inquiry can begin, it should be understood that visual presentations of data findings are irrelevant unless a sound decision is made regarding scales of measurement. Before any serious data analysis can begin, the scale of measurement must be decided for the data as this will have a long-term impact on data interpretation ROI.

The varying scales include:

- **Nominal Scale:** non-numeric categories that cannot be ranked or compared quantitatively. Variables are exclusive and exhaustive.
- **Ordinal Scale:** exclusive categories that are exclusive and exhaustive but with a logical order. Quality ratings and agreement ratings are examples of ordinal scales (i.e., good, very good, fair, etc., OR agree, strongly agree, disagree, etc.).
- **Interval:** a measurement scale where data is grouped into categories with orderly and equal distances between the categories. There is always an arbitrary zero point.
- **Ratio:** contains features of all three.

Interpreting the Data

When interpreting data, an analyst must try to discern the differences between correlation, causation and coincidences, as well as many other bias – but he also has to consider all the factors involved that may have led to a result. There are various data interpretation methods one can use.

The interpretation of data is designed to help people make sense of numerical data that has been collected, analyzed and presented. Having a baseline method (or methods) for interpreting data will provide your analyst teams a structure and consistent foundation. Indeed, if several departments have different approaches to interpret the same data, while sharing the same goals, some mismatched objectives can result. Disparate methods will lead to duplicated efforts, inconsistent solutions, wasted energy and inevitably – time and money. There are mainly two methods of interpretation of data: qualitative Interpretation and quantitative Interpretation

Qualitative Data Interpretation

Qualitative data analysis can be summed up in one word – categorical. With qualitative analysis, data is not described through numerical values or patterns, but through the use of descriptive context (i.e., text). Typically, narrative data is gathered by employing a wide variety of person-to-person techniques. These techniques include:

- **Observations:** detailing behavioral patterns that occur within an observation group. These patterns could be the amount of time spent in an activity, the type of activity and the method of communication employed.
- **Documents:** much like how patterns of behavior can be observed, different types of documentation resources can be coded and divided based on the type of material they contain.
- **Interviews:** one of the best collection methods for narrative data. Enquiry responses can be grouped by theme, topic or category. The interview approach allows for highly-focused data segmentation.

A key difference between qualitative and quantitative analysis is clearly noticeable in the interpretation stage. Qualitative data, as it is widely open to interpretation, must be "coded" so as to facilitate the grouping and labeling of data into identifiable themes. As person-to-person data collection techniques can often result in disputes pertaining to proper analysis, qualitative data analysis is often summarized through three basic principles: notice things, collect things, think about things.

Quantitative Data Interpretation

If quantitative data interpretation could be summed up in one word (and it really can't) that word would be "numerical." There are few certainties when it comes to data analysis, but you can be sure that if the research you are engaging in has no numbers involved, it is not quantitative research. Quantitative analysis refers to a set of processes by which numerical data is analyzed. More often than not, it involves the use of statistical modeling such as standard deviation, mean and median. Let's quickly review the most common statistical terms:

- **Mean:** a mean represents a numerical average for a set of responses. When dealing with a data set (or multiple data sets), a mean will represent a central value of a specific set of numbers. It is the sum of the values divided by the number of values within the data set. Other terms that can be used to describe the concept are arithmetic mean, average and mathematical expectation.
- **Standard deviation:** this is another statistical term commonly appearing in quantitative analysis. Standard deviation reveals the distribution of the responses around the mean. It describes the degree of consistency within the responses; together with the mean, it provides insight into data sets.

- **Frequency distribution:** this is a measurement gauging the rate of a response appearance within a data set. When using a survey, for example, frequency distribution has the capability of determining the number of times a specific ordinal scale response appears (i.e., agree, strongly agree, disagree, etc.). Frequency distribution is extremely keen in determining the degree of consensus among data points.

  Typically, quantitative data is measured by visually presenting correlation tests between two or more variables of significance. Different processes can be used together or separately, and comparisons can be made to ultimately arrive at a conclusion. Other signature interpretation processes of quantitative data include:

- Regression analysis
- Cohort analysis
- Predictive and prescriptive analysis

Construction of Hypotheses

A hypothesis is a tentative statement about the relationship between two or more variables. A hypothesis is a specific, testable prediction about what you expect to happen in the study. To be complete the hypothesis must include three components –

- The variables;
- The population; and
- The relationship between the variables.

A hypothesis does not have to be correct. While the hypothesis predicts what the researchers expect to see, the goal of research is to determine whether this guess is right or wrong. When conducting an experiment, researchers might explore a number of different factors to determine which ones might contribute to the ultimate outcome.

Hypotheses are the testable statements linked to the research problem. Hypotheses bridge the gap from the general question you intend to investigate to concise statements of what you hypothesize the connection between your variables to be.

Hypothesis statement should be:

Clear, Simple & Direct:

Hypothesis statements should be easy to read, short and understandable. They should be written in simple English and should be framed as if you are explaining the problem to other students, teachers or community members. This is not the place for technical jargon or high level analysis.

Testable Through Experimentation

An effective hypothesis is one that can be tested. In other words, students need to ensure that the hypothesis includes information on what they plan to do and how they plan to make it happen. After the preliminary research is complete, construct a hypothesis, or an educated guess, on the outcome of the experiment.

The hypothesis must be worded so that it can be tested in the experiment and it must include both independent and dependent variables.

An **independent variable** is the variable that is varied or manipulated during an experiment to affect change in the dependent variable.

A **dependent variable** is the variable that is studied. Changes in the dependent variable depend on changes in the independent variable.

Statistical Hypotheses

A statistical hypothesis is an assumption about a population parameter. This assumption may or may not be true. Hypothesis testing refers to the formal procedures used by statisticians to accept or reject statistical hypotheses.

The best way to determine whether a statistical hypothesis is true would be to examine the entire population. Since that is often impractical, researchers typically examine a random sample from the population. If sample data are not consistent with the statistical hypothesis, the hypothesis is rejected.

There are two types of statistical hypotheses.

- **Null hypothesis**. The null hypothesis, denoted by H_o, is usually the hypothesis that sample observations result purely from chance.
- **Alternative hypothesis**. The alternative hypothesis, denoted by H_1 or H_a, is the hypothesis that sample observations are influenced by some non-random cause.

For example, suppose we wanted to determine whether a coin was fair and balanced. A null hypothesis might be that half the flips would result in Heads and half, in Tails. The alternative hypothesis might be that the number of Heads and Tails would be very different. Symbolically, these hypotheses would be expressed as

$$H_o: P=0.5$$
$$H_a: P \neq 0.5$$

Suppose we flipped the coin 50 times, resulting in 40 Heads and 10 Tails. Given this result, we would be inclined to reject the null hypothesis. We would conclude, based on the evidence, that the coin was probably not fair and balanced.

Hypothesis testing is a formal procedure for investigating our ideas about the world using statistics. It is most often used by scientists to test specific predictions, called hypotheses, that arise from theories.

There are 5 main steps in hypothesis testing:

1. State your research hypothesis as a null (H_o) and alternate (H_a) hypothesis.
2. Collect data in a way designed to test the hypothesis.
3. Perform an appropriate statistical test.
4. Decide whether the null hypothesis is supported or refuted.
5. Present the findings in your results and discussion section.

Step 1: State your null and alternate hypothesis

After developing your initial research hypothesis (the prediction that you want to investigate), it is important to restate it as a null (H_o) and alternate (H_a) hypothesis so that you can test it mathematically.

The **alternate hypothesis** is usually your initial hypothesis that predicts a relationship between variables. The **null hypothesis** is a prediction of no relationship between the variables you are interested in.

Step 2: Collect data

For a statistical test to be valid, it is important to perform sampling and collect data in a way that is designed to test your hypothesis. If your data are not representative, then you cannot make statistical inferences about the population you are interested in.

Step 3: Perform a statistical test

There are a variety of statistical tests available, but they are all based on the comparison of **within-group variance** (how spread out the data is within a category) versus **between-group variance** (how different the categories are from one another).

If the between-group variance is large enough that there is little or no overlap between groups, then your statistical test will reflect that by showing a low *p*-value. This means it is unlikely that the differences between these groups came about by chance.

Alternatively, if there is high within-group variance and low between-group variance, then your statistical test will reflect that with a high *p*-value. This means it is likely that any difference you measure between groups is due to chance.

Step 4: Decide whether the null hypothesis is supported or refused

Based on the outcome of your statistical test, you will have to decide whether your null hypothesis is supported or refused.

In most cases you will use the *p*-value generated by your statistical test to guide your decision. And in most cases, your cutoff for refuting the null hypothesis will be 0.05 – that is, when there is a less than 5% chance that you would see these results if the null hypothesis were true.

Step 5: Present your findings

The results of hypothesis testing will be presented in the results and discussion sections of your research paper.

In the results section you should give a brief summary of the data and a summary of the results of your statistical test (for example, the estimated difference between group means and associated *p*-value). In the discussion, you can discuss whether your initial hypothesis was supported or refused.

UNIT V

Research Report Writing - Stages in preparing the research report –- Organization - write up - First draft - Second draft - Third draft - Structure of Research Report: Preliminaries - Text - Reference Materials: Foot notes and Bibliography - and Final evaluation - Writing of Abstract, Research papers , Project Proposal - Plagiarism.

Research report writing

Research reports are recorded data prepared by researchers or statisticians after analyzing information gathered by conducting organized research, typically in the form of surveys or qualitative methods. Writing research reports in the manner can lead to all the efforts going down the drain.

Prepare the context before starting to write and start from the basics: Be well prepared before taking a plunge into new topics. The order of survey questions might not be the ideal or most effective order for writing research reports. The idea is to start with a broader topic and work towards a more specific one and focus on a conclusion or support, which a research should support with the facts. The most difficult thing to do in reporting, without a doubt is to start. Start

with the title, the introduction, then document the first discoveries and continue from that. Once the marketers have the information well documented, they can write a general conclusion.

- **Keep the target audience in mind while selecting a format that is clear, logical and obvious to them:** Will the research reports be presented to decision makers or other researchers? What are the general perceptions around that topic? This requires more care and diligence. A researcher will need a significant amount of information to start writing the research report. Be consistent with the wording, the numbering of the annexes and so on. Follow the approved format for the delivery of research reports and demonstrate the integrity of the project with the objectives of the research.
- **Have a clear research objective:** A researcher should read the entire proposal again, and make sure that the data they provide contributes to the objectives that were raised from the beginning. Remember that speculations are for conversations, not for research reports, if a researcher speculates, they directly question their own research.
- **Establish a working model:** Each study must have an internal logic, which will have to be established in the report and in the evidence. The researchers' worst nightmare is to be required to write research reports and realize that key questions were not included.
- **Gather all the information about the research topic.** Talk to other researchers who have studied the subject of research. Misuse of the terms can discourage the readers of research reports from reading further.
- **Read aloud while writing.** While reading the report, if the researcher hears something inappropriate, for example, if they stumble over the words when reading them, surely the reader will too. If the researcher can't put an idea in a single sentence, then it is very long and they must change it so that the idea is clear to everyone.
- **Check grammar and spelling.** Without a doubt, good practices help to understand the report. Use verbs in the present tense. Consider using the present tense, which makes the results sound more immediate. Find new words and other ways of saying things. Have fun with the language whenever possible.

- **Discuss only the discoveries that are significant.** If some data are not really significant, do not mention them. Remember that not everything is truly important or essential within research reports.
- **Try and stick to the survey questions.** For example, do not say that the people surveyed "were worried" about an issue, when there are different degrees of concern.
- **The graphs must be clear enough so that they understand themselves.** Do not let graphs lead the reader to make mistakes: give them a title, include the indications, the size of the sample, and the correct wording of the question.
- **Be clear with messages.** A researcher should always write every section of the report with an accuracy of details and language.
- **Be creative with titles**– Particularly in segmentation studies choose names "that give life to research". Such names can survive for a long time after the initial investigation.
- **Create an effective conclusion:** The conclusion in the research reports are the most difficult to write, but it is an incredible opportunity to excel. Make a precise summary. Sometimes it helps to start the conclusion with something specific, then it describes the most important part of the study, and finally, it provides the implications of the conclusions.
- **Get a couple more pair of eyes to read the report.** Writers have trouble detecting their own mistakes. But they are responsible for what is presented. Ensure it has been approved by colleagues or friends before sending the find draft out.

Stages in preparing research report

Research reports are the product of slow, painstaking, accurate inductive work. The usual steps involved in writing report are:

a. Logical analysis of the subject matter;

b. Preparation of the final outline;

c. Preparation of the rough draft;

d. Rewriting and polishing;

e. Preparation of the final bibliography; and

f. Writing the final draft.

Logical analysis of the subject matter: It is the first step which is primarily concerned with the development of a subject. There are two ways in which to develop a subject

a. Logically and

b. Chronologically.

The logical development is made on the basis of mental connections and associations between the one thing and another by means of analysis. Logical treatment often consists in developing the material from the simple possible to the most complex structures. Chronological development is based on a connection or sequence in time or occurrence. The directions for doing or making something usually follow the chronological order.

Preparation of the final outline: It is the next step in writing the research report "Outlines are the framework upon which long written works are constructed. They are an aid to the logical organization of the material and a reminder of the points to be stressed in the report."

Preparation of the rough draft: This follows the logical analysis of the subject and the preparation of the final outline. Such a step is of utmost importance for the researcher now sits to write down what he has done in the context of his research study. He will write down the procedure adopted by him in collecting the material for his study along with various limitations faced by him, the technique of analysis adopted by him, the broad findings and generalizations and the various suggestions he wants to offer regarding the problem concerned.

Rewriting and polishing of the rough draft: This step happens to be most difficult part of all formal writing. Usually this step requires more time than the writing of the rough draft. The careful revision makes the difference between a mediocre and a good piece of writing. While rewriting and polishing, one should check the report for weaknesses in logical development or presentation. The researcher should also "see whether or not the material, as it is presented, has unity and cohesion; does the report stand upright and firm and exhibit a definite pattern, like a marble arch? Or does it resemble an old wall of moldering cement and loose brick." In addition the researcher should give due attention to the fact that in his rough draft he has been consistent or not. He should check the mechanics of writing grammar, spelling and usage.

Preparation of the final bibliography: Next in order comes the task of the preparation of the final bibliography. The bibliography, which is generally appended to the research report, is a list of books in some way pertinent to the research which has been done. It should contain all those works which the researcher has consulted. The bibliography should be arranged alphabetically and may be divided into two parts; the first part may contain the names of books and pamphlets, and the second part may contain the names of magazine and newspaper articles. Generally, this pattern of bibliography is considered convenient and satisfactory from the point of view of reader, though it is not the only way of presenting bibliography. The entries in bibliography should be made adopting the following order:

For books and pamphlets the order may be as under:

1. Name of author, last name first.
2. Title, underlined to indicate italics.
3. Place, publisher, and date of publication.
4. Number of volumes.

For magazines and newspapers the order may be as under:

1. Name of the author, last name first.
2. Title of article, in quotation marks.
3. Name of periodical, underlined to indicate italics.
4. The volume or volume and number.
5. The date of the issue.
6. The pagination.

Writing the final draft: This constitutes the last step. The final draft should be written in a concise and objective style and in simple language, avoiding vague expressions such as "it seems", "there may be", and the like ones. While writing the final draft, the researcher must avoid abstract terminology and technical jargon. Illustrations and examples based on common experiences must be incorporated in the final draft as they happen to be most effective in communicating the research findings to others. A research report should not be dull, but must

enthuse people and maintain interest and must show originality. It must be remembered that every report should be an attempt to solve some intellectual problem and must contribute to the solution of a problem and must add to the knowledge of both the researcher and the reader.

Structure/Components of Research Reports

A research report is a reliable source to recount details about a conducted research and is most often considered to be a true testimony of all the work done to garner specificities of research.

The various sections of a research report are:

1. Summary
2. Background/Introduction
3. Implemented Methods
4. Results based on Analysis
5. Deliberation
6. Conclusion

Research is imperative for launching a new product/service or a new feature. The details of a research report may change with the purpose of research but the main components of a report will remain constant.

Research Report Summary: The entire objective along with the overview of research is to be included in a summary which is a couple of paragraphs in length. All the multiple components of the research are explained in brief under the report summary. It should be interesting enough to capture all the key elements of the report.

- **Research Introduction:** There always is a primary goal that the researcher is trying to achieve through a report. In the introduction section, he/she can cover answers related to this goal and establish a thesis which will be included to strive and answer it in detail. This section should answer an integral question: "What is the current situation of the goal?"
- **Research Methodology:** This is the most important section of the report where all the important information lies. The readers can gain data for the topic along with analyzing the quality of provided content and the research can also be approved by other researchers. Thus,

this section needs to be highly informative with each aspect of research discussed in detail. Information needs to be expressed in chronological order according to its priority and importance. Researchers should include references in case they gained information from existing techniques.

- **Research Results:** A short description of the results along with calculations conducted to achieve the goal will form this section of results. Usually, the exposition after data analysis is carried out in the discussion part of the report.
- **Research Discussion:** The results are discussed in extreme detail in this section along with a comparative analysis of reports that could probably exist in the same domain. Any abnormality uncovered during research will be deliberated in the discussion section. While writing research reports, the researcher will have to connect the dots on how the results will be applicable in the real world.
- **Research References and Conclusion:** Conclude all the research findings along with mentioning each and every author, article or any content piece from where references were taken.

Write up works

Writing a First Draft

- Just write. You already have at least one focusing idea
- Make an outline. Write your topic or thesis down and then jot down what points you might make that will flesh out that topic or support that thesis
- Begin with research.
    - Limit each paragraph to one main idea. Do not try to talk about more than one idea per paragraph.
    - Prove your points continually by using specific examples and quotations from your note cards.
    - Use transition words to ensure a smooth flow of ideas from paragraph to paragraph.

Writing Second draft

The **second draft** of a piece of writing is the result of one round of editing. A writer "working on a **second draft**" is working on a first round of edits, generally focused on structural concerns like major plot points and the flow of ideas.

The draft should flow logically and supporting evidence should be sufficient. Do use transition words between paragraphs that indicate how each of them refers to your thesis statement. Do start adding additional details; look for factual information that would make the **writing** more vivid.

Editing Second Draft

If you want to know how to write a second draft, the following writing tips can help:

1. **Take a break, then go through your draft with fresh eyes**. Especially if this is your first novel, only start your second draft after you've had adequate time away from it. Creating distance between you and personal work can give your mind time to reset and detach from particular ideas. Certain story elements may feel necessary but don't actually fit into the story, or your story may need something, but you're not sure how to implement it. Taking a break can help you view your writing from a previously unseen angle that can bring more refreshing ideas to the table and help you get through your second draft. Take some distance from your writing to brainstorm new scenes.
2. **Understand your chaos**. Your first draft got your ideas down and, hopefully, created a loosely structured beginning, middle, and end. However, the first time you go through the whole thing, it will probably feel overwhelming—and it should. Go into your first chapter knowing there will be big changes and improvements to be made. You'll cut some things and add others, but don't be afraid. If it starts to go off into a direction you're not happy with, or if you have no idea how to continue forward from what you've rewritten, you can always reconfigure. That's what second drafts are for.
3. **Break it up into separate goals**. You don't have to comb through your second draft beginning to end and address everything along the way. Setting goals to address each element of your first draft, like working on emotional character arcs first, or solidifying the bare bones of your plot through each chapter can help you divide and conquer each necessary aspect of

your story that needs to come together in a cohesive manner. Once all these elements have been solidified individually, you can piece them together in a way that makes your second draft feel more manageable.

4. **Track your narrative**. Read through each plot point or chapter and see if the narrative tracks. Make notes on anything that stands out to you or doesn't feel as smooth. Are events moving logically or sequentially into the next? Are character goals clearly defined? Does each new chapter feel connected to the last? It may be a rough version you're going through, but these elements should be in place in order for you to analyze it accurately. Your subplots should feel natural to the central story and characters you've created they should just be added fodder to take up space. Ensure there aren't any redundant scenes or a repeat of information that doesn't need to be explained again.

5. **Don't proofread until the end**. It's tempting to go back and fix all your errors, but unless you're in your third stage or fourth stage, this may end up being a waste of time. Correcting typos and grammar should be saved for your final draft, as the entire writing process will entail rewriting, restructuring, and reorganizing until the moment you're ready to publish.

Writing a Final Draft

A final draft is a piece of writing that will be handed in as your best work. Treat crafting a final draft as a task of increased importance, because it is the last chance to enhance the paper and correct any flaws.

1. Take a break after writing your second draft. You will have to revise your second draft at least three more times until it is put in order have a rest before starting the final copy of your paper.
2. Do a spell check of your second draft. You should revise your paper in terms of misspelled words, typos, and accidental word repetitions; you could also perform a punctuation check at this interval.
3. Do a grammar check. It is a process that requires extreme caution, because grammatical mistakes may be far less obvious than spelling errors. This check implies correcting faulty parallelisms, problems with noun-verb agreement, dangling participles, improper usage of passive voice, and so on.

4. After you've checked the language of your paper, it is time to pay attention to its technical aspects. This includes the formatting style, your reference list, in-text citations, and the title page. Make sure all of these correspond with the requirements of your teacher or the publication you are submitting your essay to.

5. Revise the whole piece of writing once again. Since it is the last time you will read through it with an intention to make corrections, be extra-attentive and check every little detail in the text. Evaluate the structure of your essay, the way your arguments are organized, and the credibility of these arguments. Check for poor or non-existent transitions between paragraphs, pay attention to grammar, stylistics, syntax, and punctuation.

Key Points to Consider

1. Reading your final draft aloud will grant you an opportunity to take a fresh look at what you have written. Weaknesses in writing are usually easier to notice when heard.

2. Your paper should be written in your own words, except abstracts where you are using citations. It is always better to show your own understanding of an issue, even if it is incorrect, than to frame your ideas in another author's words. A final draft is your last chance to exclude any possible signs of plagiarism from your paper.

3. Using a computer for proofreading is a sound idea, since text processing software often has a function of automatic spelling and grammar checking. However, proofreading on your own once again after the computer check is still recommended to avoid mistakes a computer may not have found.

Report Format

There is no one best format for all reports. Format depends on several relevant variables. One must employ a suitable format to create desirable impression with clarity. Report must be attractive. It should be written systematically and bound carefully. A report must use the format (often called structure) that best fit the needs and wants of its readers. Normally, following format is suggested as a basic outline, which has sufficient flexibly to meet the most situations.

Research report is divided into three parts as:

I. First Part (Formality Part):

(i) Cover page

(ii) Title page

(iii) Certificate or statement

(iv) Index (brief contents)

(v) Table of contents (detailed index)

(vi) Acknowledgement

(vii) List of tables and figures used

(viii) Preface/forwarding/introduction

(ix) Summary report

II. Main Report (Central Part of Report):

(i) Statement of objectives

(ii) Methodology and research design

(iii) Types of data and its sources

(iv) Sampling decisions

(v) Data collection methods

(vi) Data collection tools

(vii) Fieldwork

(viii) Analysis and interpretation (including tables, charts, figures, etc.)

(ix) Findings

(x) Limitations

(xi) Conclusions and recommendations

(xii) Any other relevant detail

III. Appendix (Additional Details):

(i) Copies of forms used

(ii) Tables not included in findings

(iii) A copy of questionnaire

(iv) Detail of sampling and rate of response

(v) Statement of expenses

(vi) Bibliography – list of books, magazines, journals, and other reports

(vii) Any other relevant information

Footnotes

Footnotes are the acceptable method of acknowledging material which is not your own when you use it in an essay. The information given in a footnote includes the author, the title, the place of publication, the publisher, the date of publication and the page or pages on which the quotation or information is found.

Basically, footnoted material is of three types:

1. Direct quotations from another author's work. (These must be placed in quotation marks).
2. Citing authority for statements which are not quoted directly.
3. Material of an explanatory nature which does not fit into the flow of the body of the text.

In the text of an essay, material to be footnoted should be marked with a raised number immediately following the words or ideas that are being cited.The footnotes may be numbered in sequence on each page or throughout the entire essay.

I. Form and Content of Footnotes:

A. From a book:

[1]W. J. Eccles, *Frontenac The Courtier Governor* (Toronto: McClelland and Stewart Limited, 1959), 14.

B. From an article in a journal:

[1]Peter Blickle, "Peasant Revolts in the German Empire in the Late Middle Ages," *Social History*, Vol. IV, No. 2 (May, 1979), 233.

C. From a book containing quotations from other sources:

[1]Eugene A. Forsey, "Was the Governor General's Refusal Constitutional?", cited in Paul Fox, *Politics: Canada* (Toronto: McGraw-Hill Company of Canada Ltd., 1966), 186.

D. From a standard reference work:

[1]Norman Ward, "Saskatchewan," in *The Canadian Encyclopedia*, 2nd ed., Vol. 3, 1935.

E. From the Internet:

In citing material read on the Internet, it is not sufficient to indicate the website alone. You must provide information about author, title, and date of the document you are using.

II. Rules to Remember in Writing Footnotes:

1. Titles of books, journals or magazines should be underlined or italicized.
2. Titles of articles or chapters - items which are only a part of a book are put in quotation marks.

III. Abbreviating in Footnotes:

The first time any book or article is mentioned in a footnote, all the information requested above must be provided. After that, however, there are shortcuts which should be used:

(a) Several quotations in sequence from the same book:

(b) Reference to a source that already has been cited in full form but not in the reference immediately preceding, is made by using the author's last name (but not the first name or initials unless another author of the same surname has been cited), the title in shortened form, if desired and the page number.

Bibliography

The bibliography should be on a separate page. It should list the relevant sources used in the research for the paper. This list should be arranged alphabetically by the surname of the author. Unlike the footnote reference, the surname is shown first, set off from the rest of the information. The information required is: author, title, place of publication, publisher and date of publication. The information is separated for the most part by periods (rather than by commas, as in the footnotes) and the parentheses enclosing the facts of publication are dropped.

EXAMPLE:

Eccles, W. J. Frontenac The Courtier Governor. Toronto: McClelland and Stewart Limited, 1959.Johnson, J. K. and P. B. Waite. "Macdonald, Sir John Alexander." In The Dictionary of CanadianBiography,Vol.12, 591-612.

Final evaluation

The last step in a research, after rigor and extensive research processes, includes stepping back, evaluating what has been research and then reporting the findings. Research evaluation is the process in which the purpose of research, the methodology used and methods, such as data collection and analysis, are rated to ascertain their relevance, value and their ability to achieve research objectives, and to ascertain the significance of a research. In want to infer that though final evaluation of research is by far very important, all procedures of research including data collection and analysis should be concurrent with evaluation. For example, the purpose, design and availability of resources need evaluation. Also, a preliminary step of data analysis involves careful evaluation of data collected to ensure that the data is suitable for analysis.

A good evaluation report contains these basic components:

- An executive summary containing a condensed version of the most important aspects of the evaluation (see previous point).
- A summary of the evaluation's focus, with a discussion of the purpose, objectives and questions used to direct the evaluation.
- A summary of the evaluation plan.
- A discussion of the findings of the evaluation, with complete statistical and case study analysis.
- A discussion of the evaluation's conclusions and recommendations.
- Any additional information required, such as terminology, details of who was involved in the evaluation, etc. in an appendix.

Writing of Abstract

An abstract summarizes, usually in one paragraph of 300 words or less, the major aspects of the entire paper in a prescribed sequence that includes:

1) the overall purpose of the study and the research problem(s) you investigated;

2) the basic design of the study;

3) major findings or trends found as a result of your analysis; and,

4) a brief summary of your interpretations and conclusions.

The abstract allows you to elaborate upon each major aspect of the paper and helps readers decide whether they want to read the rest of the paper. Therefore, enough key information [e.g., summary results, observations, trends, etc.] must be included to make the abstract useful to someone who may want to examine your work.

Writing Style of an abstract

Use the active voice when possible, but note that much of your abstract may require passive sentence constructions. Regardless, write your abstract using concise, but complete, sentences. Get to the point quickly and **always use the past tense** because you are reporting on a study that has been completed.

Formatting

Abstracts should be formatted as a single paragraph in a block format and with no paragraph indentations. In most cases, the abstract page immediately follows the title page. Do not number the page. Rules set forth in writing manual vary but, in general, you should center the word "Abstract" at the top of the page with double spacing between the heading and the abstract. The final sentences of an abstract concisely summarize your study's conclusions, implications, or applications to practice and, if appropriate, can be followed by a statement about the need for additional research revealed from the findings.

Composing Your Abstract

Although it is the first section of your paper, the abstract should be written last since it will summarize the contents of your entire paper. A good strategy to begin composing your abstract is to take whole sentences or key phrases from each section of the paper and put them in a sequence that summarizes the contents. Then revise or add connecting phrases or

words to make the narrative flow clearly and smoothly. Note that statistical findings should be reported parenthetically.

Before handing in your final paper, check to make sure that the information in the abstract completely agrees with what you have written in the paper. Think of the abstract as a sequential set of complete sentences describing the most crucial information using the fewest necessary words.

Writing Research paper

Conduct preliminary research

Note any discussions that seem important to the topic, and try to find an issue that you can focus your paper around. Use a variety of sources, including journals, books and reliable websites, to ensure you do not miss anything glaring.

Do not only verify the ideas you have in mind, but look for sources that contradict your point of view.

- Is there anything people seem to overlook in the sources you research?
- Are there any heated debates you can address?
- Do you have a unique take on your topic?
- Have there been some recent developments that build on the extant research?

In this stage, you might find it helpful to formulate some research questions to help guide you. To write research questions, try to finish the following sentence: "I want to know how/what/why…"

Develop a thesis statement

A thesis statement is a statement of your central argument — it establishes the purpose and position of your paper. If you started with a research question, the thesis statement should answer it. It should also show what evidence and reasoning you'll use to support that answer.

The thesis statement should be concise, contentious, and coherent. That means it should briefly summarize your argument in a sentence or two; make a claim that requires further evidence or analysis; and make a coherent point that relates to every part of the paper.

You will probably revise and refine the thesis statement as you do more research, but it can serve as a guide throughout the writing process. Every paragraph should aim to support and develop this central claim.

Create a research paper outline

A research paper outline is essentially a list of the key topics, arguments and evidence you want to include, divided into sections with headings so that you know roughly what the paper will look like before you start writing.

A structure outline can help make the writing process much more efficient, so it's worth dedicating some time to create one.

Write a first draft of the research paper

Your first draft won't be perfect — you can polish later on. Your priorities at this stage are as follows:

- Maintaining forward momentum — write now, perfect later.
- Paying attention to clear organization and logical ordering of paragraphs and sentences, which will help when you come to the second draft.
- Expressing your ideas as clearly as possible, so you know what you were trying to say when you come back to the text.

You do not need to start by writing the introduction. Begin where it feels most natural for you — some prefer to finish the most difficult sections first, while others choose to start with the easiest part. If you created an outline, use it as a map while you work.

Do not delete large sections of text. If you begin to dislike something you have written or find it doesn't quite fit, move it to a different document, but don't lose it completely.

Paragraph structure

Paragraphs are the basic building blocks of research papers. Each one should focus on a single claim or idea that helps to establish the overall argument or purpose of the paper.

Here is an example of a well-structured paragraph. Hover over the sentences to learn more.

Citing sources

It's also important to keep track of citations at this stage to avoid accidental plagiarism. Each time you use a source, make sure to take note of where the information came from.

You can use our free citation generators to automatically create citations and save your reference list as you go.

Write the introduction

The research paper introduction should address three questions: What, why, and how? After finishing the introduction, the reader should know what the paper is about, why it is worth reading, and how you'll build your arguments.

What? Be specific about the topic of the paper, introduce the background, and define key terms or concepts.

Why? This is the most important, but also the most difficult, part of the introduction. Try to provide brief answers to the following questions: What new material or insight are you offering? What important issues does your essay help define or answer?

How? To let the reader know what to expect from the rest of the paper, the introduction should include a "map" of what will be discussed, briefly presenting the key elements of the paper in chronological order.

Write a compelling body of text

The major struggle faced by most writers is how to organize the information presented in the paper, which is one reason an outline is so useful. However, remember that the outline is only a guide and, when writing, you can be flexible with the order in which the information and arguments are presented.

One way to stay on track is to use your thesis statement and topic sentences. Check:

- topic sentences against the thesis statement;
- topic sentences against each other, for similarities and logical ordering;
- and each sentence against the topic sentence of that paragraph.

Be aware of paragraphs that seem to cover the same things. If two paragraphs discuss something similar, they must approach that topic in different ways. Aim to create smooth transitions between sentences, paragraphs, and sections.

Write the conclusion

The conclusion is designed to help your reader out of the paper's argument, giving them a sense of finality.

Trace the course of the paper, emphasizing how it all comes together to prove your thesis statement. Give the paper a sense of finality by making sure the reader understands how you've settled the issues raised in the introduction.

You might also discuss the more general consequences of the argument, outline what the paper offers to future students of the topic, and suggest any questions the paper's argument raises but cannot or does not try to answer.

The second draft

There are four main considerations when it comes to the second draft.

1. Check how your vision of the paper lines up with the first draft and, more importantly, that your paper still answers the assignment.
2. Identify any assumptions that might require (more substantial) justification, keeping your reader's perspective foremost in mind. Remove these points if you cannot substantiate them further.
3. Be open to rearranging your ideas. Check whether any sections feel out of place and whether your ideas could be better organized.
4. If you find that old ideas do not fit as well as you anticipated, you should cut them out or condense them. You might also find that new and well-suited ideas occurred to you during the writing of the first draft — now is the time to make them part of the paper.

The revision process

The goal during the revision and proofreading process is to ensure you have completed all the necessary tasks and that the paper is as well-articulated as possible.

Global concerns

- Confirm that your paper completes every task specified in your assignment sheet.
- Check for logical organization and flow of paragraphs.
- Check paragraphs against the introduction and thesis statement.

Fine-grained details

Check the content of each paragraph, making sure that:

- each sentence helps support the topic sentence.
- no unnecessary or irrelevant information is present.
- all technical terms your audience might not know are identified.

Project proposal writing

A project proposal is a document that outlines everything stakeholders need to know to initiate a project. It's a necessary first step towards getting a project off the ground. A project proposal is usually selected during the project intake process.

A well written project proposal informs and persuades, and combines project management skills with a few other essential skills: research, data analysis, and some copywriting.

It follows conventional proposal formats that include the following elements:

- **Executive summary**. Short and to the point, the executive summary is essentially the project's elevator pitch. It states the problem clearly, addresses how your proposed project intends to solve the problem, and discusses what a successful project looks like.
- **Background or history**. This section outlines both successful and unsuccessful previous projects, including how the latter could have been handled better, with the goal of showing how the proposed project will be more successful based on the lessons of the past.
- **Requirements**. This section briefly summarizes what's needed throughout the project life cycle in terms of resources, tools, project schedule, etc.

- **Solution**. The solution section explains how you intend to approach the project and bring it to completion. It covers the project management steps, techniques, and skills needed to get things done more efficiently, as well as how to manage problems.
- **Authorization**. This section states explicitly who the project's decision-makers are and the stakeholders authorized by the client to make approval/sign-off decisions.
- **Appendix**. Any information not included in the actual proposal should be in the appendix, such as materials and resources that team members and stakeholders can use to learn more about the project.

Steps to writing your own project proposal

- **Step 1:** Define the problem
- **Step 2:** Present your solution
- **Step 3:** Define your deliverables and success criteria
- **Step 4:** State your plan or approach
- **Step 5:** Outline your project schedule and budget
- **Step 6:** Tie it all together
- **Step 7:** Edit/proof read your proposal

Plagiarism

Plagiarism is the representation of another author's language, thoughts, ideas, or expressions as one's own original work. In educational contexts, there are differing definitions of plagiarism depending on the institution. Plagiarism is considered a violation of academic integrity and a breach of journalistic ethics. It is subject to sanctions such as penalties, suspension, expulsion from school or work, substantial fines and even incarceration. Recently, cases of "extreme plagiarism" have been identified in academia.

Types of plagiarism

There are different types of plagiarism and all are serious violations of academic honesty. We have defined the most common types below and have provided links to examples.

Direct Plagiarism

Direct plagiarism is the word-for-word transcription of a section of someone else's work, without attribution and without quotation marks. The deliberate plagiarism of someone else's work is unethical, academically dishonest, and grounds for disciplinary actions, including expulsion.

Self Plagiarism

Self-plagiarism occurs when a student submits his or her own previous work, or mixes parts of previous works, without permission from all professors involved. For example, it would be unacceptable to incorporate part of a term paper you wrote in high school into a paper assigned in a college course. Self plagiarism also applies to submitting the same piece of work for assignments in different classes without previous permission from both professors.

Mosaic Plagiarism

Mosaic Plagiarism occurs when a student borrows phrases from a source without using quotation marks, or finds synonyms for the author's language while keeping to the same general structure and meaning of the original. Sometimes called "patch writing," this kind of paraphrasing, whether intentional or not**,** is academically dishonest and punishable - even if you footnote your source!

Accidental Plagiarism

Accidental plagiarism occurs when a person neglects to cite their sources, or misquotes their sources, or unintentionally paraphrases a source by using similar words, groups of words, and/or sentence structure without attribution. Students must learn how to cite their sources and to take careful and accurate notes when doing research. Lack of intent does not absolve the student of responsibility for plagiarism. Cases of accidental plagiarism are taken as seriously as any other plagiarism and are subject to the same range of consequences as other types of plagiarism.

How to avoid plagiarism

Follow these four steps to ensure your paper is free from plagiarism:

1. Keep track of the **sources** you consult in your research.
2. **Paraphrase or quote** from your sources.
3. Credit the original author in an in-text **citation** and reference list.

4. Use a **plagiarism checker** before you submit.

Plagiarism can have serious consequences, so make sure to follow these steps for every paper you write.

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