T.Y.BA.
SEMESTER - VI (CBCS)

PAPER VI(B)
EDUCATIONAL RESEARCH

SUBJECT CODE:UAEDUB603

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SYLLABUS

Objectives:

i)   To develop an understanding of concepts of educational research
ii)   To develop an understanding the aspects of educational research
iii)   To comprehend the process of educational research
iv)   To understand the significance of a review of related literature for educational research
v)   To develop an understanding the concept and techniques of sampling
vi)   To understand the concept and methodology of action research
vii)   To develop the skill of writing an action research proposal
viii) To develop appreciation for scientific inquiry involved in research.

Semester VI : Course Code: UAEDUB603 (November to March)

Module 1: Sources of Educational Data
a)   Primary and Secondary sources of educational data
b)   Sampling techniques- Probability Sampling (Simple random, systematic, stratified), Non-probability (purposive, convenience, quota sampling)
c)   Techniques in collecting educational data – observation and interview
d)   Tools in collecting educational data – rating scale, checklist, questionnaire, interview schedule

Module 2: Data Analysis
a)   Measures of central tendency and variability, normal probability curve, graphical representation of data, correlation
b)   Quantitative Data Analysis - Measures of central tendency, variability
c)   Qualitative Data Analysis – Immersion (get to know your data), standing back, reflecting. Analyzing (coding and categorisation) Synthesizing (emerging themes-bringing it all together); relating to other research work; disseminating and sharing.
d)   Interpretation and reflection of results

Module 3: Use of Computer Applications in Educational Research
a)   Review of Related Literature – Internet search, edu research websites
b)   Use of computers in data analysis
c)   Constructing graphs, maps and tables
d)   Internet research ethics
e)   Reference Work, Analysis, Report writing

Module 4: Research Report-Writing
a) Elements of writing an Educational Research Report
b) Criteria of a good research report (Comprehensibility, Authenticity, Truthfulness and Appropriateness)

Module 5: Practical work in Educational Research:
a. Each student is expected to construct a Rating Scale and an Interview Schedule, on any relevant topic in the TYBA Education syllabus, or on an educational problem
b. Prepare a rubric for evaluating an educational research project.

Reference Books:
Aggrawal J.C. Educational Research: An Introduction
Best JW & Kahn J Research in Education, Prentice Hall of India, 2007
Ganesan Raja New Themes for Educational Research & Development
NeelKamal Publications, Hyderabad, 2013
Khan Mohd Sharif Educational Research, Ashish Publishing House,2000
Koul Lokesh Methodology of Educational Research, Vikas Pubg House
Lulla B.P. Essentials of Educational Research
Mcniff Jean Action Research: Principles & Practice
Pathak RP Statistics in Educational Research, Kanishka Publrs
Rao Usha Conducting Educational Research
Rao Usha Action Research
Sharma RA Fundamental of Educational Research, Loyal Book Depot, Meerut, 1985
Singh Yogeshkumar Research Methodology, APH Publ Corp, NDelhi,2007
Sukhia SP,) Essentials of Educational Research, Allied Publishers, Bombay, 1989
Mehrotra PV, Mehrotra RN)
Tharayani Action Research

Reference Websites:
Fox Nick How To Use Observation In A Research Project,
Trent Focus Group, 1998
http://web.simmons.edu/~tang2/courses/CUAcourses/lsc745/sp05/observation.pdf

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SOURCES OF EDUCATIONAL DATA

A. Primary and Secondary Sources of Educational Data

Unit Structure :

1.1 INTRODUCTION

In order to answer specific research questions, test hypotheses, and assess findings, data collection is the process of systematic and organised gathering and measurement of information on variables of interest. All academic disciplines, including the humanities, social sciences, business, and natural and applied sciences, use data collection as a regular component of research. The importance of guaranteeing precise and true collecting, despite methods differing by profession, is continuous.

Data gathering is one of the most important stages of conducting research. even with the world's best research design, if you are unable to gather the necessary data, your project will not be successful. Data collecting is a highly difficult task that requires careful planning, diligence, endurance, patience, and a variety of other skills to be able to execute the task successfully. The selection of a sample from a certain population comes

after the first phase in data collecting, which is determining the kind of data that is required. Then, a particular instrument must be used to gather the data from the selected sample.

1.2 LEARNING OBJECTIVES

After completing this unit, you ought to be able to:

➢   Able to understand the definition and forms of data,

➢   Explain and differentiate between primary and secondary data,

➢   Describe various techniques for gathering primary data and the benefits and drawbacks of each,

➢   Know about some important sources of secondary data.

1.3 MEANING AND TYPES OF DATA

A statistical investigation deals with the massive proportion of connected facts presented as numerical values. Data is the general term for this information that is presented as numerical figures. However, data can also sometimes take the shape of a general description or an explanation. Data are a particular kind of information that are frequently gathered through observation, surveys, requests, or are created as a result of human action for the purpose of the study, to say it simply.

Types of data

Data is divided into two categories based on the sources and methods used to obtain them:
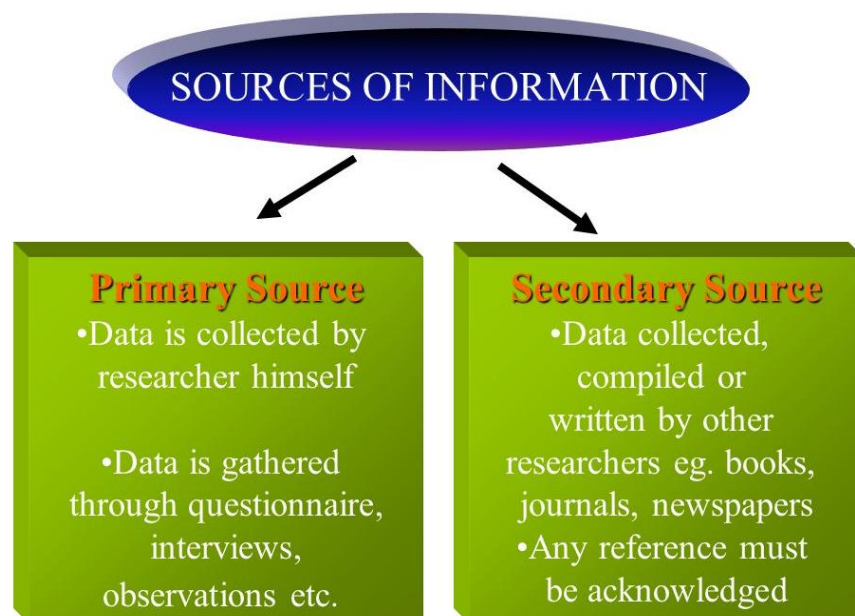
1.4 PRIMARY AND SECONDARY SOURCES OF DATA

The technique used to collect data has a significant impact on the statistical analysis. There are two sorts of information collection methods that can be employed in research: primary data and secondary data (Douglas, 2015). The term "primary data" refers to information that is first obtained by the researcher, as opposed to "secondary data," which refers to information that has already compiled or created by others. The many differences between primary and secondary data are briefly covered in this unit.

1.4.1 Primary data

Tests, surveys, and interviews are just a few of the techniques researchers use to collect primary data, which is information that comes directly from primary sources. Primary data, often acquired from the original source, is seen to be the greatest kind of data for study. Let's say you wanted to discover how well-liked a movie star was among pupils. For this, you will need to conduct an extensive amount of interviews with school children in order to gather the necessary data. The information you receive is a primary data example.

Primary data, which has not yet been made public, is more reliable, accurate, and impartial. Because primary data hasn't been updated or altered by humans, it has a higher level of validity than secondary data. A study can be done without secondary data, but one that focuses entirely on it is less trustworthy and may contain biases because secondary data has already been manipulated by individuals.

Uses and advantages of primary data

The major advantages of this type of data are as follows:

➢ The data's original and independent collection boosted its authenticity.
➢ Data dependability is improved by directly collecting pieces of information.
➢ Used in both quantitative and qualitative research approaches,
➢ Data from primary sources can be used to uncover hidden information.
➢ Primary data can be utilised as secondary data once they have been analysed.

Disadvantages of Primary Data

Following are the disadvantages of primary data:

➢ The accuracy of the respondents' information affects reliability.
➢ Information might be slanted.
➢ Being both pricey and time-consuming.
➢ A lack of research experience.
➢ Requires field work.

1.4.2 Sources of primary data

As was previously said, primary data refers to information that a researcher collects for the first time specifically for his or her own purposes. Primary data sources are scarce, and often it is challenging to collect data from them due to either a lack of people or a lack of collaboration. There are a few ways to get primary data, including observation, interviews, schedules, and questionnaires. Let's learn more about them in depth.

Observation Method

The Concise Oxford Dictionary defines observation as, "accurate watching and noting of phenomena as they occur in nature with regard to cause and effect or mutual relations". So, in addition to scientific looking, observation also includes listening, reading, and thinking about the phenomena that are being observed. There are three steps in it. They are: perception, focus or attention, and sensation.

Instead of relying on third parties' reports, the researcher uses this approach to get information directly through observation. It is a technique for acquiring relevant information without posing any particular questions and, in some cases, even with the respondents' consent. This method of data collecting is extremely effective in behavioural surveys. For example, a research on the behaviour of attendees at trade shows, studying the attitude of employees while they are working, clients' negotiating tactics, etc.

Participant Observation: In the participant observation approach, the researcher actively participates in the day-to-day activities of informants or organizations and watches them in action.

Non-participant Observation: In the non-participant observation method, the researcher will observe from the outside rather than interact with the informants or organizations.

Survey Method

The survey method is one of the primary methods for gathering quantitative data about the constituents of a population. Surveys are used to collect data in a range of scenarios in both the public and private sectors. Any subject area is open to the researcher while conducting a survey. The researcher contacts the respondents directly by phone, email, or another means. The information acquired is extremely accurate, up to date, and relevant to the issue, despite the fact that this method is time-consuming, expensive, and labor-intensive. The two most common survey types used to gather data are online and offline surveys

Online Survey: Online surveys are carried out using mobile phones, PCs, tablets, and other internet-capable devices. Responders can receive them via email, social media, or websites.

Offline Survey: Offline surveys, however, can be finished without an internet connection. A paper-based survey is the most common type of offline survey.

One of the most effective and popular methods for gathering primary data in educational research is an interview. We watch interviews on TV networks on a daily basis about a variety of subjects including social, educational, business, sports, and budget-related issues. In the words of **C. William Emory**, "personal interviewing is a two-way purposeful conversation initiated by an interviewer to obtain information that is relevant to some research purpose". Thus, a meeting between two people to gather information for a planned study is essentially what an interview is. The individual conducting the interview is referred to as the interviewer, whereas the informant is the individual being interrogated. It should be noted that the information acquired using this method involves more than just the researcher and informant speaking; it also involves other non-verbal cues such gestures, facial expressions, speech volume, and looks. The researcher can gather a wide variety of data using this strategy in a thorough and broad manner.

Direct Personal Interview: The researcher meets the study's informants one-on-one, asks them questions pertaining to the investigation, and uses direct personal interviewing techniques to collect the necessary data. As a result, if a researcher wanted to gather information on the spending patterns of Delhi University (DU) students, he or she would visit the university, get in touch with the students, conduct interviews with them, and gather the necessary data.

Indirect Personal Interview: Another interview strategy where information cannot be directly obtained from the study's informants is this one. In this strategy, the investigator makes contact with witnesses or third parties who have a close connection to the subjects of the investigation and who can provide the information needed. For instance, a probe of a pattern of bribery at a workplace It is inevitable in such a situation to obtain the desired information indirectly from others who may know them. The CBI similarly gathers information regarding the offences. The greatest caution must be used to ensure that the people being questioned are fully informed of the details of the issue being investigated and are not seeking to distort the truth.

Structured Interview: In a structured interview, candidates are asked predefined questions, and their responses are recorded in a specified format. This is helpful when many investigators are tasked with conducting large-scale interviews. The interviewer's prejudice can be minimised by the researcher. This method is additionally known as a formal interview.

Un-structured interview: In an unstructured interview, the investigator might not have a predetermined list of questions but may just have a few important topics to base the interview on. Such interviews are typically done as part of an exploratory survey when the researcher is unsure exactly what kind of data will be collected. Additionally known as an informal interview. This technique is typically used in conjunction with other data collection techniques when doing business-related research.

Nowadays, interviews conducted over the phone or on a mobile device are frequently utilised to gather the required data for small surveys. For instance, banks may speak with credit card users about the quality of the services they are receiving. In developed regions, this method is especially used in industrial surveys.

Questionnaire Method

In this approach, items are delivered individually or via mail by requesting to many respondents that they complete it and return it. A mail questionnaire is one that is sent out via postal mail to respondents. Depending on the study's purpose, the amount of time and resources available, and other factors, questionnaires may occasionally be distributed through email. The informants read the questions after getting the surveys and enter their answers in the appropriate spaces on the form. For a speedy and high response rate, self-addressed envelopes is the preferable way to deliver the questionnaire.

Schedule Method

As was already said, this is a list of questions used to gather information from the field. Typically, the researcher or the enumerators fill this out. For the aim of gathering data when the study's scope is broad, the researcher appoints individuals known as enumerators. They are taking interview of the informants during their visits, asking them the items on the schedule in the order they are listed, and recording their answers in the space designated on the schedule for the responses. For instance, population surveys are carried out using this technique all over the world. In contrast to a schedule, which is filled out by the researcher or enumerator, a questionnaire is filled out by the informants.

By means of regional reporters and correspondents

This approach involves assigning local agents or reporters to various locations within the area under study. When frequent information needs to be collected, government entities typically use this strategy. Newspapers, periodicals, radio, and TV news stations can all benefit from using this technique. When routine information is necessary but high precision is not crucial, this strategy has been utilised.

Case Study Method

This is another methods of primary sources of data collection in which researcher wants in-depth information of a particular individual, specific group, circumstance, or community. In this method data are typically acquired from a specific sample group and by employing a variety of techniques (e.g. observations & interviews). The case history, or personal history of the patient, is where the case study research methodology first appeared in clinical medicine. The case study methodology, also known as the idiographic approach, frequently entails just observing what occurs to, or reconstructing, "the case history," of a single participant or set of participants (such as a school class or a particular social group). Case studies give researchers the chance to look into a subject in much more detail than

they might be able to if they tried to deal with a lot of research subjects (nomothetic technique) with the intention of "averaging" their responses.

In this study, almost all facets of the participant's whole life are examined in order to look for trends and reasons behind behaviour. The idea is to apply what is learned from analysing one situation to a variety of others. Unfortunately, case studies can involve a great deal of subjectivity, making it challenging to extrapolate findings to a wider audience.

1.4.3 Secondary data

Secondary data are those that which is collected by researcher from different reports, books, internet websites and have already statistical analysis or have been acquired by someone else. They can be acquired from any source, such as a website, or through published sources including government reports, records, newspapers, and books written by economists. Data are therefore primary to the source that first gathers and processes them, and secondary to all other sources that use them subsequently. Utilizing secondary data helps you save money and time. For instance, after gathering information on the movie star's popularity among students, you issue a report. If someone utilises the information you gathered for a comparable study, it becomes secondary data.

There are two distinct study threads from which secondary data might be gathered:

Quantitative: Census, housing, social security, election statistics, and other relevant databases are examples of quantitative data.

Qualitative: Field notes, observation logs, focus group transcripts, semi-structured and structured interviews, and other personal research-related materials.

Uses and advantages of secondary data

The major advantages of this type of data are as follows:
- ➢ These data can be handled fast.
- ➢ Time and cost balance is still preserved.
- ➢ Information is already examined by professionals.
- ➢ Applied to modify or reinterpret existing data.
- ➢ Helpful for authors, thinkers, and philosophers while inventing new concepts.
- ➢ Less field work is done.

Disadvantages of secondary Data

Following are the disadvantages of secondary data:
- ➢ There is no accepted measure of validity.
- ➢ Need knowledge.
- ➢ Secondary data is always less accurate and reliable than primary data.

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1.4.4 Sources of secondary data

Primary data collection is sometimes impossible due to time, financial, and human resource limitations. Therefore, secondary data must be used by researchers. Let's now talk about the numerous sources that one might use to obtain secondary data.

A. Documentary Sources of Data

Paper Source is another name for this sort of secondary data source. The two basic types of documentary data's original data are:

1) Published Sources

Statistics on business, trade, commerce, health, education, and other areas are gathered and published by several national and international organisations, semi-official reports, from countless committees and commissions, and private publications. These publications from different organisations serve as helpful secondary data sources. These are listed below:

➢ **Government Publications: Both the government (central and state)** publish quarterly and annually different secondary data in the form of current information along with statistical data on various subjects. For example, Reports of National Council of Applied Economic Research (NCEAR), Monthly Statistical Abstract, All India Survey on Higher Education (AISHE), National Income Statistics, Economic Survey, Federation of Indian Chambers of Commerce and Industry (FICCI), Central Statistical Organisation (CSO), Indian Council of Agricultural Research (ICAR), etc.

➢ **International Publications:** International Monetary Fund (IMF), The United Nations Organisation (UNO), Asian Development Bank (ADB), International Labour Organisation (ILO), World Bank, etc., also publish relevant data and reports.

➢ **Semi-official Publications:** Publishing organisation such as agencies reports, district boards, panchayats, etc. are published under these authorities.

➢ **Committees and Commissions:** Secondary data is provided by a number of committees and commissions that the State and Central Governments have created. For instance, the report of the Fifth Pay Commission or the Tenth Financial Commission, etc.

➢ **Private Publications:** Information on various aspects of economics, commerce, and trade is published in newspapers and periodicals. For instance, the Economic Times, Financial Express, and journals like Business Today, the Indian Journal of Commerce, the Journal of Industry and Trade, and Economic and Political Weekly. Like the Indian Institute of Finance,

certain research and financial institutions also release their yearly reports. Reports written by academics, universities, and others also serve as secondary sources of information.

2) Unpublished Sources

Not all of the data or information that organisations or people maintain must be available in published form. A few research institutions, trade associations, universities, academics, private businesses, and other organisations gather data, but they typically don't publish it. This information is available in their registries, files, etc.

B. Electronic Sources

Electronic media can also be used to access the secondary data (through Internet). By typing your subject for which the information is needed you can receive information from various sources by going to websites like google.com, yahoo.com, msn.com, etc. Additionally, the following online journals and CDs contain secondary data:

Electronic Journal	http://businessstandard.com
Electronic Journal	http://www.businessworldindia.com
Census of India	http://www.censusindia.net
Union Budget and Economic Survey	http://www.indianbudget.nic.in
Directory of Government of India	http://goidirectory.nic.in
Institutions	
Online Education Database	https://www.oecd.org
All India Survey on Higher Education	https://aishe.gov.in
Ministry of Education	http://education.gov.in
Ministry of Tribal Affairs	https://tribal.nic.in

1.5 CONCLUSION

It can be inferred from the foregoing that each strategy has some drawbacks or another. In reality, the method to be used relies on the type of inquiry, the goal and scope of the inquiry, the money set aside for data collecting, the level of accuracy needed, and the deadline for data gathering.

B. Sampling Techniques- Probability and Non- probability sampling

Unit Structure :

1.1 INTRODUCTION

The first step in conducting a research study is to best way to approach knowledge about the topic. In other words, you need to gather information. This information is necessary to verify all existing judgments or theories you may have. Assume for a moment that you are a researcher who wants to examine the relationships between undergraduate students at Central Universities' study habits and motivation for achievement. You must choose a small number of typical cases or samples from among all of the Central Universities' undergraduate students for this. The concept of population, sample, and various sampling methodologies must be thoroughly understood in order to carry out the selection process. We will introduce the ideas of sample and population to you in this Unit. We shall also discuss the characteristics of a good sample and the various methods of sampling.

1.2 LEARNING OBJECTIVES

On the completion of this Unit, you should be able to:

➢ Define the terms, population and sample,

➢ Describe the steps in the sampling process and the various methods of sampling,

➢ Define a probability sample and describe the various types of probability sample,

➢ Define a non-probability sample and describe the various types of non-probability sample.

1.3 DEFINITION OF POPULATION AND SAMPLING

We must clarify a few basic words before going into detail about sampling techniques. The word "population" refers to all individuals who meet a particular set of requirements or criterion. For example, the entire population of India is referred to as the population of India. An element is a single person within any given population. A sample is when only a portion of the population is chosen; a census is when the entire population is included.

A sample is a subset of the population that represents the entire group. When the population (or universe) is too large for the researcher to survey all its members because of its cost, the number of personnel to be employed, or the time constraint, a small carefully chosen sample is extracted to represent the whole. The method you use to select this sample is known as your **Sampling Technique**.

1.4 CLASSIFICATION OF SAMPLING METHODS

Sampling methods are classified into Probability or Non-probability. If the purpose of research is to draw conclusions or make predictions affecting the population as a whole (as most research usually is), then one must use probability sampling. But, if one is only interested in exploring how a small group, perhaps even a representative group, is doing for purposes of illustration or explanation, then one may use non-probability sampling. Let us first discuss probability sampling.

1.4.1 Probability Sampling

In probability samples, each member of the population has a known non-zero probability of being selected. The key point behind all probabilistic sampling approaches is random selection. The advantage of probability sampling is that sampling error can be calculated, which is the degree to which a sample might differ from the population. Probability methods include random sampling, systematic sampling, and stratified sampling. We shall discuss each of them.

A.   Random Sampling

Random sampling is the purest form of probability sampling. Simple random sampling is a method of selecting a sample from a finite population in such a way that every unit of the population is given an equal chance of being selected. The prerequisite for a random sample is that each and every item of the universe has to be identified. Random selection is effective in a clearly defined population that is relatively small and self-contained. When the population is large, it is often difficult or impossible to identify its each and every member, so the assemblage of available subjects becomes biased.

Disadvantages associated with simple random sampling include (Ghauri and Gronhaug, 2005):

➢   A complete frame (a list of all units in the whole population) is needed;

➢ In some studies, such as surveys by personal interviews, the costs of obtaining the sample can be high if the units are geographically widely scattered;

➢ The standard errors of estimators can be high.

B. Systematic sampling

Systematic sampling is also called an "Nth-name selection" technique. After the required sample size has been calculated, every Nth record is selected from a list of population members. As long as the list does not contain any hidden order, this sampling method is as good as the random sampling method. Its only advantage over the random sampling technique is simplicity. Systematic sampling is frequently used to select a specified number of records from a computer file.

Systematic sampling provides a more even spread of the sample over the population list and leads to greater precision. The process involves the following steps:

i) Make a list of the population units based on some order - alphabetical, seniority, street number, house number or any such factor.

ii) Determine the desired sampling fraction, say 50 out of 1000; and also the number of the Kth unit. [$K=N/n= 1000/50 = 20$].

iii) Starting with a randomly chosen number between 1 and K, both inclusive, select every Kth unit from the list. If in the above example the randomly chosen number is 4, the sample shall include the 4th, 24th, 44th, 64th, 84th units in each of the series going up to the 984th unit

C. Stratified sampling

Stratified sampling is a commonly used probability method that is superior to random sampling because it reduces the sampling error. A stratum is a subset of the population that shares at least one common characteristic. Examples of strata might be males and females, or managers and non-managers. The researcher first identifies the relevant strata and their actual representation in the population. Random sampling is then used to select a 'sufficient' number of subjects from each stratum. 'Sufficient' refers to a sample size large enough for the researcher to be reasonably confident that the stratum represents the population.

Stratified sampling is most successful when,

➢ The within the variance of each stratum is less than the overall variance of the population;

➢ When the strata in the population are of unequal size or have unequal incidence; and

➢ when sampling is cheaper in the strata.

The steps involved in the stratified sampling are given as follows:

i) Deciding upon the relevant stratification criteria such as sex, geographical region, age, courses of study, etc.

ii) Dividing the total population into sub-populations based on the stratification criteria.

iii) Listing the units separately in each sub-population.

iv) Selecting the requisite number of units from each sub-population by using an appropriate random selection technique.

iv) Consolidating the sub-samples for making the main sample.

1.4.2 Non-probability Sampling

In non-probability sampling, members are selected from the population in some non-random manner. In this method, the degree to which the sample differs from the population remains unknown. Non-probability methods include Convenience sampling, Judgment sampling, Quota sampling and Snowball sampling. Let us now discuss each of the nonprobability sampling methods.

A. Purposive sample

A purposive sample is also known as a judgement sample. This type of sample is chosen because there are good reasons to believe that it is a representative of the total population. The researcher selects a sample based on his /her experience or knowledge of the group to be sampled. For example, for study of 'gifted' children,the researcher, on the basis of his/her past experience, selects certain individuals giving extra ordinary performance in school while excluding all others from the sample.

A purposive sample differs from convenience sample in that the researcher uses experience and prior knowledge to identify criteria for selecting the sample rather than selecting those who happen to be available. It is the clear criteria which forms the basis for describing purposive and defending purposive samples. Much of the sampling in qualitative research is purposive as the primary focus is on identifying subjects who can provide rich information for in-depth study about the particular topic and setting, not subjects who necessarily represent some larger population. Representativeness is secondary to the quality of the participants' ability to provide the desired information. Within the domain of purposive sampling are about 16 different types of specific approaches that may be used in qualitative researches. A few among these are:

Random purposive sampling When the purposive sample is larger than one can handle , one may select a required number of subjects from the purposively selected subjects. This is known as random purposive sampling technique. For example, if 20 potential

participants were purposively identified by the researcher, but only 10 participants could be studied , a random sample of 10 from the 20 potential participants would be chosen.

B.   Convenience sampling

Convenience sampling is used in exploratory research where the investigator is interested in getting an inexpensive approximation of the fact. As the name implies, the sample is selected because it is convenient. Also called haphazard or accidental, this method is based on using people who are a captive audience, just happen to be walking by, or show a special interest in research. The use of volunteers is an example of convenience sampling. This method is often used during preliminary research efforts to get a gross estimate of the results, without incurring the cost or time required to select a random sample.

C.   Quota sample

Quota sample is another type of non-probability sample which is most often used in survey research when it is not possible to list all the members of population of interest. It involves the selection of sample units within each stratum on the basis of the judgement of the researcher rather than on calculable chance of the individual units being included in the sample. Suppose a national survey has to be done on the basis of quota sampling. The first step in quota sampling would be to stratify the population region wise like rural/ urban, administrative districts etc. and then fix a quota of the sample, i.e. how many from each stratum , to be selected. In the initial stage quota sampling is similar to stratified sampling. However, it may not necessarily employ random selection procedure in the initial stage in exactly the same way as probability sampling. The essential difference between probability sampling and quota sampling lies in the selection of the final sampling units. The quota is usually determined by the proportion of the groups. Suppose a researcher wants to study the attitude of university teachers towards distance education. First of all, he/she may stratify the university teachers in the category of sex and then as professors, readers and lectures. Later, he/she may fix quotas for all these categories. In this way, the quota sample would involve the use of strata but selection within the strata is not done on a random basis. The data are obtained from the easily accessible individuals. Thus, members who are less accessible are underrepresented.

The advantages of quota sampling are, its being less expensive, convenient, and more suitable in the case of missing or incomplete sampling frames.

C. Techniques in Collecting Educational Data

Unit Structure :

1.1 INTRODUCTION

Data collection is a systematic and organized process of gathering information on variables of interest, measuring, testing hypotheses, evaluating conclusions, in order to answer specific research questions.

Academic subjects including humanities, social sciences, business, all academic disciplines including humanities, social sciences, business, and natural and applied sciences are all used as regular components of data collection.

Although methods of research differ from profession to profession, continuous data collection is one of the most important stages of conducting research. The best research structure in the world, if you are unable to gather the necessary information, your project will not succeed. Data collection is a very difficult task that requires careful planning, diligence, patience, patience, and various other skills to successfully select a sample from a specific population to be able to execute the task.

After the first step of collecting information, it is necessary to decide on the type of information. Then, a specific instrument must be used to collect information from the selected sample.

1.2 LEARNING OBJECTIVES

After completing this unit, you will be able to:

- Be able to understand the definition and nature of information,
- Able to explain and differentiate between primary and secondary information,
- Describe various techniques for collecting primary data and state the advantages and disadvantages of each.
- Learn about some important sources of secondary information.

1.3 OBSERVATION

Observation is a greater herbal manner of collecting information. It seeks to check what human beings assume and do. By looking them in motion as they specify themselves in diverse conditions. It is the system wherein one or extra character observes what's taking place in a few actual lifestyles state of affairs and classify and document happenings in step with a few deliberate scheme. Observation is extra than simply looking. It is calling systematically and noting humans, conduct, events, settings and surroundings. The essential function of an observation is that it offers an investigator the possibility to acquire stay information from herbal going on social conditions.

According to Marshall and Rassman (1989),"The systematic description of events, behavior in social setting chosen for study."

According to Bernard (1994),"Observation require is certain amount of description and impression management. Observation is a more natural way of gathering data. Restriction imposed in questionnaire and interview are missing in observation."

1.3.1 Types of Observation

1. **Participant observation:** In participant observation the researcher acts as a part of that group. He tries to gain in-depth understanding of the situation by becoming the member of that group. The observer interacts with the other members of the groups, take part in different activities and observe their behavior by becoming the member of their group.

2. **Non-participant observation**: In Non-participant observation, the researcher doesn't participate in the group but observe from a distance. Here researcher is a passive observer. He observes group activities without participating in them. Purely non participant observation is not possible and often yields unreliable information.

3. **Structured observation**: In structured observation the researcher plans properly in a systematic way to conduct observation.

4. **Non-structured observation**: In non-structured observation there is no proper planning. Researcher just observe and record.

1.3.2 Stages in the process of Observation

1. Planning for Observation

Following points should be kept in mind while conducting observation:

- Definition of unique project.

- A suitable organization of challenge to note.

- Extent of statement-person or organization.

- Calculation of duration of every remark interval.

- Determining approximately the devices and shapes of recording and bodily role of the observer.

- Discovering the unique situation necessary for participants.

- Making of right instrument for writing down comments.

- Getting person educated in phrases of proficiency of a spectator.

2. Implementation of Observation

A professional implementation demands:

- Accurate association of unique situations for the respondents.

- Presuming the right bodily role for noticing.

- Concentrating interest on the unique task or units of devices under monitoring.

- Remarking immediately, the period and quality of durations and periods determined upon.

- Holding properly the recording gadgets to be applied.

- Making use of the experience acquired in phrases of proficiency.

3. Noting and Interpreting Observations

The two strategies for recording observation are -

- Concurrent- while the spectator is going `on noting his statements concurrently with the prevalence of the situation discovered, when sample was collected.

- Right after the noticing - while the spectator write down his statements now no longer concurrently together along with his real remark procedure, however at once after he has located for a unit of time, at the same time as the information are nevertheless sparkling in his brain.

1.3.3 Merits and Demerits

Merits

- Observation as a procedure is subtle and made genius to a quality that it's far possibly to make build an essential offerings in descriptive researches.

- Important components of character those are explicit in behavior may be studied at once.

- By primary observation, the researcher can accumulate, examine and put down accurate data.

- Much affability in phrases of conduction.

- Give further suggestions for future researchers.

- No technological knowledge is required in collecting data and is one the simple way of collection.

- Better technique to map out hypothesis.

- This method is very simple to use and is frequently used in sciences.

- In some cases observation is the only available tool to get desired information.

- Permission of the respondents is not necessary in order to record them. one watches from a gap and write down his observations.

Demerits

- Takes long time to collect data in comparison to other methods.

- Greater chances of subjective biasness.

- Much chances of influencing the behaviour of observed group.

- Many of the constructs like liking, feelings and attitude the spectator may not get accurate data.

- Results from the observation are not considered authentic if they can't be used for lab experiments.

- Sometimes the results of two spectators noticing the same situation differs which leads to faulty perceptions.

- It is time consuming and also highly costly.

1.4 INTERVIEW

Interview is the verbal conversation between two people with the intent of getting authentic information for the sake of research. In perspective of research, the interview is a bilateral method where information is acquired by words of other people. In this technique information is given face to face to the interviewee. Research questions always emphasis on particular questions related to the query. It is very simple, easy and reliable method of collecting data. Thus it is believed that information acquired from interviews is more authentic than the other methods.

According to Monett et al (1986:156),"An interview involves an interviewer reading questions to respondents and recording their answers."

According to Burns (1997:329),"An interview is a verbal interchange, often face to face, though the telephone may be used, in which an interviewer tries to elicit information, beliefs or opinions from other person."

1.4.1 Forms of Interviews

1. **Focus group**: Focus groups are used to collect collective information and views from different people.it is the process of collecting data through interviews with group of people from 4 to 5. Researcher initiate the discussion by asking few questions and then eliciting the responses. These are useful when interaction among individuals

produces authentic information. While conducting the focus group interview keep in mind that each and every participant get equal chance to put forth his points.

2. **Structured interview**: These are those interviews in which researcher has already prepared the procedure to be followed and are standardised in its process. There is not much freedom to the researcher and he has to follow the procedure already planned. Same type of questions are given in same manner to every individual and responses are recorded.

3. **Unstructured interview**: The main advantage of this interview is that there is complete freedom in conducting the interview as there are not set procedures already set. Researcher can accordingly mould questions in order to get in-depth understanding and information about the phenomenon. They are usually labelled as focused, depth and non-directive. These are extremely useful in qualitative researches where on has to explore the situation deeply.

4. **Semi-structured interview**: These interviews are the amalgamation of structured interviews and non-structured interviews. In semi-structured interviews interviewee always have option to make changes whenever required. Here researcher can get information deeply and according to his objectives by making changes wherever necessary.

5. **Personal interview**: Personal interviews are most frequently used interviews where questions are asked directly from the respondents personally. It is a both way communication to get information from the respondents.

6. **Phone interview**: One of the simple and reliable way to get information. It is a data collection method where the researcher communicates over phone with the respondents. Phones are used to conduct in-depth interviews in a faster, easier and reliable way.

7. **Online interview**: these represents latest form of data collection. Increasing access to technology has made interviewing at distance possible.it is conducted through chat, video, or audio platform.

1.4.2 Guidelines for conducting interviews

Following steps should be kept in mind while conducting interview:

Pin down the interviewees

Identify the interviewees by using one of the purposeful sampling technique.

1. **Choose the interview to be used:** The premise of conducting a research interview is to choose your method. It is necessary to use right method. To select a method, one can keep in mind following variables like your respondents age and habits. Consider telephone

interviews, focus group interviews, email interviews or some other method.

2. **Establish interview questions and procedure:** Other step is developing your interview questions and procedure. Researcher must prepare a framework to conduct the procedure smoothly. Interview must be audiotaped and brief notes must be taken during the interview. Suitable place should be located for conducting the interviews. Consent must be taken from the interviews to partite in the study. Have a plan but be little flexible.

3. **Facilitate the interview:** Once the interview is planned use every possible way to felicitate the interview. Use experts to watch over the interview. Use probes to obtain the additional and in-depth information .be courteous and professional while conducting the interview or when the interview is over.

4. **Analyse the data obtained:** After the competition of research interview one can analysis the obtained data. Go through the notes properly and listen to the audio recording of the interview so that even single information should not be missed. Researcher can also have follow up interviews in order to gain additional information.

Advantages of Interview

- Interview permits the investigator to collect full details about of the situation.

- It makes peaceful flow of data from the participants to the investigator.

- First-hand information is obtained as the investigator directly acquires the information from the actual source.

- It is more malleable in approach than other techniques as in case of some misinterpretations, clarification can be made at a spot.

- This method is cheap as most of the respondents provide information for the free.

- This method is fast and time saving.

- This method enables the researcher to find individual feelings and attitudes of the respondents.

- The information obtained here is recorded for future references.

Limitations of Interview

- Time consuming data collection method.

- The respondents may hide information due to lack of trust and confidence in the interviewer.

- Some respondents may intentionally give wrong information to mislead the research.

- The outcomes of interview method are to be contingent on the strength of the respondents' ability to remember.

- This method is affected by language barrier.

- Interview method can easily divert the intention of the researcher.

1.5 CONCLUSION

We need information more and more to keep our pace of progress right, so information is becoming the basis/foundation of our life. That is why the "Information Age" appears to exist. If the researcher consciously studies the information obtained through various means, not only a fountain but a waterfall of knowledge is obtained, as a result the research work becomes more motivating.

1) Data collection determines the direction and direction of the research.

2) Information obtained through primary sources is more useful.

3) Questionable issues can be resolved quickly through observation.

4) The "reality" of individuals and society comes to light through surveys.

5) Quality research is done only through information therapy.

D. Tools of Data Collection

1.1 INTRODUCTION

Data collection tools are essential part of educational research. These are required to assist in data analysis and interpretation. These tools can be rating scales, questionnaires or interview schedule. In coming section we will study more about it.

A. Rating Scale

Rating scale is common used method for online as well as offline surveys. "Rating is a term applied to expression of opinion or judgment regarding some situation, object or character. Opinions are usually expressed on a scale of values. Rating techniques are devices by which such judgments may be quantified - Barr, et al (1953). It mainly contains close ended questions and also different set of categories for participants. It is useful tool for acquiring information related to qualitative as well as quantitative studies. The most frequently used scales are Likert scale and 1 -10 rating scale. It is one of the popular tool for conducting market researches. This scale is mostly applied to gather information about the performance of the product, job satisfaction of the workers, customer satisfaction etc.

Types of Rating Scale

1. Numerical Rating Scale

It is the simplest rating scale used. Numerical rating scale has answers in the form of numbers despite the fact that not each number corresponds to some characteristics or meaning.

2. Descriptive Rating Scale

In descriptive rating scale, every option of the answer is explained deeply to the respondents. A numerical value is not necessary associated to the answer options in the descriptive rating scale. It is also termed as 'Behavioral Statement Scale'.

3. Graphic Rating Scale

Graphic rating scale gives the options to the answer on the scale of 1-3, 1-5 etc. Respondents rate their option on the line or scale. The most frequently used graphic rating scale is Likert scale.

4. Percentage rating scale

It is applied when the researcher wants early ratings with almost same number from participant to participant. This techniques require the evaluator to keep the rates among non-identical unique percentage groups or into different percentiles or quartiles.

5 Comparative rating scale

The investigator come up with a point of contrast for participants in order to give answers to the proposed problems. Hence, all the participants have a similar view of comparison for choosing the answers.

Principles for preparing rating scales

- It relates directly to the learning objectives.

- Needs to be confined so that performance can be observed.

- It should clearly define the specific trait or mode of behavior.

- Must keep some space in the rating scale card for the rater to give extra remarks.

- Near about 3 to 7 rating positions must be provided.

- There should be option or provision to deduct the items.

Steps in developing a rating scale

- Acknowledge the targets.

- Make the list of particular targets.

- Set forth the observable targets.

- Set out the ratings in qualitative as well as quantitative terms.

- Sum up the ratings by adjoining all the outcomes.

- Make total scores in order to differentiate the students.

Characteristics of a rating scale

- Provides a malleable approach to compute the results of the participants.

- It makes quantitative judgment about qualitative attributes.

- Frequently used tool to carry out well planned observations.

- Help in getting valuable judgments about the characteristics of one participant by another participant.

Advantages of Rating Scale

- These are adjustable and very malleable research device.

- They are used for rating of attentiveness, point of view, and individual attributes.

- They record both qualitative and quantitative aspects about performances.

- Helpful in measuring specified outcomes or objectives of education which are important to the teacher.

- It is useful for teachers to give rating to their students regularly on various attributes such as honesty, regularity, oral tests etc.

- These are adaptable and flexible.

- These can be administered on large number of students.

- It decreases the chances of the biasness and uncertainness.

Limitations of Rating Scale

- It is not always possible to rebuild the rating about many aspects of an individual.

- There are chances of decreased objectivity due to misuse.

- There are chances of subjectivity that leads to irrational and reckless scale.

- Evaluator can lack consistency during interpretation of results

- There are few sources which leads to error in scale and thus influence the rationality of the scale;

- Vagueness

- Respondents point of view

- Respondent's nature

- Opportunity for adequate observation.

B. Check List

The checklist is a simple tool that contains proper list of expects items of performance and attributes which the researcher checks. It contains words, phrases, sentences and paragraphs following which researcher take down a check mark to denote a existence or non-attendance of whatever is being observed. Maximum times these are used for descriptive purposes. The main highlight of check list is that nothing should be overlooked. It is an important tool for collecting information for educational surveys. Very common example of checklist is "to do list.'

An example of checklist is given below;

Who is your favorite person in your family?

Mother ( )

Father   ( )

Sister   ( )

Brother ( )

Some Common Styles of Constructing Check Lists

Types of Check Lists -

1. It is very simple form of the all, all the elements found in a situation are to be examined, and a participant is asked to fill P in the space provided besides the options.

    Music ( )

    Sports period ()

    Dance ()

2. In second form, the respondents are told to mark yes or no and are advised to enclose or underscore the answer to the given question.

3. In the third type is that in which only positive items are mentioned and respondents have to put P in a column in the right.

4. In the fourth form, the elements are given in the sentences and the most suitable answer out of the given options is to be ticked, marked or encircled.

Guidelines on Construction of a checklist

Following points given below should be kept in mind while constructing questionnaire;

*   The items in the checklist should be in a continuation form.

*   The items must be properly divided in subgroups.

*   Experts' judgment must be taken and accordingly list should be formulated.

*   Items enlisted must be in proper sequential or psychological order.

*   Terms must be clearly defined which are being used in the list.

*   Researcher must properly review the literature and know which type of list to be formed.

*   It should be brief yet comprehensive.

*   A pilot study must be conducted to know the validity of checklist.

Advantages of checklist

*   Checklist allows researcher to compare responses on broad level.

*   It is a very simple method for recording observation.

*   It is compatible with subject matter areas.

*   It is very useful tool in evaluating learning activities.

*   If it is properly made it provides direct attention to the observer.

*   Personal and social development can be checked.

- Helpful in evaluating those activities which are divided into many sub-categories.

- It reduces the chances of error in observation.

- It is helpful to students as they can do self-evaluation with its help.

Disadvantages of checklist

- It use is limited as it only checks the quality of performance.

- Clinical performance can be evaluated to some extent only.

- Yes or no judgment can only be given.

- The degree of accuracy of performance can't be measured only the presence or absence of some attribute, behavior or performance parameter.

- It is not much of usage in qualitative research studies.

C. Questionnaire

A questionnaire is a tool comprising of a sequence of questions dealing with some psychological, social, educational issues etc., topic given to the individual or group of individuals with the view of collecting the data in order to solve the particular issue. Questionnaire is the most widely used tool for the data collection. Educational research's frequently use this tool to collect data about some conditions and attributes to obtain the opinions and attitudes of an individual or the group of the individuals. A questionnaire is either given personally to a group or individual or it is mailed to them in order to save a great deal of time and travel.

Some definitions;

Barr, et.al (1953), define questionnaire as "A systematic compilation of questions that are submitted to a sampling of population from which information is desired". Its scope is very vast. It has been used for studying a wide range of problems.

Goode and Hatt(1952) state that in general the word questionnaire refers to a device for securing answers to series of questions by using a form which the respondents fills in himself.

Types of Questionnaire

1. **Structured Questionnaire :** Structured questionnaire is pre-planned and designed to collect brief information. They are mainly used to collect quantitative data. They mainly contain close ended questions.

2. **Unstructured Questionnaire :** Unstructured questionnaire uses basic planning and some branching questions but there is no limit to the responses of the respondents. They are mainly used to collect qualitative data. The questions here are more open ended that provides participants a chance to give detailed information.

3. **Closed form :** They are generally multiple choice questions or answered in yes or no. It is the most basic and natural form of questionnaire.

4. **Open form :** In open form the open ended questions are there where respondents are free to answer. There is no restriction and detailed information is given by the respondents.

5. **Online questionnaire :** Online questionnaire is a systematize questionnaire which is given to the respondents through the online mode. It has a form builder where one can build different types of questionnaire for research. It is time saving tool during data collection. It is also a less expensive method used for data collection. It provides a flexible approach to the respondents to answer whenever they want to. Since it is administered online one can get data from large number of respondents.

6. **Telephone questionnaire :** Here researcher collects information via phone directly. In this type of questionnaire responses are quick and accurate as sometimes people hesitate to give information on face.

Principles of construction of the questionnaire

- Motive of the questionnaire

- Particulars of the respondents.

- Social validity of the responses

- Avoidance of leading questions.

- Structure of questions.

- Length of questionnaire must be short.

- Preliminary tryout of the questionnaire.

- Validity of the questionnaire.

- Reliability of the questionnaire.

- Administration of the questionnaire.

- Analyzing and interpreting questionnaire responses.

Characteristics of a Good Questionnaire

- The questions should be short and precise.

- The questions should be non- provocative. They should respect the values of a respondent.

- The questions used in the questionnaire should not be subjective or show any biasness.

- Questions used in the questionnaire should be related to the topic only.

- Questions must be framed in a simple language so that they can be easily understood by the participants.

- Avoid probing questions so that respondent may not get hint of the following questions.

- Avoid unnecessary and use of emotional words to hurt the sentiments of the respondents.

- Questionnaire should be appealing to the eyes.

- Planning and briefing should be understandable and outright.

- It should be constituted in psychological order from unknown to known questions.

Advantages of questionnaire

- This tool is good for making compositions.

- This method is convenient to the researcher as the researcher has nothing to do with field work here.

- It is helpful to investigator in getting bulk of knowledge because it can be circulated to large number of individuals.

- This tool furnishes the investigator with the first-hand data as it is provided by the right respondents.

- It is time saving tool as large number of respondents deal with it at the same time.

- This method provides the participants with enough time to think before they response.

- It also gives an opportunity to researcher to store the data for future references.

Limitations

- Sometimes the information can be ambiguous due to poor handwriting or not having proper command over the language which may not understood by the researcher properly.

- This method is associated with rigidity and lacks flexibility. The can be manipulated by the researcher according to his convince without informing the respondent.

- There are high chances of getting biased sample.

- It is also a time consuming and expensive method.

- Respondents can misinterpret a query and thus there are chances of imperfect or partial response intentionally or sometimes unintentionally, the results will not be valid then.

- Some respondents may not give responses on disputed topics.

- The behaviors, gestures, reactions, emotions of the participants are not visible.

- Sometimes the research areas are so fragile, subtle and private in nature that questions can't be framed on them.

- The questionnaire cannot be used by illiterate people

D. Interview- Schedule in Social Research

There are different ways to collect first-hand data in social researches. Interview and structured schedule are the most commonly used tools. Most of the interviews are based on structured - schedules and schedules are filled by interview techniques so both tools are interrelated. In a layman terms – an interview is a face to face interaction where questions are being asked from someone for a newspaper article, television show, or research etc.

Qualitative interviews are referred to as -depth interviews. The interview is semi-structured and open ended questions are being designed. The main aim is to first-hand and authentic information from the respondents about the topic.

Interview schedule contains a list of some questions pre planned to guide the interview in the right direction. This schedule will serve as a framework for a interviewer who will proceed the interview. Interview schedule helps the researcher to plan everything accordingly and to conduct interview in a smooth way and record ever thing properly.

Forms of interview schedule

Different forms of interview schedules are given below;

In-depth interview schedule

This interviews are mainly used for qualitative studies where researcher has to explore and gain in-depth understanding of the topic. These are mainly open ended interviews containing open ended questions where there is complete freedom to the researcher to answer. The questions contained probes for clarification and in order to get detain information about the topic.it must adopt one step at a time approach. All questions should be relevant and related to the topic only. Unnecessary questions should be avoided if one wants to get a useful information. They are flexible in their structure. They are deep and very interactive.

Structured interview schedule

Structured interview schedule are pre planned and are similar to the format used in questionnaire or surveys. These are those interviews in which researcher has already prepared the procedure to be followed and are standardised in its process. There is not much freedom to the researcher and he has to follow the procedure already planned. Same type of questions are given in same manner to every individual and responses are recorded. This gives a direction to the interviewer to conduct interview in a planned way. It contains all the information like questions to be asked, where the interview will be conducted, who will record the interview etc.

Merits of an Interview Schedule

- Interview schedule provides a framework to conduct interview step by step in right direction.

- It raises the chances of acquiring authentic information and data.

- It enables the researchers to get in-depth information.

- The chances of getting responses are higher in this method.

- It provides greater flexibility.

- This method is cheap as most of the respondents provide information for the free.

- This method is fast and time saving.

- This method enables the researcher to find individual feelings and attitudes of the respondents

Demerits of interview schedule

- It is a tedious method.

- There are high chances of subjective biasness.

- Some respondents may intentionally give wrong information to mislead the research.

- The outcome of interview method is to be conditional on the strength of the respondents' ability to remember.

- This method is affected by language barrier.

- Interview method can easily divert the intention of the researcher.

1.2 CONCLUSION

The tools for data collection can be used in accordance with the needs of the research. The three methods of gathering data—interviews, focus groups, and observation—have been covered. Questionnaires and interviews are similar in that the interviewer makes sure all the questions are answered and that the answers are clear. The interviewer has the option to ask more questions if necessary in an unstructured interview. When it is crucial for participants to hear what others have to say, focus groups are useful for gathering input from participants. Observation Data can also be gathered through interviews, focus groups, and observation, but the quality, objectivity, and cost of the data will vary depending on the observer.

REFERENCES

Ajayi, V. O. 2017. Primary Sources of Data and Secondary Sources of Data. *Researchgate* , 1-5.

Kothari, C.R. 2004. *Research Methodology Methods and Techniques,* New Age International (P) Limited : New Delhi.

Kothari, C.R.1995. Research Methodology Methods andTechniques. 2nd ed. revised edition, New age international publishers. p. 55–67.

IGNOU (2004): Evaluation Perspectives in Higher Education, Instruction in Higher Education. New Delhi: School of Education, IGNOU.

Yadav., R. 2022. Construction of Questionnaire in Ed. Book **Tools of Data Collection in Educational Research** under MHRD Project, University of Delhi, Lucky International, New Delhi, pg. 13-28

https://www.formpl.us/blog/primary-data

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2

DATA ANALYSIS

Unit Structure :

2.0   Objectives

2.1   Introduction

2.2   Measures of central tendency and variability, normal probability curve, graphical representation of data, correlation

2.3   Quantitative Data Analysis

   2.3.1 Measures of central tendency,

   2.3.2 variability

2.4   Qualitative Data Analysis –

   2.4.1 Immersion (get to know your data), standing back, reflecting.

   2.4.2 Analysing (coding and categorisation)

   2.4.3 Synthesizing (emerging themes-bringing it all together);

   2.4.4 relating to another research work; disseminating and sharing.

2.5   Interpretation and reflection of results

2.0 OBJECTIVES

After reading this unit the student will be able to:

- To help students to Understand the statistical measures of central tendency and variability.

- To help students to Understandthe graphical representation of data.

- To help students to Understand Concepts, use and interpretation of Quantitative Data Analysis

- To help students to Understand Concepts, use and interpretation of Qualitative Data Analysis

- To help students to UnderstandInterpretation and reflection of results.

2.1 INTRODUCTION

The practise of looking through tabulated information to unearth hidden truths or meanings is referred to as "**Data Analysis**." It requires breaking complicated current factors into simpler parts and reconstructing them in new arrangements for interpretation. The process of analysing research data as a whole has greatly benefited from the statistical technique. Practically all researchers involving large or even small numbers of subjects use simple statistical computations, whereas many different kinds of studies need

complicated statistical computations as fundamental base. Therefore, it could be reasonable to include some analytical techniques being used educational research.

Analysis of data means studying the tabulated material in order to determine inherent facts or meanings. It involves breaking down existing complex factors into simpler parts and putting the parts together in new arrangements for the purpose of interpretation. Barr and Scates suggest four helpful modes to get started on analysing the gathered data.

1.   To think in terms of significant tables that the data permit.

2.   To examine carefully the statement of the problem and the earlier analysis and to study the original records of the data.

3.   To get away from the data and to think about the problem in layman's terms.

4.   To attack the data by making various simple statistical calculations.

The word statistics is sometimes used to describe the numerical data gathered. Statistical data describe group behaviour or group characteristics abstracted from a number of individual observations that are combined to make generalizations. Because most research yields such quantitative data, statistics is a basic tool of measurement, evaluation, and research.

Research consists of systematic observation and description of the characteristics or properties of objects or events for the purpose of discovering relationships between variables. The ultimate purpose is to develop generalizations that may be used to explain phenomena and to predict future occurrences. Measurement is the most precise and universally accepted process of description, assigning quantitative values to objects and events.

In the application of statistical treatments, two types of data are recognized:

Parametric Data: -

Data of this type are measured data, and parametric statistical tests assume that the data are normally, or nearly normally, distributed. Parametric tests are applied to both interval- and ratio-scaled data.The distribution of the population from which the sample was drawn is assumed in parametric statistics. The population distribution data is well-known and is based on a set of established characteristics. It presumes that the qualities under study have a normal distribution. Using parametric approaches might result in inaccurate findings when the data significantly differs from the assumptions. The t-test, ANOVA, and Pearson coefficient of correlation are examples of frequently used parametric procedures.

Nonparametric Data: -

Data of this type are either counted (nominal) or ranked (ordinal). Nonparametric tests, sometimes known as distribution-free tests, do not rest

on the more stringent assumption of normally distributed populations. Non-parametric statistics are those that make very few or no population-related assumptions. It implies that information may be gathered from a sample that does not adhere to a certain distribution.

Unknown is the information on population distribution. The population distribution's parameters are not set in stone. Therefore, a test of the hypothesis for the population in question is required. In comparison to parametric processes, non-parametric techniques are more challenging to interpret. Spearman's rank correlation is an example of a non-parametric approach.

Check Your Progress – I

Define Parametric Data

_____

_____

Define Non-Parametric Data

_____

_____

2.2 MEASURES OF CENTRAL TENDENCY AND VARIABILITY, NORMAL PROBABILITY CURVE, GRAPHICAL REPRESENTATION OF DATA, CORRELATION

The system of mathematical methods or techniques for collecting, describing, organising, and analysing numerical data is known as statistics. Statistics is a fundamental instrument in measuring and research because it is common for study to provide such quantitative data. The use of statistics by researchers involves more than just manipulating data; statistical techniques have their roots in the primary goals of analysis. Two different applications of statistical data analysis may be used in educational research.

1. Descriptive Data Analysis, and

2. Inferential Data Analysis.

Descriptive Data Analysis:

Descriptive analysis use either all of the numerical data or only a selection of it. It illustrates continuous data's means and deviations as well as categorical data's percentages and frequencies. Descriptive statistics are frequently used in fundamental educational research and provide significant details on the nature of a specific group or class.

When describing a collection of data that has simply been gathered, descriptive statistics are utilised. In a summary that explains the data sample

and its measurements, descriptive statistics define, illustrate, and summarise the fundamental characteristics of a dataset observed in a specific research. It aids in improved data comprehension for analysts.

- There are several types, characteristics, or measures of descriptive statistics.

    1. Measures of Central tendency

    2. Variability

    3. Normal Probability Curve

    4. Distribution or Graphical representation of data

1.   MEASURES OF CENTRAL TENDENCY:

A one-number description of the data that generally describes the data's centre is called a measure of central tendency. The mean, the mode, and the median are the three approaches used to calculate the outcome for measures of central tendency, which estimate a dataset's average or centre.

Mean: The most popular way to calculate averages is to use the mean, commonly abbreviated as "M." Adding up all the response values results in the mean, which is then calculated by dividing that total by the "N" or "number of replies." The ratio of the total number of observations to the sum of all the observations in the data is known as the mean. This also goes by the name "Average." Thus, the mean is a value that the entire data set is distributed around.

Mode: Only the most common response value is considered the mode. Multiple modes, including "zero," may exist in a dataset. Putting your dataset's values in ascending order from lowest to highest can help you identify the mode. In other words, mode is the number that appears the most frequently in the complete data set.

The data is considered **Uni-modal** if there is just one number that appears the most frequently.

The data is said to be **bi-modal** if there are two numbers that appear the most frequently.

The data is referred to as **multi-modal** if there are more than two numbers that can occur the maximum amount of times.

Median: The precise middle value of the dataset is the median, which is the last variable we will discuss. Examine the values after they are arranged in ascending order.The median is the point at which all of the data are divided into two equally sized halves. The median is exceeded by one-half of the data, while the other half is less than it. The data are first arranged in either ascending or descending order before the median is determined.

The middle observation in the sorted form provides the median if the number of observations is odd.The median is determined by the mean of the two middle observations in the sorted form if the number of observations is even.It's crucial to remember that the median is unaffected by the ascending or descending order of the data.

2. VARIABILITY:

The spread of data around the central tendency is referred to as dispersion. The range and the standard deviation are two often used metrics of dispersion. The statistician can determine how evenly distributed the replies are using the measure of variability.

The spread has three aspects — range, standard deviation, and variance.

Range: Range is the difference between the Maximum value and the Minimum value in the data set.To get the distance between the most extreme numbers, use range. Start by dividing the dataset's top and lowest values.

Standard Deviation: The square root of Variance is called the Standard Deviation.This requires a bit more effort. Your dataset's average level of variability is represented by the standard deviation (s), which displays the variance of each score in relation to the mean. Your dataset's variable will be more significant the higher your standard deviation.

Variance: The spread of the dataset is reflected in the variance. The variation in relation to the mean increases with the degree of data dispersion.Variance is a measurement of how widely apart data points are from the mean. A large variance suggests that the data points are widely dispersed, whereas a low variance suggests that the data points are more closely related to the data set mean.

3. NORMAL PROBABILITY CURVE

After gathering the data from the field, one of the first steps is to tabulate it using a frequency distribution table. By placing the data in an orderly fashion, eliminating the little differences while keeping the big differences, and organising it, a frequency distribution table transforms the data into a systematic and manageable form. A compact frequency curve can thus represent a big volume of data. A frequency curve's form reveals the mechanism that produced a certain kind of curve.

Of all types of curves, we have in social and in natural sciences a particular bell-shaped symmetrical curve known as **"Normal Curve"** has very important role to play in statistical analysis.

The term "normal distribution" refers to a set of numbers that are neither extremely big nor very tiny, but rather a balanced blend of the two. Figure following depicts a normal curve's form. A larger number of values are seen to cluster around a centre value in a normal

distribution. This is a characteristic of practically all the variables produced by a typical process, which revolves around middle values and does not favour or discriminate against any particular value. Age of persons, height of pupils in a class, student grades, average bulb life, etc. are examples of factors that might determine whether a frequency distribution curve is normal or nearly normal.

## 4. GRAPHICAL REPRESENTATION OF DATA

The frequency of specific values or ranges of values for a variable is summed up in the distribution. Every possible value of a variable, together with the number of people who had each value, would be listed in the simplest distribution. There are two methods to represent frequency distributions: as a table or a graph. Bar graphs, pie charts, and line graphs are examples of this. In order to show the form of the distribution, the line graph is typically used to display the distribution of the scores obtained on a variable. The mean scores on the variable under study in distinct subgroups are compared using the bar diagram. Pie charts are used to show the variation of a certain variable or the proportion of various subgroups in the sample.

A statistical graph is a tool that teaches you about a sample's or a population's form or distribution. Because we can see where data clusters and when there are only a few data values, a graph can be a more effective way to communicate data than a mass of numbers. Graphs are used in newspapers and on the internet to illustrate patterns and make it easy for readers to compare data quickly. To visualise the data, statisticians frequently plot the data first. The use of more formal tools is thus possible.

The dot plot, bar graph, histogram, stem-and-leaf plot, frequency polygon, pie chart, and line graph are some examples of the graph types that are used to summarise and organise data.

Pie Charts:

In a pie chart, each category is represented by a slice of the pie. The area of the slice is proportional to the percentage of responses in the category. This is simply the relative frequency multiplied by 100.
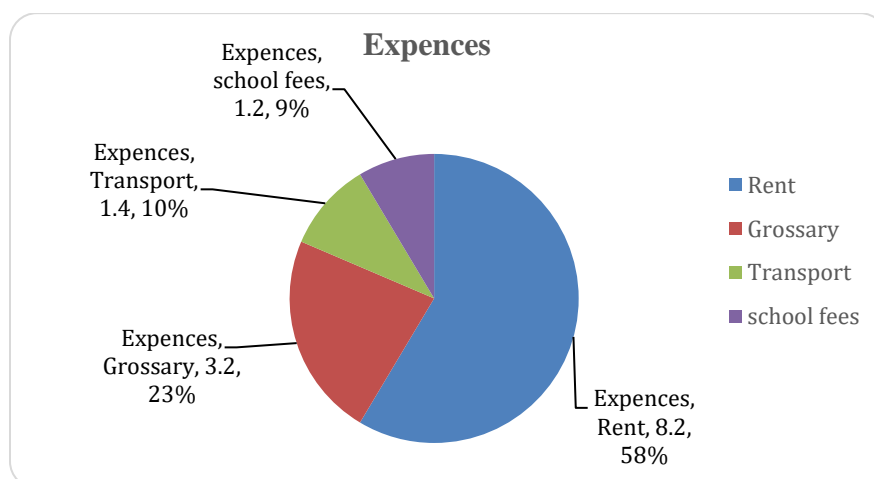
Pie charts are effective for displaying the relative frequencies of a small number of categories. They are not recommended, however, when you have a large number of categories. Pie charts can also be confusing when they are used to compare the outcomes of two different surveys or experiments.

Bar charts:

Bar charts can also be used to represent frequencies of different categories. Often we need to compare the results of different surveys, or of different conditions within the same overall survey. In this case, we are comparing the "distributions" of responses between the surveys or conditions. Bar charts are often excellent for illustrating differences between two distributions.

Average Transactions by Payment Type

■ 2019-2020   ■ 2020-2021   ■ 2021-2022
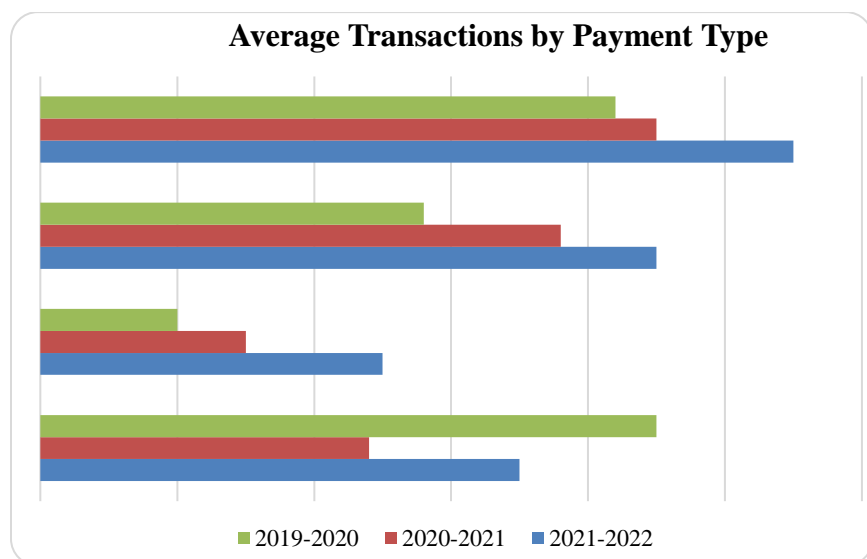
Inferential Data Analysis:

Samples derived from complete data can be used in inferential analysis. By using various samplings, an analyst might draw diverse conclusions from the same extensive data set. A statistic that was calculated using a sample may be used to estimate a parameter's value in the population from which it was drawn.

Correlation:

In daily life, the term "correlation" denotes a relationship of some kind. We may claim to have seen a connection between wheezy episodes and foggy days. However, correlation is the statistical word used to describe the relationship between two quantitative variables. We also assume that the relationship is linear, meaning that for every unit rise or reduction in one variable, the other increases or decreases by a constant amount. Regression, which entails calculating the optimal straight line to summarise the correlation, is the other method that is frequently employed in similar situations.It is possible to calculate correlation and regression coefficients when the variables are on an interval or ratio scale. A measure of the linear relationship between two variables on an interval or ratio scale is the

Pearson product-moment correlation coefficient. The measure, which is typically represented by the letter r, ranges from -1 to +1, with 0 denoting a lack of a linear connection. Sometimes the term "correlation" is used as a generalised synonym for "association."

A connection between two variables is said to have a **positive correlation** when both variables move in the same direction. Consequently, when one variable rises as the other increases, or when one variable decrease while the other decreases. The correlation between height and weight is a good example.When there is a **negative correlation** between two variables, it means that when one variable increases, the other one decreases. Height above sea level and temperature serve as an example of a negative correlation. It gets colder as you ascend the mountain (raise in height) (decrease in temperature).When there is no correlation between two variables, it is called a **zero correlation.** For instance, there is no correlation between IQ level and the quantity of tea consumed.

Correlation Coefficient:

A correlation coefficient, represented by the symbol r, quantifies the strength of the link. It is a measurement of linear connection and is occasionally referred to as Pearson's correlation coefficient after its creator. Other and more complex measurements of the correlation must be utilised if a curved line is required to represent the connection.

A scale from + 1 to -1 is used to calculate the correlation coefficient. Either + 1 or -1 represents a variable's complete connection with another. The correlation is positive when one variable rises as the other rises; it is negative when one variable falls as the other rises. A correlation with zero degree of absence is indicated by 0.A correlation of –1 indicates a perfect negative correlation, while a correlation of +1 means that as one variable goes down, the other goes up. There is no rule for determining what size of correlation is considered strong, moderate or weak. For example, with demographic data, we generally consider correlations above 0.75 to be relatively strong; those below 0.45 to be weak.

No.	Value of "r"	Magnitude
1	0.00-0.20	Negligible
2	0.21-0.40	Low
3	0.41-0.60	Moderate
4	0.61-0.80	Substantial
5	0.81-1.00	Very High

There are four different correlations:

1. Spearman

2. Pearson

3. Kendall rank

4. Point-Biserial

Check Your Progress – II

1. **Mode refers to the value within a series that occurs _____ number of times.**

   a. Maximum

   b. Minimum

   c. Zero

   d. Infinite

2. **The values of extreme items do not influence the average for_____.**

   a. Mean

   b. Mode

   c. Median

   d. None of the above

3. **Which of the following are methods under measures of dispersion?**

   a. Standard deviation

   b. Mean deviation

   c. Range

   d. All of the above

4. **The square of standard deviation is _____.**

   a. Square deviation

   b. Mean square deviation

   c. Variance

   d. None of the above

5. **The correlation for the values of two variables moving in the same direction.**

   a. Perfect positive

   b. Negative

   c. Positive

   d. No correlation.

2.3 QUANTITATIVE DATA ANALYSIS

Statistical data analysis techniques gather unprocessed information and convert it to numerical information. While quantitative data analysis is described as the act of studying data that is based on numbers or that can be quickly transformed into numbers, data analysis may be stated as the process of obtaining meaningful information through reviewing data. As it

tries to analyse the data gathered through numerical variables and statistics, it is founded on describing and interpreting objects with numbers and statistics. Algorithms, mathematical analytical tools, and software are frequently used in quantitative data analysis approaches to glean insights from the data and provide answers to queries like how many, how frequently, and how much. The majority of the time, surveys, questionnaires, polls, and other methods are used to collect data for quantitative data analysis.

2.3.1 Measures of Central Tendency

We can determine the point at which items have a propensity to cluster by using measures of central tendency (or statistical averages). This measurement is regarded as the one that best captures the entirety of the data. The term "statistical average" also refers to a measure of central tendency. The most widely used averages are **mean, median, and mode**.

Mean:

The mean, sometimes referred to as the arithmetic average, is the most widely used indicator of central tendency and may be calculated by dividing the sum of the values of all the items in a series by the total number of items. The arithmetic average is a typical definition of the mean of a distribution. A mean number is what students are familiar with as the term "grade-point average." It is calculated by dividing the total number of scores by the sum of all the scores.

$$\overline{X} = \frac{\sum X}{N}$$

where X= mean

Σ = sum of

X = scores in a distribution

N = number of scores

Example

X
6
5
4
3
2
1

$\Sigma X = 21$

N=6

$X = 21/6 = 3.5$

Median:

In an array, the median is a point (not necessarily a score) at which half of the scores fall. It is typically found by inspection rather than computation and is a measure of position rather than quantity.When a series is arranged in ascending or descending order of magnitude, the median value is the middle item. It divides the series in half, with all things falling below the median in one half and all items exceeding the median in the other.

$$Median = L + \left(\frac{N}{2} - C.F.\right)\frac{h}{f}$$

Where;

$L = Lower\ limit\ of\ median\ class$

$N = total\ frequency$

$C.F. = cumulative\ frequency(less\ than\ type)$
$of\ the\ class\ preceding\ the\ median\ class$

$f = frequency\ of\ median\ class$

$h = width\ of\ median\ class$

Class Interval	f	c.f.	
5 – 15	6	6	
15 – 25	10	16	
25 – 35	16	32	
35 – 45	15	47	→Median C.I.
45 – 55	24	71	
55 – 65	8	79	
65 – 75	7	86	
Total	86		

Here, N = 86, $\frac{N}{2}$ = 43

$$Median = l + \left(\frac{\frac{N}{2} - c.f.}{f}\right) \times h = 35 + \left(\frac{43 - 32}{15}\right) \times 10 = 35 + \frac{22}{3} = 42.33$$

Hence, median = 42.33.

Mode:

The value that appears in a series the maximum frequently is its mode. In a distribution, the item with the highest concentration is the mode. In general, the size of the item with the highest frequency is considered to be the mode, although at times, this may not be the case due to the influence of the frequencies of other things. The score that appears most frequently in a distribution is the mode. Instead of using computation, it is located by inspection. The midscore of the interval with the maximum frequency is assumed to be the mode in grouped data distributions.

6
5
4
4
3
2
1

The Mode (Mo)

Mode

2.3.2 Variability:

In statistics, our objective is to quantify the degree of variability for a given distribution of scores. Simply said, there is no variety if the scores in a distribution are all the same. When scores differ by only a little amount, the variability is low; when scores differ by a big amount, the variability is high.

The degree to which scores in a distribution are dispersed or grouped together is quantified by the concept of **variability.**

A distribution's variability is a crucial quality in addition to its shape and central tendency. The term **"variability"** describes how spread out or dispersed the scores are in relation to the mean.

Variability describes the distribution. Specifically, it tells whether the scores are clustered close together or are spread out over a large distance. Variability measures how well an individual score (or group of scores) represents the entire distribution. This aspect of variability is very important

43

for inferential statistics where relatively small samples are used to answer questions about populations.Descriptive statistics, which indicate how similar a group of scores are to one another, include measures of variability. The measure of variability or dispersion would be smaller the more comparable the scores were to one another. The measure of variability or dispersion will be larger the less comparable the scores are to one another. Introduction to Measures of Variability Generally speaking, the greater the spread of a distribution. The measure of dispersion will be greater. Dispersion, to put it simply, is the variation in data values within a sample.

Measures of variability: –

Range:

Range can be defined as the difference between the highest and lowest score in the distribution. This is calculated by subtracting the lowest score from the highest score in the distribution. The equation is as follows: Range = Highest Score – Lowest Score(R=H-L) The range is a rough measure of dispersion because it tells about the spread of the extreme scores and not the spread of any of the scores in between.

For instance, the range for the distribution 4,10,12,20, 25, 50 will be 50 - 4 = 46.

Standard Deviation:

Karl Pearson coined the phrase "standard deviation" in a piece of literature in 1894.Greek letter sigma 'σ'is used to represent the population standard deviation, while the letter s is used to represent it for a sample. The standard deviation represents the average distance between the mean and all other scores. It is the positive square root of the average of all the scores' squared deviations from the mean. It is the variance's positive square root. The term "root mean square deviation" is another name for it. "As the square root of the average of the squares of the deviations of each score from the mean," is how standard deviation is defined. SD is the most steady and trustworthy indicator of variability since it is an absolute measure of dispersion.

The most popular and important measure of variability is the standard deviation.Standard deviation measures variability by considering the distance between each score and the distribution's mean as a reference point. It determines how close or distant the scores are from the mean on average.That is, are the scores dispersed or grouped together? The standard deviation basically relates to the average deviation from the mean.

Variance:

The average squared deviation of the results from the mean is known as variance. The variance is calculated by comparing each result to the mean, unlike the preceding measurements of variability. This statistic is calculated by adding the squared differences between each data point and the mean, dividing by the total number of observations. the average squared difference, as a result. The average of the squared departures from the mean is the variance. How far a score deviates from the mean is known as a deviation. The square of the standard deviation represents variance. This indicates that the variance's units are substantially bigger than the values of a normal data set value.

Population variance:

A whole population's variance may be calculated using the following formula:

$$\sigma^2 = \frac{\sum (\chi - \mu)^2}{N}$$

In the equation, N is the number of data points, which should represent the total population, and 2 and are the population parameters for the variance and mean, respectively.

Check Your Progress – III

Explain Measures of Central Tendency?

_____

_____

_____

_____

Explain Measures of variability?

_____

_____

_____

_____

2.4 QUALITATIVE DATA ANALYSIS

Using words, symbols, images, and observations, this technique gathers data. This approach does not employ statistics. It is possible to notice and document qualitative data. The nature of this data type is not numerical. Focus groups, one-on-one interviews, observations, and other similar techniques are used to gather this kind of data. Data that may be categorised based on the characteristics and traits of an object or phenomena is referred to as qualitative data in statistics.

The variety of techniques and procedures known as qualitative data analysis are used by researchers to give explanations, understandings, and interpretations of the phenomena they are studying based on the symbolic and meaningful content of the data. It offers methods for identifying, scrutinising, contrasting, and analysing significant patterns and themes. Meaningfulness is established by the unique aims and objectives of the issue at hand, and depending on the study topic, the same collection of data can be analysed and synthesised from a variety of viewpoints. Its foundation is the interpretive school of thought. Qualitative data are in-depth, rich, soft, and subjective descriptions that are often expressed in words. Observations, life histories, semi-structured and unstructured interviews, documentation, and life histories are the most typical ways to collect qualitative data.

Researchers frequently wonder "why" things happen the way they do, "why" people behave the way they do, or "why" a policy is implemented the way it is. When trying to comprehend human behaviour or purpose, quantitative tools are frequently not helpful in answering a variety of these "why" or "how" issues. On the other hand, qualitative research may be quite helpful since it enables the study of individuals in their natural environments. Therefore, qualitative research necessitates a period of immersion and practise in comprehending your study subjects.

2.4.1 Immersion (Get to Know Your Data), Standing Back, Reflecting.

Immersion is the process through which researchers read over or carefully examine a section of the data they have acquired. For the purpose of finding themes, categories, and patterns in the data, immersion is an iterative, inductive process. Immersion-Crystallization can be conceptualised, at its most basic level, as involving repeated exposure and probing into data that results in the formation of meaningful themes and categories. "Immersion is a qualitative analytic style involving cycles of concentrated textual review of data, combined with reflection and intuitive insights, until reportable interpretation becomes apparent."

Immersion: This stage of the process involves researchers completely losing themselves in the information they've read, heard, seen, or otherwise collected. One can undertake an immersion alone or in a group. The first immersion into the data is likely to happen at the moment of data collection, even if early insights may appear during topic selection and research planning. Though they can help researchers refine their questions and arrange for gathering data, insights from these early immersions are useful in and of themselves. For example, the moderator and observer might record the themes and patterns they believed had formed after the focus group is over and utilise these observations to enhance the moderator's question guide for the next group.In extensive interview research, similar insights can be used to improve the open-ended questionnaire. Initial immersion cycles might enhance even participant observation inquiries. As an illustration, key informants' accounts of findings from a research on workplace health and safety regardingwhich industrial techniques they believed to be the mostdangerous can assist researchers in reorienting their attention tothese regions. Each stage of the immersion process involves aboth throughout the study and each iteration cycle.

Immersion- can evaluate a wide variety of data sources. These consist of the typical data types used in qualitative research, such as transcripts from focus groups and interviews, participant observation field notes, and original texts. Additionally, it can be used with audio and video records, cultural artefacts, and even databases of quantitative survey and measurement results. The only constraints are knowledge with the data source, its context, and the underlying theoretical presumptions.

Reflection: Reflection is the process of examining one's own attitudes, prejudices, opinions, and behaviours to see how they could affect the course of the research and its outcomes. Openness and acceptance that one is a participant in the research and that one's subjectivity affects data collection and processing are necessary for qualitative studies. Researchers should specifically take into account the impact of these factors, both individually and collectively. As the study cycle proceeds, they can refer back to them as they explicitly explain and record them in the beginning.

2.4.2 Analysing (Coding and Categorisation)

The process of establishing and assigning codes to categorise data extracts is known as qualitative data coding. Later on, Researcher can utilise these codes to create themes and patterns for their qualitative study.

Coding is "how you define what the data you are examining are about" in qualitative research (Gibbs, 2007). Coding is the process of locating a passage in a written document or other data item (such as a photograph or image), searching for and recognising ideas, and then determining how

those concepts relate to one another. Coding, then, is not merely labelling; it also involves connecting data to the study hypothesis and then relating that data back to other data. You may organise data using the codes that are applied so that you can review and analyse it in an organised manner, for as by looking at the relationships between the codes.

Coding: A code is a label that summarises a segment's main theme. A researcher must need to look for descriptions and frequently theoretical claims during coding that go beyond the concrete observations. According toLewins and Silvers"Qualitative coding is the process through which segments of data are identified as relatingto, or being an example of, a more general notion, instance, topic, or category," In order to be recovered together at a later time, data segments from the entire dataset are grouped together.

For coding the data, the researcher needs to ask the following questions:

What is happening? What is the problem? What is observed here? What is the person trying to tell? Which experience is depicted here? How does this contribute to the study at hand?   What theoretical category does this datum indicate? What does the datum suggest or articulate? From whose point of view?

Both inductive and deductive methods of coding typically occur in two stages: initial coding and line by line coding. In the initial coding stage, the objective is to get a general overview of the data by reading through and understanding it. If you're using an inductive approach, this is also where you'll develop an initial set of codes. Then, in the second stage (line by line coding), you'll delve deeper into the data and (re)organise it according to (potentially new) codes.

The following guidelines could help a research in coding the data:

1.　Use line-by-line coding as an initial tool for opening up the data.

2.　 Ask what is happening in each bit of data.

3.　Compare data with data, statement with statement, story with story and incident with incident.

4.　Then compare code with code.

Benefits of qualitative coding:

● **Increase validity:** Qualitative coding provides organization and structure to data so that you can examine it in a systematic way to increase the validity of your analysis.

● **Decrease bias:** Qualitative coding enables you to be aware of potential biases in the way data is analyzed.

● **Accurately represent participants:** Qualitative coding allows you to evaluate if your analysis represents your participant base, and helps you avoid over representing one person or group of people.

● **Enable transparency:** Qualitative coding enables other researchers to methodically and systematically review your analysis.

2.4.3 Synthesizing (Emerging Themes-Bringing it all Together)

A qualitative synthesis, also known as a qualitative systematic review, searches for research on a topic in a systematic way and synthesises the results of many studies. Although the practise of conducting systematic evaluations of quantitative data is well established, qualitative research is still a relatively new field, and methodologies are constantly developing.

There are several approaches to conducting a qualitative synthesis.According to Noblit and Hare,There are two main categories of qualitative syntheses. First, **integrated review**, which group or summarise data and frequently include themes. The second **interpretative review**involves interpreting the data, as the title suggests. New conceptual insights can come from this inductive method, which can then result in the creation of a theory that unifies and clarifies the notions. The focus is with developing ideas that have the most explanatory utility possible, Dixon-Woods et al. emphasise pointing out that all methods of synthesis include some interpretation and a summary of the data

There is still significant disagreement about whether it is permissible to combine qualitative studies, and more particularly, whether several qualitative research methods based on various theoretical presumptions and methodologies should be mixed. The assertions made by writers regarding the theories behind their work are not really always closely related to the methods actually employed. A recent study found that because many writers failed to define their terminology, it is exceedingly difficult to establish clear boundaries separating one sort of qualitative research from another. Despite these issues, the same research discovered that it is feasible to synthesise data from many theoretical and methodological traditions. In fact, some review teams perceive this ability to combine data from various theoretical and methodological traditions as a review's strength.

Methods proposed for the synthesis of qualitative evidence

Sr. No.	Synthesis method	Description
1	Meta-ethnography	A set of techniques for synthesising qualitative research. It entails selecting, comparing, and analysing studies in order to develop new interpretations or concepts. The reading and rereading of studies, identifying the relationships between the studies by listing and contrasting key concepts, translating the studies into one another, and synthesising the translations to find concepts that go beyond individual accounts and can be used to produce a new interpretation are important stages.

2	Thematicanalysis/synthesis	The identification of significant or recurring themes. The results are summarised under many themes. Tabulated data makes it possible to identify key themes and provides organised approaches to handling the data within each theme. The technique has been improved more recently, leading to the development of a new technique called theme synthesis.
3	Narrative synthesis	A broad framework as well as particular methods and techniques that promote openness and trustworthiness. may be used to evaluate both quantitative and qualitative research since different methods and approaches can be used based on the kind of study design and data that will be reviewed.

2.4.4 Relating to another Research Work; Disseminating and Sharing.

Qualitative research, done well, is worth disseminating. The rationale for pursuing examples of how good qualitative research has been communicated was because they pay attention to both the scientific and communicative concerns of qualitative research. In short, their aim is to make more of a difference to the lives of the people the research is about. The previous cross-sector literature reviews focusing on the impact of research in general have been unable to locate studies, specifically or in detail, that address the dissemination and implementation of qualitative research findings. Even sources that consider the use of qualitative research appear to make no attempt to search the literature for examples of its impact. Dissemination, as the written or oral representation of research findings, usually happens at the end of a research project (Barnes et al. 2003) and is part of utilisation – utilisation addresses the gap between what we know and do (Nutley et al. 2002). Implementation refers to the use of strategies to change behaviour in specific settings.

You can disseminate and share your project's research and evaluation findings, the methodologies or methods you employed the audiences you addressed, the difficulties you ran into along the road, and any outputs or publications. Conference presentations, poster sessions, and publishing an article in a peer-reviewed publication are examples of conventional methods of sharing. All of these activities are worthwhile, but there are a lot of other ways to share your work that can be more efficient, more widespread, or more effective.

2.5 INTERPRETATION AND REFLECTION OF RESULTS

The next progressive step is to interpret the data after it has been examined. The process of giving meaning to the processed and analysed data is known as **data interpretation.** It gives us the ability to draw defensible and significant inferences, draw implications, determine the importance of the correlations between variables, and account for data patterns. The diverse nature of the data necessitates the use of distinct data interpretation techniques in order to explain numerical data points and categorical data points, respectively.

Giving meaning to the data is the process of data interpretation. It entails describing the data's patterns and trends that were found. Data interpretation follows data analysis as the following phase.Quantitative and qualitative methodologies are used to interpret the data. Due to the inability of the statistics to speak for themselves, data interpretation is necessary. For the figures to be understood, manual human interaction is required.

Check Your Progress – IV

Explain the meaning of the following terms:

Immersion

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Coding

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_____

Synthesising

_____

_____

_____

Disseminating

_____

_____

_____

References: -

David M. Lane1. (2008). *Introduction to Statistics*.

Keone Hon. (2009). *An Introduction to Statistics*.

Illowsky, B., & Dean, S. (2013). *Introductory Statistics*. OpenStax College.

Henry E. Garrett. (1949). Statistics in Psychology and Education. Henry E. Garrett. In *the Quarterly Review of Biology* (Vol. 24, Issue 3). LONGMANS, GREEN AND CO.

Cohen, L., Manion, L., & Morrison, K. (2020). Experiments, quasi-experiments, single-case research and meta-analysis. In Research Methods in Education.

Dr. Shefali Pandya, (2017). Research Methodology. A P H Publishing Corporation.

Borkan J.M. Family Practice, 2022, 39, 785–789 https://doi.org/10.1093/fampra/cmab158 Advance access publication 25 November 2021

https://statisticsbyjim.com/basics/variability-range-interquartile-variance-standard-deviation/

https://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/11-correlation-and-regression

https://onlinelibrary.wiley.com/doi/full/10.1111/tct.13169

https://ebn.bmj.com/content/ebnurs/15/4/101.full.pdf

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3

USE OF COMPUTER APPLICATIONS IN EDUCATIONAL RESEARCH

Unit Structure :

3.0 OBJECTIVES

- To provide education in the use of information and communication technology (ICT) for teaching and learning

- To encourage higher-level thinking and creativity through ICT

- To deliver students with a learning experience in instructional technology

- To promote computer-based educational resources

- To make students aware of information technology

- To determine the practical use of technology integration

- To improve the quality and learning outcomes of students by using audio, video and graphics aids

- To provide access to the internet for information search and online resources

- To enhance student engagement and motivation by using interactive and adaptive pedagogy

- To support student assessment and feedback by using online quizzes, tests and surveys

- To enable collaboration and communication among students and teachers by using email, chat, forums and social media

3.1 INTRODUCTION

Education is an integral aspect of every society and in a bid to expand the frontiers of knowledge, educational research must become a priority. Educational research plays a vital role in the overall development of pedagogy, learning programs, and policy formulation.

Educational research is a spectrum that bothers on multiple fields of knowledge and this means that it draws from different disciplines. As a result of this, the findings of this research are multi-dimensional and can be restricted by the characteristics of the research participants and the research environment

3.2 REVIEW OF RELATED LITERATURE

A literature review is a comprehensive survey of the works published in a particular field of study or line of research, usually over a specific period of time, in the form of an in-depth, critical bibliographic essay or annotated list in which attention is drawn to the most significant works[12]. It is a common form of academic writing in various disciplines.

A. What is a literature review?

A literature review is a survey of scholarly sources on a specific topic. It provides an overview of current knowledge, allowing you to identify relevant theories, methods, and gaps in the existing research that you can later apply to your paper, thesis, or dissertation topic.

There are five key steps to writing a literature review:

1. **Search** for relevant literature

2. **Evaluate** sources

3. **Identify** themes, debates, and gaps

4. **Outline** the structure

5. **Write** your literature review

A good literature review doesn't just summarize sources—it analyzes, synthesizes, and critically evaluates to give a clear picture of the state of knowledge on the subject.

A literature review is done in order to clarify the areas of prior research of the matter you've currently undertaken. If you have coursework to write, research, term paper or whatever another sort of writing, have no time to do the search yourself – then literature reviews will be your saviors. It gives you all the background you need in any discipline, which comes very in handy when doing any research. Now let's clarify on literature review definition.

B. What Is the Purpose of a Literature Review and Its Feature

The first major purpose of a literature review is, of course, to mention all the sources which have been used.

But it's much more than that. A research paper's focus is to introduce some new argument to think about, and the purpose of a literature review in a research study is to provide you with excessive data you may use to support your new insight.

There are the three main purposes of a literature review:

- To survey the literature on an area of study;

- To present information in literature as an organized sum up;

- To critically analyze data (To find gaps in modern theories and points of view, show where further research may be done and to review all the controversial moments).

So the main purpose of a literature review is basically to be a sum up of all the ideas and insights in a nice, short and easy to read way. It also will demonstrate that you're familiar with a body of knowledge and are thus credible. Without this everything you've written won't be taken seriously into account.

C. Literature Review Outline

1. Finding a decent topic is essential. So think what you find the most interesting and what has a lot of research potential. Talking to professor and brainstorming after reading lecture notes and recent writes in this field will definitely help. What is interesting to you and others, choose some study area that's worth reviewing.

2. Working with literature. It is called a literature review for a reason. Remember to look through reference lists to recent articles in your field – they may lead to some valuable data. Also, don't forget to include some other points of view in your study and not only yours. Think of exact time span you may need for research.

3. While reviewing your sources. Analyze what the assumptions of writers are and the methods they use. Evaluate all the findings and conclusions that have been drawn. Write down experts of the field and their names, especially those that are often mentioned. Look up all the conflicting theories, methods and conclusions as well as their popularity that has or hasn't changed with time.

4. Look for examples. Check out literature reviews of your discipline and examine them. It is how you'll know what is expected and you will also have your little model.

5. How your literature review should be composed. There are the three main parts of any piece of writing: the introduction, body, and conclusion.

    o   In the introduction, you aim to explain what your focus is and how important the subject is. Tell what work was done on the topic and tell background history. You could also write why you decide to choose this specific topic.

    o   In the body, which is divided by headings and subheadings, give all the major information. That is literally the biggest part of your literature review. Discuss all the research that leads to your project.

    o   In conclusion, sum up all your evidence and present it. Give your final verdict on the matter and tell what further research may be undertaken.

D. Literature review sources

Sources for literature review can be divided into three categories as illustrated in table below. In your dissertation you will need to use all three categories of literature review sources:

Sources for literature review and examples

Generally, your literature review should integrate a wide range of sources such as:

- **Books** - Textbooks remain as the most important source to find models and theories related to the research area. Research the most respected authorities in your selected research area and find the latest editions of books authored by them. For example, in the area of marketing the most notable authors include Philip Kotler, Seth Godin, Malcolm Gladwell, Emanuel Rosen and others.

- **Magazines -**Industry-specific magazines are usually rich in scholarly articles and they can be effective source to learn about the latest trends and developments in the research area. Reading industry magazines can be the most enjoyable part of the literature review, assuming that your selected research area represents an area of your personal and professional interests, which should be the case anyways.

- **Newspapers** can be referred to as the main source of up-to-date news about the latest events related to the research area. However, the proportion of the use of newspapers in literature review is recommended to be less compared to alternative sources of secondary data such as books and magazines. This is due to the fact that newspaper articles mainly lack depth of analyses and discussions.

- **Online articles**. You can find online versions of all of the above sources. However, note that the levels of reliability of online articles can be highly compromised depending on the source due to the high levels of ease with which articles can be published online. Opinions offered in a wide range of online discussion blogs cannot be usually used in literature review. Similarly, dissertation assessors are not keen to appreciate references to a wide range of blogs, unless articles in these blogs are authored by respected authorities in the research area.

Check Your Progress

1. Explain the concept of review of related literature

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2. What are the sources of review and examples ?

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3.2.1 Internet Search

The use of the Internet in the educational environment has enabled easy access to many resources, and information sharing has, therefore, significantly increased. Moreover, the prevalence of this sharing has brought additional benefits in that these resources can be used in any location and any time. Although the efficiency of this technology, it is evaluated with use of proportion of the desired results in student achievement does not exactly come out and is difficult to determine. Hence, much research has been conducted over time to understand the reasons for this situation.

Websites and online resources outside academic bibliographic databases can be significant sources for **identifying literature**, though there are challenges in searching and managing the results. These are pertinent to systematic reviews that are underpinned by principles of transparency, accountability and reproducibility.

The most effective communication resources, computers and the Internet, are part of our daily life and have become one of the important tools in the education. The Internet helps transfer information between different points therefore this satiation makes the Internet a very powerful information system. People in different age groups and jobs, students and academicians who do scientific research and prepare projects prefer using the Internet because it is the easiest, fastest, and cheapest ways of accessing necessary information (Cloud, 1989). Even though the Internet is a very important and indispensable source for students, the issue of whether the referenced source is trustworthy and/or credible, has been raised. This is because there is no control on any particular piece of information published through the Web, in opposition to the scientific and professional journals published by the scientific institutions, business world and the organizations known to the public. Additionally, other journals and books issued by commercial organizations do not have a control unit including editors and referees. Many of the sites on the Internet enable anybody to submit any kind of information without being controlled, and many of the sites known as reliable are restricted to open access for commercial purposes or security requirements (IP restriction, membership). This limits the accessibility for students and deprives them of these sites. Figure 1 explains the different resources and their accessibility for the students through the Internet

A. **Academic Journals Database :** The efficiency of Academic Journals Database is related to the number of periodicals covered and the evaluation techniques of them in order to form a universal academic index. They provide a rich source of specialized information, and are widely used by many academics and students. They are an essential reference tools for these people for detailed research into different subject areas, and are grouped into subjects according to the different disciplines.

B. **Search Engines :** Search engines are open access sites and are the most widely used resources for students' projects. Many of them have open access on Internet Explorer programs, but some are customizable tools supplying multiple search engines like "Copernic". Resources which are accessed through these engines are mostly used by students for gathering the required information for their projects. Information obtained from these sites changes according to the student's level and the importance of the project content. By using different filters in the advanced search tabs, directly accessible resources provide more effective query results for specific types of documents such as documents with pdf, ppt, doc extensions. This makes it possible to access the information required or to extract unwanted resources.

C. **Electronic Libraries :** Electronic Libraries which offer an important advantage in accessing information required from related sites are classified into two different groups: open or closed access web sites of universities, and other web sites which are completely open through the Internet. The closed sources in Electronic Libraries in universities are based on academic books and contractual journals and are completely trustworthy. These collections are ideal for the undergraduate/graduate students, researchers, and academicians. However, the reliability of open access libraries is not at a suitable level, and is approximately at the same level of reliability as the external sources that write them. The articles in libraries such as Wikipedia, which has become an official research tool can be compared with the information in other resources and this makes it more detailed and reliable. For this reason, the majority of subjects in Wikipedia are written by accessing official and private libraries, although the reliability of the article can only be judged, if the references have been well documented.

D. **Blogs/Forums :** Many students are able to access the required information by using search engines for project assignments. The majority of subjects that are listed in search engines are written blogs and forums. The information given in these links is often all that can be found and so is judged acceptable by the readers. Consequently, a comparison should be made after applying different sources and information should be confirmed. These open-access resources are often personal studies of people who are interested the subject, no matter whether they are academicians or not, and therefore, should be confirmed with other sources on the same subject written by people who are well qualified.

E. **Related Software :** There are many different software programs used by different departments of   university students. They are used as part of the current educational programme or related to a specific branch of science after graduation. This software includes the required information for both business life and projects. Many computer programs are for commercial purposes but must be used under license and their usage is very limited for educational purposes.

Check Your Progress

1. What are the various sources of Internet search?

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3.2.2 Educational Research Websites

1. The **Educational Resources Information Centre** (ERIC) is a search engine for academic research with more than 1.3 million bibliographic records of articles and online materials.

2. The **Virtual Learning Resources Centre** (VLRC) is an online index hosting thousands of scholarly websites, all of which are selected by teachers and librarians from around the globe.

3. **Scirus** is a comprehensive research tool with more than 460 million scientific items including journal content, courseware, patents, educational websites, and more.

4. The **Library of Congress** website allows users to search catalogues of libraries fromallover the world.

5. **ReferenceDesk.org** is a web directory that provides information on business and finance, federal government resources, scholarships, newspapers, search engines, and more.

6. "**Shodhganga**" is a digital repository of Indian Electronic Theses and Dissertations set-up by INFLIBNET Centre. As the name suggests "Shodh" is a Sanskrit word for research and discovery and "Ganga" is the holiest, largest and longest of all rivers in Indian subcontinent. Shodhganga denotes a huge reservoir of research and discovery (intellectual property) for the academicians maintained by the INFLIBNET Centre.

7. **Google Scholar** Google Scholar is an open-access literature Journal powered by Google. It gives you access to peer-reviewed online academic journals that are indexed.It offers advanced search options by author, publish date, phrase, etc. Access to these journals is unlimited.

8. **Elsevier** If you are into extensive research, Elsevier is the website to look out for, because it is one of the best online research journals, with its competitive features like an effective full-text search option and database. It is quite interesting because of its thorough peer reviews and multiple topics.

9. **Academia.edu** One of the most trusted websites for research papers in all areas of study is Academia.edu. It is considered one of the most popular websites for publishing papers for free, and also has a feature that includes the capability of a user to monitor his published articles and a compatible validation mechanism.

Check Your Progress

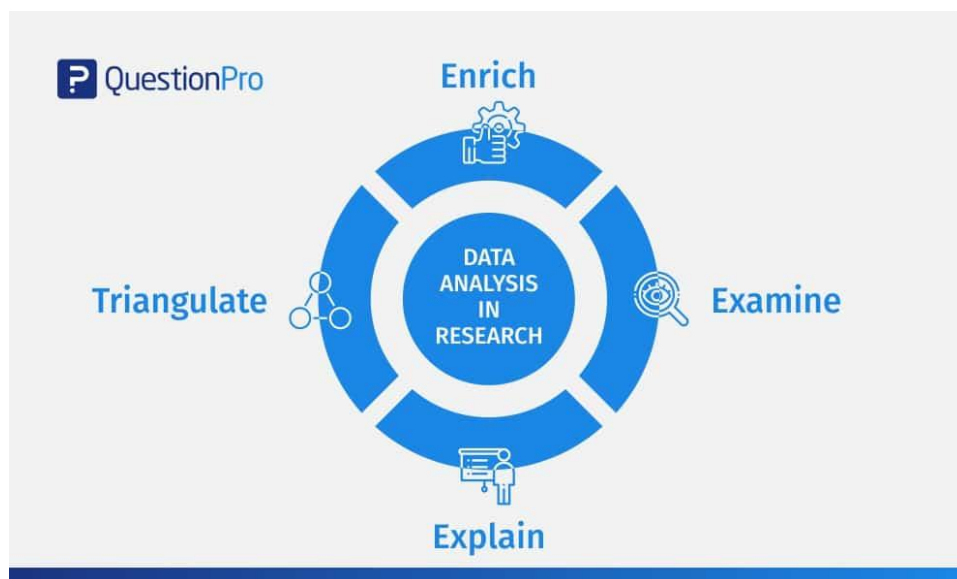1. Mention any 5 educational research websites

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3.3 USE OF COMPUTERS IN DATA ANALYSIS

3.3.1 What is data analysis in research?

According to LeCompte and Schensul, research data analysis is a process used by researchers to reduce data to a story and interpret it to derive insights. The data analysis process helps reduce a large chunk of data into smaller fragments, which makes sense.

Three essential things occur during the data analysis process — the first is data organization. Summarization and categorization together contribute to becoming the second known method used for data reduction. It helps find patterns and themes in the data for easy identification and linking. The third and last way is data analysis – researchers do it in both top-down and bottom-up fashion.

On the other hand, Marshall and Rossman describe data analysis as a messy, ambiguous, and time-consuming but creative and fascinating process through which a mass of collected data is brought to order, structure and meaning.

We can say that "the data analysis and data interpretation is a process representing the application of deductive and inductive logic to the research and data analysis."

3.3.2 Types of Data in Research

Every kind of data has a rare quality of describing things after assigning a specific value to it. For analysis, you need to organize these values, processed and presented in a given context, to make it useful.

Data can be in different forms; here are the primary data types.

A. **Qualitative data:** When the data presented has words and descriptions, then we call it qualitative data. Although you can observe this data, it is subjective and harder to analyze data in research, especially for comparison. **Example:** Quality data represents everything describing taste, experience, texture, or an opinion that is considered quality data. This type of data is usually collected through focus groups, personal qualitative interviews, or using open-ended questions in surveys.

B. **Quantitative data:** Any data expressed in numbers of numerical figures are called quantitative data. This type of data can be distinguished into categories, grouped, measured, calculated, or ranked. **Example:** questions such as age, rank, cost, length, weight, scores, etc. everything comes under this type of data. You can present such data in graphical format, charts, or apply statistical analysis methods to this data. The (Outcomes Measurement Systems) OMS questionnaires in surveys are a significant source of collecting numeric data.

C. **Categorical data:** It is data presented in groups. However, an item included in the categorical data cannot belong to more than one group. **Example:** A person responding to a survey by telling his living style, marital status, smoking habit, or drinking habit comes under the categorical data. A chi-square test is a standard method used to analyze this data.

3.3.3 Data analysis in qualitative research

Data analysis and qualitative data research work a little differently from the numerical data as the quality data is made up of words, descriptions, images, objects, and sometimes symbols. Getting insight from such complicated information is a complicated process. Hence it is typically used for exploratory research and data analysis.

I. Methods used for data analysis in qualitative research

There are several techniques to analyze the data in qualitative research, but here are some commonly used methods,

A. **Content Analysis:** It is widely accepted and the most frequently employed technique for data analysis in research methodology. It can be used to analyze the documented information from text, images, and sometimes from the physical items. It depends on the research questions to predict when and where to use this method.

B. **Narrative Analysis:** This method is used to analyze content gathered from various sources such as personal interviews, field observation, and surveys**.** The majority of times, stories, or opinions shared by people are focused on finding answers to the research questions.

C. **Discourse Analysis:** Similar to narrative analysis, discourse analysis is used to analyze the interactions with people. Nevertheless, this particular method considers the social context under which or within which the communication between the researcher and respondent takes place. In addition to that, discourse analysis also focuses on the lifestyle and day-to-day environment while deriving any conclusion.

D. **Grounded Theory:** When you want to explain why a particular phenomenon happened, then using grounded theory for analyzing quality data is the best resort. Grounded theory is applied to study data about the host of similar cases occurring in different settings. When researchers are using this method, they might alter explanations or produce new ones until they arrive at some conclusion.

II. Data analysis in QuantitativeRresearch

A. **Preparing data for analysis**

The first stage in research and data analysis is to make it for the analysis so that the nominal data can be converted into something meaningful. Data preparation consists of the below phases.

Phase I: Data Validation

Data validation is done to understand if the collected data sample is per the pre-set standards, or it is a biased data sample again divided into four different stages

- **Fraud:** To ensure an actual human being records each response to the survey or the questionnaire

- **Screening:** To make sure each participant or respondent is selected or chosen in compliance with the research criteria

- **Procedure:** To ensure ethical standards were maintained while collecting the data sample

- **Completeness:** To ensure that the respondent has answered all the questions in an online survey. Else, the interviewer had asked all the questions devised in the questionnaire.

Phase II: Data Editing

More often, an extensive research data sample comes loaded with errors. Respondents sometimes fill in some fields incorrectly or sometimes skip them accidentally. Data editing is a process wherein the researchers have to confirm that the provided data is free of such errors. They need to conduct necessary checks and outlier checks to edit the raw edit and make it ready for analysis.

Phase III: Data Coding

Out of all three, this is the most critical phase of data preparation associated with grouping and assigning values to the survey responses. If a survey is completed with a 1000 sample size, the researcher will create an age bracket to distinguish the respondents based on their age. Thus, it becomes easier to analyze small data buckets rather than deal with the massive data pile.

III. Methods used for data analysis in quantitative research

After the data is prepared for analysis, researchers are open to using different research and data analysis methods to derive meaningful insights. For sure, statistical techniques are the most favored to analyze numerical data. The method is again classified into two groups. First, *'Descriptive Statistics'* used to describe data. Second, *'Inferential statistics'* that helps in comparing the data.

A.   Descriptive Statistics

This method is used to describe the basic features of versatile types of data in research. It presents the data in such a meaningful way that pattern in the data starts making sense. Nevertheless, the descriptive analysis does not go beyond making conclusions. The conclusions are again based on the hypothesis researchers have formulated so far. Here are a few major types of descriptive analysis methods.

a)   Measures of Frequency
- Count, Percent, Frequency
- It is used to denote home often a particular event occurs.
- Researchers use it when they want to showcase how often a response is given.

b)   Measures of Central Tendency
- Mean, Median, Mode
- The method is widely used to demonstrate distribution by various points.
- Researchers use this method when they want to showcase the most commonly or averagely indicated response.

c) **Measures of Dispersion or Variation**

- Range, Variance, Standard deviation

- Here the field equals high/low points.

- Variance standard deviation = difference between the observed score and mean

- It is used to identify the spread of scores by stating intervals.

- Researchers use this method to showcase data spread out. It helps them identify the depth until which the data is spread out that it directly affects the mean.

d) **Measures of Position**

- Percentile ranks, Quartile ranks

- It relies on standardized scores helping researchers to identify the relationship between different scores.

- It is often used when researchers want to compare scores with the average count.

For quantitative market research use of descriptive analysis often give absolute numbers, but the analysis is never sufficient to demonstrate the rationale behind those numbers. Nevertheless, it is necessary to think of the best method for research and data analysis suiting your survey questionnaire and what story researchers want to tell. For example, the mean is the best way to demonstrate the students' average scores in schools. It is better to rely on the descriptive statistics when the researchers intend to keep the research or outcome limited to the provided sample without generalizing it. For example, when you want to compare average voting done in two different cities, differential statistics are enough.

Descriptive analysis is also called a 'univariate analysis' since it is commonly used to analyze a single variable.

B. **Inferential Statistics**

Inferential statistics are used to make predictions about a larger population after research and data analysis of the representing population's collected sample. For example, you can ask some odd 100 audiences at a movie theater if they like the movie they are watching. Researchers then use inferential statistics on the collected sample to reason that about 80-90% of people like the movie.

Here are two significant areas of inferential statistics.

- **Estimating parameters**: It takes statistics from the sample research data and demonstrates something about the population parameter.

- **Hypothesis test**: It's about sampling research data to answer the survey research questions. For example, researchers might be interested to understand if the new shade of lipstick recently launched is good or not, or if the multivitamin capsules help children to perform better at games.

These are sophisticated analysis methods used to showcase the relationship between different variables instead of describing a single variable. It is often used when researchers want something beyond absolute numbers to understand the relationship between variables.

Here are some of the commonly used methods for data analysis in research.

A. **Correlation:** When researchers are not conducting experimental research or quasi-experimental research wherein the researchers are interested to understand the relationship between two or more variables, they opt for correlational research methods.

B. **Cross-tabulation:** Also called contingency tables, cross-tabulation is used to analyze the relationship between multiple variables. Suppose provided data has age and gender categories presented in rows and columns. A two-dimensional cross-tabulation helps for seamless data analysis and research by showing the number of males and females in each age category.

C. **Regression analysis:** For understanding the strong relationship between two variables, researchers do not look beyond the primary and commonly used regression analysis method, which is also a type of predictive analysis used. In this method, you have an essential factor called the dependent variable. You also have multiple independent variables in regression analysis. You undertake efforts to find out the impact of independent variables on the dependent variable. The values of both independent and dependent variables are assumed as being ascertained in an error-free random manner.

D. **Frequency tables:** The statistical procedure is used for testing the degree to which two or more vary or differ in an experiment. A considerable degree of variation means research findings were significant. In many contexts, ANOVA testing and variance analysis are similar.

E. **Analysis of variance:** The statistical procedure is used for testing the degree to which two or more vary or differ in an experiment. A considerable degree of variation means research findings were significant. In many contexts, ANOVA testing and variance analysis are similar.

IV. Considerations in Research Data Analysis

Researchers must have the necessary skills to analyze and manipulation the data, Getting trained to demonstrate a high standard of research practice. Ideally, researchers must possess more than a basic understanding of the rationale of selecting one statistical method over the other to obtain better data insights.

- Usually, research and data analytics projects differ by scientific discipline; therefore, getting statistical advice at the beginning of analysis helps design a survey questionnaire, select data collection methods, and choose samples.

- The primary aim of data research and analysis is to derive ultimate insights that are unbiased. Any mistake in or keeping a biased mind to collect data, selecting an analysis method, or choosing audience sample il to draw a biased inference.

- Irrelevant to the sophistication used in research data and analysis is enough to rectify the poorly defined objective outcome measurements. It does not matter if the design is at fault or intentions are not clear, but lack of clarity might mislead readers, so avoid the practice.

- The motive behind data analysis in research is to present accurate and reliable data. As far as possible, avoid statistical errors, and find a way to deal with everyday challenges like outliers, missing data, data altering, data mining, or developing graphical representation.

Check Your Progress

1. Explain the concept of data analysis in the research

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2. Which are the methods used for data analysis in qualitative research

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3.4 CONSTRUCTING GRAPHS, MAPS AND TABLES

Constructing graphs, maps and tables in research methodology in education is a way of presenting and analyzing data that can help answer research questions and test hypotheses. Graphs, maps and tables can show relationships, patterns, trends and comparisons between different variables or groups of data. They can also make the data more visually appealing and easier to understand for the reader.

Some steps to follow when constructing graphs, maps and tables are:

- Choose the type of graph, map or table that best suits your data and research purpose. For example, bar graphs can show frequencies or proportions, line graphs can show changes over time, pie charts can show percentages, maps can show spatial distribution or location, and tables can show numerical or textual information.

- Use appropriate tools or software to create your graph, map or table. For example, Excel can be used to create graphs and tables, and GIS (geographic information system) can be used to create maps.

- Label your graph, map or table clearly and accurately. Include a title that describes what the graph, map or table shows, and label the axes, legends, scales and units. Use consistent fonts, colors and symbols throughout your graph, map or table.

- Reference your graph, map or table in your text and cite the source of your data if it is not your own. Follow the citation style and format required by your discipline or journal. For example, APA style requires a methods section that describes how you collected and analyzed your data, and a reference list that includes all the sources you used.

- Evaluate and justify your choice of graph, map or table and explain how it helps answer your research question or test your hypothesis. Discuss the main findings, implications and limitations of your data presentation.

3.4.1 What is a Graph?

A graph, in layman terms, is a pictorial representation of organized data that helps the readers of the same understand complex information more easily.

While each kind of visual aid comes with its own pros and cons, some of the main features that underlie each can be summed up as below:

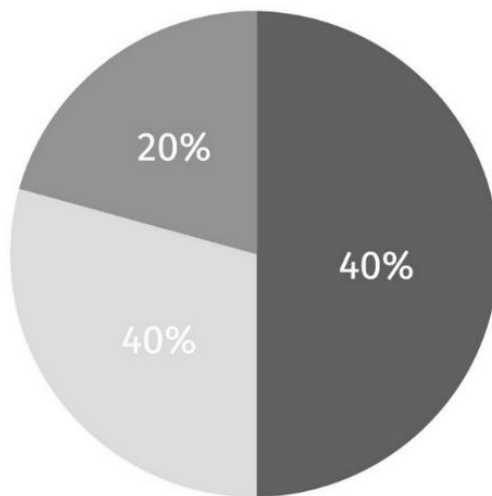- They provide information in the form of easy-to-understand images.

- Different data types require different graphs.

- They are often unable to display the major assumptions and causes behind the data fluctuations.

- They are easier to manipulate than factual information.
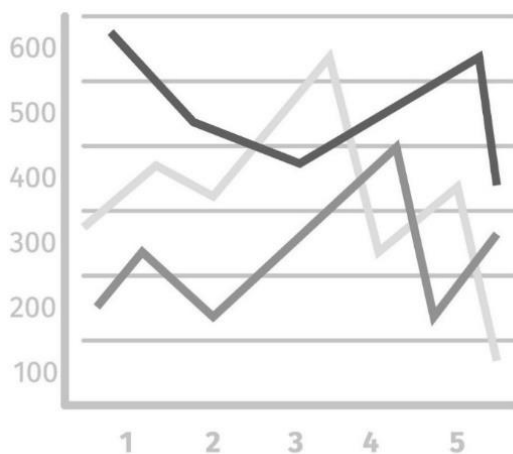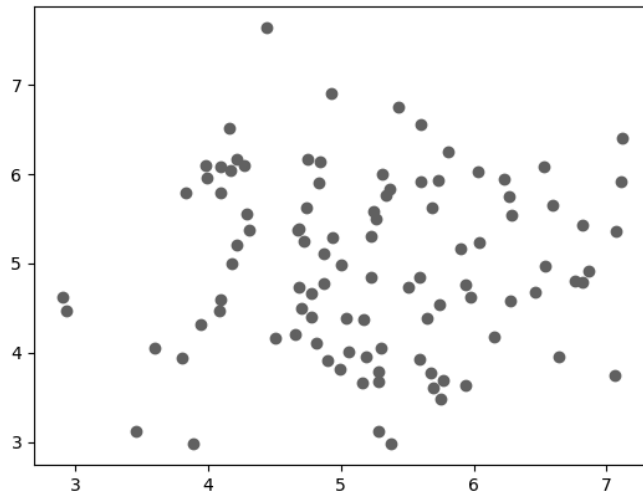
3.4.2 Types of Graphs and Charts

- **Bar Graph**
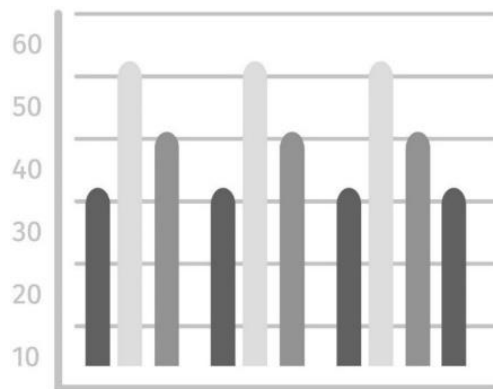
- **Pie Chart**

- **Line Chart**

- **Scatter Plot**

- **Flowchart**
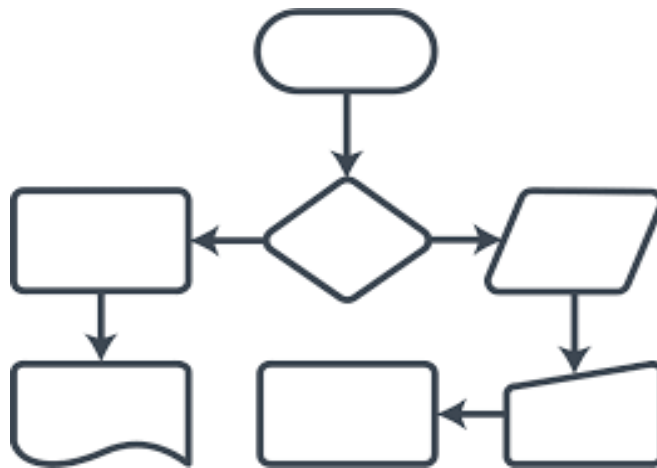
- **Histogram**

- **Pictograph**

- **Gantt Chart**

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TITLE 02	LOREM IPSUM DOLOR			LOREM IPSUM		
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TITLE 05	LOREM IPSUM			LOREM IPSUM		
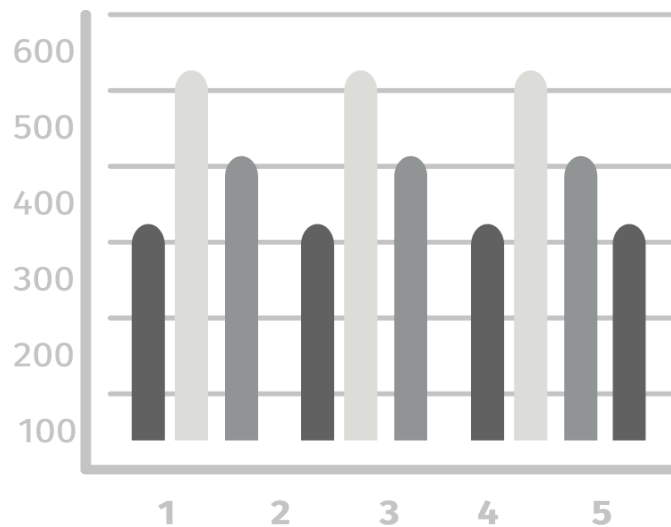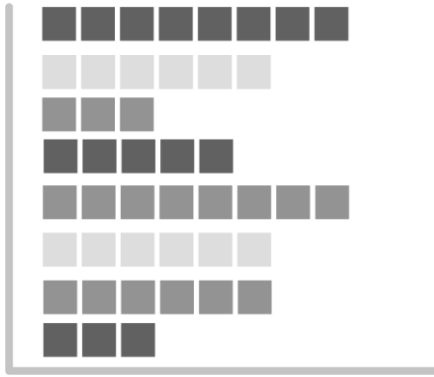
- **Bullet Chart**
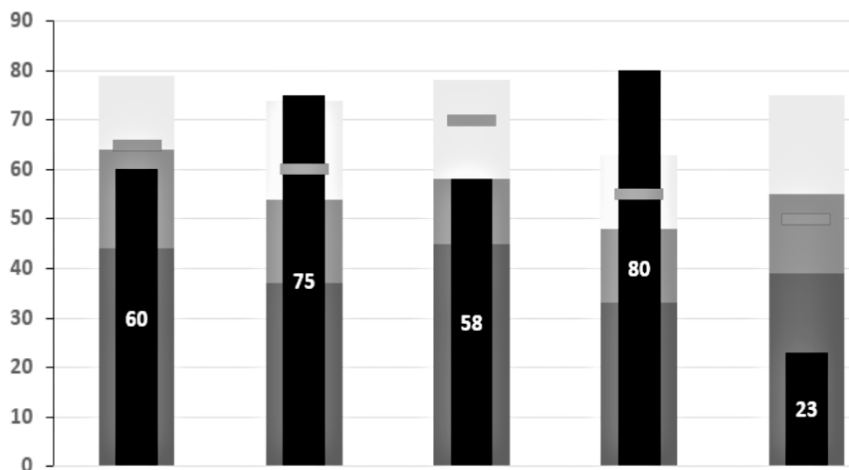
3.4.3 Tables

Research papers are often based on copious amounts of data that can be summarized and easily read through tables and graphs. When writing a research paper, it is important for data to be presented to the reader in a visually appealing way. The data in figures and tables, however, should not be a repetition of the data found in the text. There are many ways of presenting data in tables and figures, governed by a few simple rules.

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A. Using Tables

Tables are easily created using programs such as Excel. Tables and figures in scientific papers are wonderful ways of presenting data. Effective data presentation in research papers requires understanding your reader and the elements that comprise a table. Tables have several elements, including the legend, column titles, and body. As with academic writing, it is also just as important to structure tables so that readers can easily understand them. Tables that are disorganized or otherwise confusing will make the reader lose interest in your work.

- Title: Tables should have a clear, descriptive title, which functions as the "topic sentence" of the table. The titles can be lengthy or short, depending on the discipline.

- Column Titles: The goal of these title headings is to simplify the table. The reader's attention moves from the title to the column title sequentially. A good set of column titles will allow the reader to quickly grasp what the table is about.

- Table Body: This is the main area of the table where numerical or textual data is located. Construct your table so that elements read from up to down, and not across.

B. Using Figures

The placement of figures and tables should be at the center of the page. It should be properly referenced and ordered in the number that it appears in the text. In addition, tables should be set apart from the text. Text wrapping should not be used. Sometimes, tables and figures are presented after the references in selected journals.

Figures can take many forms, such as bar graphs, frequency histograms, scatterplots, drawings, maps, etc. When using figures in a research paper, always think of your reader. What is the easiest figure for your reader to understand? How can you present the data in the simplest and most effective way? For instance, a photograph may be the best choice if you want your reader to understand spatial relationships.

- Figure Captions: Figures should be numbered and have descriptive titles or captions. The captions should be succinct enough to understand at the first glance. Captions are placed under the figure and are left justified.

- Image: Choose an image that is simple and easily understandable. Consider the size, resolution, and the image's overall visual attractiveness.

- Additional Information: Illustrations in manuscripts are numbered separately from tables. Include any information that the reader needs to understand your figure, such as legends.

Check Your Progress

1. Which steps are to be followed when constructing graphs, maps and tables

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3.5 INTERNET RESEARCH ETHICS

Internet ethics **refers to the acceptable behaviour for using the internet**. It includes elements such as uploading genuine data, refraining from involvement in any dubious activity, and condemning child pornography, hate speech, fake news, and similar phenomena. Internet research ethics is a subdiscipline that fits across many disciplines and includes ethical issues such as participant knowledge and consent, data privacy, security, anonymity and confidentiality, and integrity of data, intellectual property issues, and community, disciplinary, and professional standards or norms. Internet ethics is a broad term that analyses the role of the internet in the development of the good life and whether it is playing a positive or negative role.

Ethical principles are rules that are more permanent, universal, and unchanging than values, and they help inform and influence values[1]. Some of the major ethical principles that can be used by individuals and organizations are:

1. **Utilitarianism:** An action is morally right if it produces the greatest good for the greatest number of people.

2. **Universalis:** An action is morally right if it follows a universal rule that everyone should act in the same way in a similar situation.

3. **Rights**: An action is morally right if it respects the moral and legal entitlements of others.

4. **Justice**: An action is morally right if it treats people fairly and equitably according to some standard of distribution.

5. **Virtue**: An action is morally right if it reflects a good character trait or moral excellence.

6. **Common good**: An action is morally right if it contributes to the well-being of the community or society as a whole.

7. **Ethical relativism**: An action is morally right if it conforms to the norms and values of one's culture or group.

These principles are not mutually exclusive and can be used in combination or in different situations. They can also help examine choices and options before making a decision or solving an ethical dilemma.

Check Your Progress

1. Which are the internet research ethics?

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3.6 REFERENCE WORK, ANALYSIS, REPORT WRITING

3.6.1 Reference Work

The reference section is a very important component of the report. It contains all the necessary literature that have been referred to before, during and after the study and contains books, journal articles and documents from where the materials have been referred to. References differ from bibliography in that references are those literature which have been cited in the main text of the report in different places. Bibliography includes many referred as well as many unreferred literature in the text of the report. Sometimes a book would have been consulted but not necessarily referred to in the text. Thus the bibliography will be inclusive of many materials which have not been referred in the text. Of course it may contain the referred materials also. On the other hand the references will contain basically the referred materials. In this unit we are going to focus on references , how to write the same and the importance of reference etc. Basically we will be depending on the APA source for this purpose.

I. A Reference List (The Format)

As per Publication Manual of American Psychological Association (Sixth Edition, 2009) just as data in the paper support interpretations and conclusions, so Reference citations support document statements made about the literature. All citations in the manuscript must appear in the Reference list, and all References must be cited in the text. The Reference list should be succinct, not exhaustive; simply provide sufficient references to support your Research. Choose References judiciously and cite them accurately. For example, if you retrieve an abstract but do not also retrieve and read the full article, your Reference should be identified as an abstract. The standard procedures for citation ensure that References are accurate, complete, and useful to investigators and readers. Whenever possible, support your statements by citing empirical work, such as method and results of an empirical study or a review of empirical studies (Lalumiere, 1993). When you cite nonempirical work, make this clear in your narrative as given in the examples below (see the box) Tripathi (1991) theorized that

Pandey (in press) argued that Parmeshwar (1993). Similarly, when you want to direct the reader to background information, signal the reader with phrases such as "for a review, see" and "(e.g., see [author, year]). "References" section begins at a new page with the label "References" at the centre. References comprise all documents including journals, books, technical Reports, computer programmers and unpublished works mentioned in the text of the Report. References are arranged in alphabetical order by the last name of the author(s) and the year of publication in parenthesis or in case of unpublished citations, only the Reference is cited. Sometimes no author is listed and then, in that condition the first word of the title or sponsoring organisation is used to begin the entry. When more than one name is cited within parenthesis, the References are separated by semicolons. In parenthesis page number is given only for direct quotations. The Researcher should check carefully that all References cited in the text appear in.

II. References (Process of Writing)

References should not be confused with Bibliography. A bibliography contains everything that is included in the Reference section plus other publications which are useful but were not cited in text or manuscript. Bibliography is not generally included in Research Reports. Only References are usually included. References in APA Format The APA style guide prescribes that the Reference section, Bibliographies and other lists of names should be accumulated by surname first, and mandatory inclusion of surname prefixes. For example, "Martin de Rijke" should be sorted as "De Rijke, M" and "Saif Al Falssi" should be sorted as "Al-Falasi, S." (The preference for References in Research Report 7 9 Report Writing 8 0 Arabic names now is to hyphenate the prefix so that it remains with the surname.) Reference citations in text are done using parenthetical referencing. Most usually, this involves putting the author's surname and the date of publication within parentheses, separated by a comma, generally placed immediately after the Reference or at the end of the sentence in which the Reference is made. However, it is also common for the authors to be the subject or object of a sentence. In such a case only the year is in parentheses. In all cases of citation, author name(s) are always followed immediately by the year in which the article was published. In the case of a quotation, the page number is also included in the citation.

Full bibliographic information is then provided in a Reference section at the end of the article. APA style defines that the Reference section may only include articles that are cited within the body of an article. This is the distinction between a document having a Reference section and a Bibliography, which may incorporate sources read by the authors as background but not referred to or included in the body of a document.

 Let us now see how to write references

λ **Single author Format** should be Author's last name followed directly by a comma, then the year of publication. When one makes the Reference to the author(s) directly as a part of the narrative, then only the year (and page number if needed) would remain enclosed within parentheses. The same

holds for multiple authors. Examples are given below: "A recent study found a possible genetic cause of alcoholism (Pauling, 2005)." "Pauling (2005) discovered a possible genetic cause of alcoholism."

λ **Two authors Authors** should be presented in order that they appear in the published article. If they are cited within closed parentheses, use the ampersand (&) between them. If not enclosed in parentheses then use expanded "and". Examples are given below: "A recent study found a possible genetic cause of alcoholism (Pauling & Liu, 2005)   "Pauling and Liu (2005) discovered a possible genetic cause of alcoholism."

λ **Three to five authors**With three to five authors, the first Reference to an article includes all authors. Subsequent citations in the same document may refer to the article by the principal author only plus "et al." All authors must be present in the References section. A recent study found a possible genetic cause of alcoholism (Pauling, Liu, & Guo, 2005). Examples are given below: "Pauling, Liu, and Guo (2005) conducted a study that discovered a possible genetic cause of alcoholism." 8 1 "Pauling et al. (2005) discovered a possible genetic cause of alcoholism." "A recent study found a possible genetic cause of alcoholism (Pauling et al., 2005)."

λ **Six or seven authors**The correct format in the text is (First Author et al., Year) or First Author et al. (Year). Examples given below: "Brown et al. (2005) discovered a possible genetic cause of alcoholism." In the Reference section, all authors' names should be included if there are six or seven authors.

λ **Eight or more authors**In the text, the first and all subsequent References should be to First Author et al. (Year) or (First Author et al., Year). In the Reference list, list the first six authors, and then put an ellipsis (three periods), and then list the last author. Example given below: "Brown, A.B., Johnson, C., Laird, K., Howard, O. P., Evans, S., . . . Pritchard, J. (2004). ..... (study has eight or more authors)"

λ **Multiple publications**, same author If an author has multiple publications that you wish to cite, you use a comma to separate the years of publication in chronological order (oldest to most recent). If the publications occur in the same year, the Publication Manual recommends using suffixes a, b, c, etc. (note that corresponding letters should be used in the Reference list, and these References should be ordered alphabetically by title). Example given below: "Recent studies have found a possible genetic cause of alcoholism (Pauling, 2004, 2005a, 2005b)." "Pauling (2004, 2005a, 2005b) has conducted studies that have discovered a possible genetic cause of alcoholism"

λ **Multiple publications, different authors** Follow the rules for one author above, and use a semicolon to separate articles. Citation should first be in alphabetical order of the author, then chronological. Example given below: "Recent studies found a possible genetic cause of alcoholism (Alford, 1995; Pauling, 2004, 2005; Sirkis, 2003)"

λ **Direct quotes**The same rules as above apply here, the format being (Author, Year, Page Number). Example given below: "When asked why his behaviour had changed so dramatically, Max simply said, "I think it's the reinforcement" (Pauling, 2004, p. 69)."

Check Your Progress

Elucidiate The Importance of Reference Work

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3.6.2 Analysis

Analysis in educational research is a systematic collection and analysis of data related to the field of education. It may involve a variety of methods and various aspects of education including student learning, interaction, teaching methods, teacher training, and classroom dynamics.

Thematic analysis (TA) is a commonly used qualitative data analysis approach in psychology, health care, sport and exercise, and many other fields including education.

TA is used to identify patterns or themes within qualitative data.

Other types of qualitative data analysis include coding and/or content analysis, concept map analysis, discourse or narrative analysis, grounded theory, phenomenological analysis or interpretative phenomenological analysis (IPA)

Analysis in educational research in detail is a broad topic that can be approached from different perspectives and methods. Here are some key points to consider:

- Analysis in educational research is the process of examining and interpreting data collected from various sources related to the field of education.

- Analysis in educational research can be either qualitative or quantitative, depending on the nature of the research question, the data, and the methods used.

- Qualitative analysis in educational research involves identifying patterns or themes within non-numerical data, such as words, images, or actions. Some common types of qualitative analysis are thematic analysis, coding and/or content analysis, concept map analysis, discourse or narrative analysis, grounded theory, phenomenological analysis or interpretative phenomenological analysis (IPA).

- Quantitative analysis in educational research involves applying statistical techniques to numerical data, such as test scores, surveys, or experiments. Some common types of quantitative analysis are descriptive statistics, inferential statistics, regression analysis, factor analysis, or meta-analysis.

- Analysis in educational research should be guided by the research question, the theoretical framework, and the ethical principles of the researcher. The researcher should also be aware of the strengths and limitations of each type of analysis and choose the most appropriate one for their purpose.

- Analysis in educational research should be reported clearly and transparently, with sufficient details and evidence to support the findings and conclusions. The researcher should also acknowledge any limitations or biases that may affect the validity or reliability of the analysis.

Check Your Progress

1. Which are the key points considered for analysis process?

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3.6.3 Report Writing

A research report is a publication that reports on the findings of a research project or alternatively scientific observations on or about a subject. Normally the research assignments like projects, investigations, explorations, theses, dissertations fall in this category. A research report is a well-crafted document that outlines the processes, data, and findings of a systematic investigation. It is an important document that serves as a first-hand account of the research process, and it is typically considered as an objective and accurate source of information.

A. Features of a Research Report

A good research report is marked by certain features:

1. A good research report should be written lucidly, precisely in simple language and should provide a detailed presentation of the whole of research processes. It should present the data in tables and figures with suitable objective explanations. The end part should include the concluding remarks, the prime findings and recommendations, if any.

2. The language and style should be academic, formal, less flaunting and simple. .

3. The report is normally based on the first hand information collected by the researcher. However, the reports written on the basis of secondary data are also presented in a systematic and lucid manners.

4. A research report should normally be written in the third person and aoid use of pronouns like, 'I', 'Me', 'My' etc.

5. The report should facilitate the reader with systematic presentation like proper headings, title, sub-tiles, tables, graphs, parts and even bullet points where required.

6. The reports normally forward recommendations too as the solutions to the problems and policy making by the concerned authorities, corporate organizations, institutions and governments.

B. TYPES OF RESEARCH REPORT

The research report is classified based on 2 things; nature of research and target audience.

C. Nature of Research

I. Qualitative Research Report

This is the type of report is written for qualitative research. It outlines the methods, processes, and findings of a qualitative method of systematic investigation. In educational research, a qualitative research report provides an opportunity for one to apply his or her knowledge and develop skills in planning and executing qualitative research projects.

A qualitative research report is usually descriptive in nature. Hence, in addition to presenting details of the research process, you must also create a descriptive narrative of the information

II. Quantitative Research Report

A quantitative research report is a type of research report that is written for quantitative research. Quantitative research is a type of systematic investigation that pays attention to numerical or statistical values in a bid to find answers to research questions. In this type of research report, the researcher presents quantitative data to support the research process and findings. Unlike a qualitative research report that is mainly descriptive, a quantitative research report works with numbers; that is, it is numerical in nature.

III. Identification of Knowledge Gaps

With a research report, you'd be able to identify knowledge gaps for further inquiry. A research report shows what has been done while hinting at other areas needing systematic investigation. In market research, a research report would help you understand the market needs and peculiarities at a glance. A research report allows you to present information in a precise and concise manner. It is time-efficient and practical because, in a research report, you do not have

to spend time detailing the findings of your research work in person. You can easily send out the report via email and have stakeholders look at it.

Research Report

Major Parts	Sections
Preliminary Part	1. Title 2. Certificate/Authorisation document 3. Contents 4. Preface & Acknowledgements 5. List of Tables/Figure 6. Acronyms (If applicable)
Main Body	1. Introduction 2. Review of Literature 3. Research Objectives/Questions/Hypotheses 4. Research Methodology 5. Data Analysis/Results/Discussion 6. Conclusions and Findings 7. Recommendations
End part	1. Endnotes/References 2. Appendices 3. Bibliography 4. Index

A. Preliminary Part

Preliminary part of a research report includes the title page of the report, certificate of authentication by the research supervisor or letter of accreditation/authorisation by research sponsoring agency, the contents of the report based on the chapter scheme, foreword, preface and acknowledgements, and the list of tables or figures, if any. Usually foreword is written by an expert of the area. Preface is the face of report i.e. a brief discussion about the research problem, objectives and researcher's approach about dealing with it. Tables or figures are normally numbered on the basis of Chapter No. and tables in continuity e.g Table No.1.1; 1.2;1.3;1.4; 1.5 Table 2.1; 2.2; 2.3; 2.4 etc.

B. Main Body

a. Introduction -

The purpose of your report. The thesis statement will be useful here. Background information may include a brief review of the literature already available on the topic so that you are able to 'place' your research in the field. Some brief details of your methods and an outline of the structure of the report.

b. Literature Review–

'Literature Survey' is the first major task to be performed by a researcher before and after the selection of problem. It could be done even before selection of problem to determine the research problem to be selected. The reason of carrying out a Literature Survey is to exhibit and develop ones familiarity with other people's works related with the research problem chosen.It normally involves the survey or search of written works in the shape of books and papers in academic journals, and also speeches, letters, documents, films or other outputs.

There are many types of Literature Survey, and,it depends on one's needs like looking through citations, quotations, bibliographies, indexes etc. In literature review the major works related with research problems are reviewed in brief. The review could be done on the basis of classification of works thematically or could be done in chronological order.

The researcher should be able to underline the major argument, content or finding of the work reviewed and present that analytically in reference to the research problem showing the existing gap, difference or lag in the study.

c. Methodology

Research Methodology means the adoption of the special procedures, tools and techniques in order to find, categorise, select, process, and analyse information about a particular research problem. In a research document, be it a paper, dissertation, thesis or project the methodology section allows the reader to critically evaluate a study's overall validity and reliability. Jansen and Warren (2020) observe that the research methodology simply refers to the practical "how" of any given piece of research. More specifically, it's about how a researcher systematically designs a study to ensure valid and reliable results that address the research aims and objectives. It includes research approach, sample plan, data sources, questionnaire type etc. In methodology section the researcher discusses in details the research methodology he has followed i.e. what he did and how he did it. Methodology should be clearly written so that other researcher could also understand it and follow it in similar kind of research endeavours. Methodology is normally written in a passive voice e.g. 'the population was selected on the basis of stratified sampling' or 'the respondents were asked to answer the questions' instead of writing in active voice e.g. 'I asked the respondents to fill the questionnaire'.

d. Data Analysis

Data Analysis' is the step to be followed once the first hand information has been collected. It refers to the process to examine, elicit, elucidate and explain the data, in the course of which concepts or theories are likely to be considered, advanced and developed. The application of tools or techniques depends upon the nature of the data and suitability of the tools for analysing it. It is also classified into preliminary analysis or hypotheses testing. While the former involves the presentation of data in graphs or tables the latter refers to testing of the inferences (hypotheses) made in the beginning. The data can be small, medium or large in quantum and quantitative (numeric) or qualitative (textual) in nature.

e.   Results

The results represent the findings of the study based upon the methodology or methodologies applied in collection of data and the tools and techniques applied in data analysis.

The results should state the findings of the research in a systematic manner and in logical sequence without bias or interpretation. It is here where the researcher indicates what he has found. In simple words it is the data collected and arranged systematically ready for interpretation.

f.   Discussion

Discussion mostly forms part of the natural science or quantitative studies. However, they can be used in social sciences too wherever the data is presented cartographically in quantitative manner or patterns or figures drawn even in qualitative research. 'The purpose of the discussion is to interpret and describe the significance of your findings in light of what was already known about the research problem being investigated, and to explain any new understanding or fresh insights about the problem after you've taken the findings into consideration. he discussion will always connect to the introduction by way of the research questions or hypotheses you posed and the literature you reviewed, but it does not simply repeat or rearrange the introduction; the discussion should always explain how your study has moved the reader's understanding of the research problem forward from where you leftthem at the end of the introduction'(Paul 2008). In this section one discusses the relevance of results and how the findings fit with other research in the area. It will relate back to your literature review and your introductory thesis statement.

g.   Conclusion

Conclusion refers to the broad drawing of the study done and the major findings and suggestions made. It can also becalled the summary ofthe major findings ofthe study. In conclusions the researchers are advised not to include any new information or ideanot discussedin the previous chapters. However, one can specify the limitations of the study andthe zones of its utility and applications.

h.   Recommendations

Normally recommendations are included in the concluding part or in conclusions. However, they can be presented separately too. Recommendations include include suggestions for what needs to be done as a result of your findings. Recommendations are usually listed in order of priority.

i.   End Part

'The End Part' of the report comprises of endnotes, references, appendices, bibliography and indexes. It also includes endnotes if foot notes are not used in the report. Endnotes are like footnotes but are located at the back rather than the bottom of each page. These would include all of the references for all works cited in the Review of Related Literature or any other sections of the report as well as the references for quotations, either direct or indirect, taken from other sources, or any footnote comments that might have been included. These are listed in numeric order as presented in the text (Hill 1970).

j.   Bibliography

Bibliography includes all the references used in the report or referred to for background information. Bibliography preparation is based on specific patterns. Kindly check the stylesheets for learning how to prepare a bibliography.

k.   Appendices

Any information in the forms of tables/figures, acts, documents, letters, speeches or other materials which is not totally central to the analysis but need to be mentioned are placed in appendices. Theseshould add extra information to the report. If you include appendices they must be referred to in the body of the report and must have a clear purpose for being included. Each appendix must be named and numbered.

3.6.4 Applications of Report Writing

Research reports have many applications, including:

- **Communicating research findings:** The primary application of a research report is to communicate the results of a study to other researchers, stakeholders, or the general public. The report serves as a way to share new knowledge, insights, and discoveries with others in the field.

- **Informing policy and practice**: Research reports can inform policy and practice by providing evidence-based recommendations for decision-makers. For example, a research report on the effectiveness of a new drug could inform regulatory agencies in their decision-making process.

- **Supporting further research:** Research reports can provide a foundation for further research in a particular area. Other researchers may use the findings and methodology of a report to develop new research questions or to build on existing research.

- **Evaluating programs and interventions**: Research reports can be used to evaluate the effectiveness of programs and interventions in

achieving their intended outcomes. For example, a research report on a new educational program could provide evidence of its impact on student performance.

- **Demonstrating impact**: Research reports can be used to demonstrate the impact of research funding or to evaluate the success of research projects. By presenting the findings and outcomes of a study, research reports can show the value of research to funders and stakeholders.

- **Enhancing professional development**: Research reports can be used to enhance professional development by providing a source of information and learning for researchers and practitioners in a particular field. For example, a research report on a new teaching methodology could provide insights and ideas for educators to incorporate into their own practice.

3.6.5 How to write Report Writing

Here are some steps you can follow to write a research report:

- **Identify the research question:** The first step in writing a research report is to identify your research question. This will help you focus your research and organize your findings.

- **Conduct research**: Once you have identified your research question, you will need to conduct research to gather relevant data and information. This can involve conducting experiments, reviewing literature, or analyzing data.

- **Organize your findings:** Once you have gathered all of your data, you will need to organize your findings in a way that is clear and understandable. This can involve creating tables, graphs, or charts to illustrate your results.

- **Write the report:** Once you have organized your findings, you can begin writing the report. Start with an introduction that provides background information and explains the purpose of your research. Next, provide a detailed description of your research methods and findings. Finally, summarize your results and draw conclusions based on your findings.

- **Proofread and edit:** After you have written your report, be sure to proofread and edit it carefully. Check for grammar and spelling errors, and make sure that your report is well-organized and easy to read.

- **Include a reference list:** Be sure to include a list of references that you used in your research. This will give credit to your sources and allow readers to further explore the topic if they choose.

- **Format your report:** Finally, format your report according to the guidelines provided by your instructor or organization. This may include formatting requirements for headings, margins, fonts, and spacing.

3.6.6 Purpose of Report Writing

The purpose of a research report is to communicate the results of a research study to a specific audience, such as peers in the same field, stakeholders, or the general public. The report provides a detailed description of the research methods, findings, and conclusions.

Some common purposes of a research report include:

- **Sharing knowledge:** A research report allows researchers to share their findings and knowledge with others in their field. This helps to advance the field and improve the understanding of a particular topic.

- **Identifying trends:** A research report can identify trends and patterns in data, which can help guide future research and inform decision-making.

- **Addressing problems:** A research report can provide insights into problems or issues and suggest solutions or recommendations for addressing them.

- **Evaluating programs or interventions**: A research report can evaluate the effectiveness of programs or interventions, which can inform decision-making about whether to continue, modify, or discontinue them.

- **Meeting regulatory requirements:** In some fields, research reports are required to meet regulatory requirements, such as in the case of drug trials or environmental impact studies.

3.6.7 Characteristics of ReportWriting

There are several characteristics of a research report that distinguish it from other types of writing. These characteristics include:

- **Objective:** A research report should be written in an objective and unbiased manner. It should present the facts and findings of the research study without any personal opinions or biases.

- **Systematic:** A research report should be written in a systematic manner. It should follow a clear and logical structure, and the information should be presented in a way that is easy to understand and follow.

- **Detailed:** A research report should be detailed and comprehensive. It should provide a thorough description of the research methods, results, and conclusions.

- **Accurate**: A research report should be accurate and based on sound research methods. The findings and conclusions should be supported by data and evidence.

- **Organized:** A research report should be well-organized. It should include headings and subheadings to help the reader navigate the report and understand the main points.

- **Clear and concise:** A research report should be written in clear and concise language. The information should be presented in a way that is easy to understand, and unnecessary jargon should be avoided.

- **Citations and references:** A research report should include citations and references to support the findings and conclusions. This helps to give credit to other researchersand to provide readers with the opportunity to further explore the topic.

3.6.8 Advantages of Report Writing

Research reports have several advantages, including:

- **Communicating research findings:** Research reports allow researchers to communicate their findings to a wider audience, including other researchers, stakeholders, and the general public. This helps to disseminate knowledge and advance the understanding of a particular topic.

- **Providing evidence for decision-making**: Research reports can provide evidence to inform decision-making, such as in the case of policy-making, program planning, or product development. The findings and conclusions can help guide decisions and improve outcomes.

- **Supporting further research:** Research reports can provide a foundation for further research on a particular topic. Other researchers can build on the findings and conclusions of the report, which can lead to further discoveries and advancements in the field.

- **Demonstrating expertise:** Research reports can demonstrate the expertise of the researchers and their ability to conduct rigorous and high-quality research. This can be important for securing funding, promotions, and other professional opportunities.

- **Meeting regulatory requirements:** In some fields, research reports are required to meet regulatory requirements, such as in the case of drug trials or environmental impact studies. Producing a high-quality research report can help ensure compliance with these requirements.

3.6.9 Limitations of Report Writing

Despite their advantages, research reports also have some limitations, including:

- **Time-consuming:** Conducting research and writing a report can be a time-consuming process, particularly for large-scale studies. This can limit the frequency and speed of producing research reports.

- **Expensive:** Conducting research and producing a report can be expensive, particularly for studies that require specialized equipment, personnel, or data. This can limit the scope and feasibility of some research studies.

- **Limited generalizability:** Research studies often focus on a specific population or context, which can limit the generalizability of the findings to other populations or contexts.

- **Potential bias**: Researchers may have biases or conflicts of interest that can influence the findings and conclusions of the research study. Additionally, participants may also have biases or may not be representative of the larger population, which can limit the validity and reliability of the findings.

- **Accessibility:** Research reports may be written in technical or academic language, which can limit their accessibility to a wider audience. Additionally, some research may be behind paywalls or require specialized access, which can limit the ability of others to read and use the findings.

Check Your Progress

1. Explain the importance of report writing in research

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2. Explain the parts of report writing

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3.7 CONCLUSION

Computer applications in educational research are tools and resources that can enhance the quality and effectiveness of teaching and learning processes. They can help teachers to prepare and deliver interactive and engaging lessons, using multimedia presentations, online platforms, and data analysis software. They can also help students to access information, collaborate with peers and teachers, and create and share their own knowledge products. Computer applications can also facilitate educational research by enabling researchers to collect, store, analyze, and disseminate large amounts of data from various sources.

A possible conclusion for the use of computer applications in educational research is:

Computer applications have become an integral part of education in the information age. They offer many benefits and uses for teachers, students, and researchers who want to improve their practice and outcomes. By using computer applications, educators can leverage the power of technology to make learning more personalized, accessible, and meaningful for all learners. Computer applications can also support educational research by providing tools and methods for generating and communicating new knowledge in the field. Therefore, computer applications are essential for advancing education in the 21st century.

3.8 EXERCISE

1. What is the purpose of a review of literature in the research?

2. Explain the concept of Internet search?

3. Explain the types of data analysis in research?

4. What are the steps of data analysis in quantitative research?

5. Explain the concept of descriptive statistics

6. Which steps are followed when constructing graphs,maps and tables?

7. What is the process of references writing?

8. Explain the applications of report writing

9. Explain the characteristics of report writing

10. What are the advantages of report writing?

3.9. REFERENCE

1. https://essay-writingsservices.com/literature-review-definition

2. https://www.scribbr.com/methodology/literature-review/

3. https://research-methodology.net/research-methodology/literature-review-sources/

4. www.bing.com/search

5. http://www.tojet.net/

6. www.jagranjosh.com/

7. www.educationplanetonline.com/

8. www.questionpro.com

9. https://mindthegraph.com/blog/graphs-charts-tips-research-paper/

10. https://www.enago.com/academy/

11. https://www.researchgate.net/publication/354533791_Research_Methodology_WRITING_A_RESEARCH_REPORT

12. https://researchmethod.net/research-report/

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4

RESEARCH REPORT-WRITING

Unit Structure :

4.0 OBJECTIVES

1.   To enable students to understand the meaning, purpose and importance of Research Report.

2.   To acquaint students with various types of Research Reports.

3.   To help the students to know about elements of writing an Research Report.

4.   To enable the students to know about Criteria of good Research Report.

5.   To get acquainted with the format of Research Report

4.1 INTRODUCTION

After continuous and consistent efforts made by researcher undertaking any research work ,the most important thing is to communicate the research findings and results to others this is done by writing research report. Research Report writing is a valuable experience for a researcher and considered as an essential part of the research process with an objective to disseminate the entire process of research right from selection of problem, its significance, methodology used, process of data collection, data analysis, major findings and recommendations in a documented form. Researcher have options to communicate research results may be through oral presentation or written form. Dissemination of research results in documented form always proved useful as it make research activity complete and also preserve the record in the documented form which can be used further. In module 1,2&3 of this course , you learned about sources of educational data, data analysis, and use of computer applications in

Educational Research. Collecting & analysing data, making graphical presentations, using internet for reviews and all other efforts made by you i.e. your experiences during the task completion are suppose to be made available to the readers. This is possible only if you write report of your research work. In this module we will discuss about meaning of Research Report, its purpose & importance , and types of Research Reports . Besides this, you will come to know about the elements of writing an Research Report and also the criteria of good Research Report. After going through this module you will gain deeper understanding about reporting research results in written form.

4.2 MEANING OF RESEARCH REPORT

Historically we have the evidence of Research Report in the form of articles or letters written by the researcher to communicate their research findings to the readers. Research Report is the comprehensive presentation or documentation of researchers activities & the results obtained.

Koul L (1984) "The researcher is obliged to give a detailed account of all his experience and thinking involved in the process of research, from identifying the problem to drawing the conclusions. Presentation of detailed account of research experience is called a Research Report."

Best and Kahn(1993) "The Research Report whether it be a thesis , dissertation or a short term paper or report, usually follows a fairly standardized pattern"

Mohan(2003) "Research Report is the presentation of research findings directed to a specific audience to accomplish a specific purpose"

Thus Research Report is written document in which emphasis is laid on research findings and results, its implications, recommendations and suggestions which can be useful for readers in future.

Check your Progress

1. What do you mean by Research Report?

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2. Research Report is the document for future use by other researchers - Justify

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3. What is the meaning of Research Report as laid down by Koul? Explain.

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4.3 PURPOSE AND IMPORTANCE OF RESEARCH REPORT

Main purpose of Research Report is to convey ideas and information in a way that promotes understanding and this information is useful for the readers. Research Report provides information about the extent to which objectives of the research attained. Research Report provide complete picture about the research problem, objectives, hypotheses, reviews collected, sample, statistical techniques used, findings, recommendations and suggestions. Research Report is a written document containing 4 to 6 chapters, each chapter focus on certain aspects which we will discuss in 4.5 i.e. Elements of writing an Research Report. Thus the purpose of Research Report is to communicate to others what has been researched on and what are the results of research study.

Check your Progress

1. State any 3 purpose of research report.

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2. Why is Research Report important?

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3. What information does the Research Report provide?

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4.4 TYPES OF RESEARCH REPORTS

There are different ways to classify Educational Research and depending upon the type of Research-Research Report may be prepared by researchers to disseminate their research results. Hence, we find that there are various types of Research Reports based on to whom the researcher is considering the readers like peers, fellow researchers, teachers , educational practitioners, policy makers etc. Different types of research reports are as follows:

- Articles

- Abstracts

- Theses

- Dissertations

- Project reports , etc.

Articles: Articles are grouped as conceptual article, review article, theoretical article and research article. Each will have standard style and format and guidelines provided by publisher.

Abstract: Abstract is a comprehensive summary of the article, theses, dissertation or project report. Abstract is a summarized report in about 150 to 200 words or 1 or 2 paragraphs located in the beginning of the report giving idea in concise form about the research work .Good abstract should be accurate , concise, specific , coherent and readable.

Theses and Dissertations: These are the record of research activities produced in the partial fulfilment of requirement of the course or programme completion. It involves presenting a research problem with an argument or point of view. These reports are submitted to an institution or university for examining for the award of degree. Dissertation or theses is written as per the standard format recommended by American Psychological Association (APA)

Project reports: These are the reports written for research projects undertaken by individuals , group or institution . Research projects are funded by various funding agencies like-UGC, ICSSR, UNICEF, UNESCO etc

Project investigator is expected to submit Project report to the funding agency prepared in accordance to the guidelines/format provided by funding agency.

Check your Progress

1. What are the different types of Research Reports?

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2. Write characteristics of good abstract.

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4.5 ELEMENTS OF WRITING RESEARCH REPORT

There are certain elements to be considered while writing an Research Report ,these elements make your writing highly structured and scientific. Writing Research Report is somewhat different experience from that of other kind of writing ,it demands from researcher to provide complete information in few words i.e. precise and accurate. As already mentioned Research Report is document to communicate results to others , to make this communication clear an orderly, presentation of ideas in sequential and systematic manner is required which will maintain continuity of words , concepts ,thematic development from the beginning till the end of report. There are several styles /formats or manuals available for writing Research Report, usually in Educational Research style specified in the publication manual of the American Psychological Association (APA) is followed universally. APA recommends certain elements arranged in a logical sequence which are divided into three sections-

i) Preliminary Section

ii) Main Body

iii) Reference Section

Each section comprises many sub-sections, in order to get clear idea of the elements of writing an research report let us discuss each element in detail.

i)   **Preliminary section :** The preliminary section is the element which covers first few pages of the report and have following sub-sections.

   (a)   **Title page**: the first page of the report is the title page which basically give information about:

      The title of the study:-title should be concise and should clearly indicate the purpose of the study, abbreviations should not be used in the title. The title is centred on the page and typed in upper and lowercase letters and when two lines are needed they should be doubled spaced.

      Author's name and Institutional Affiliation: On the title page author's name should be centred below the title and the next line should indicate the name of the institution to which the author is affiliated. In case of dissertation or theses submitted for the partial fulfillment of the course or program completion, after title the next line should indicate the name of the institution or university to whom report is submitted for examining for the

award of degree. The preferred form of an author's name is first name, middle initial and last name as this assist researchers to refer as well as librarians to preserve the documents. Use the same format for publication throughout your career. Ex : instead of A.K.Mangal, the correct way of author title is Alok K Mangal.

The affiliation identifies the location where the author conducted the study which is usually an institution. when the author has no institutional affiliation, write the city and state of residence below the authors name .If the institutional affiliation has changed since the work was completed ,give the current affiliation in the authors identification notes.If the report is for partial fulfillment of any course or programme , name of the agency to which report is submitted, name of student along with seat number and supervisors name is mandatory

Running Head for Publication: The running head is an abbreviated title that is printed at the top of the pages of a published article to identify the article for readers. The head should be a maximum of 50 characters counting letters, punctuation, and spaces between words.eg: if the title is "A study of Emotional Intelligence among Secondary School Students of Aurangabad " , the running head for all pages will be "Emotional Intelligence"

Month and Year of Submission: At the bottom of the title page , month and year of submission should be mentioned.

Specimen of the Title page of the Research Report

A STUDY OF EMOTIONAL INTELLIGENCE AMONG SECONDARY SCHOOL STUDENTS OF AURANGABAD Submitted To Name of the Institute or University By Name of the Researcher with seat No Name of the Guide Month & Year of submission

The title page and each subsequent page of the report have shortened title and page number appearing in the upper right hand corner, remaining pages were numbered consecutively, beginning with the title page but title page will not have number typed.

(b) **Acknowledgement (if Any):** In this section researcher need to acknowledge the help and encouragement received at various stages for the completion of the research activity. Support and cooperation received from funding agency (if any), supervisor, affiliating institute, in the form of academic and administrative support etc. Acknowledgment should always be written in brief.

(c) **Declaration:** This will certify that the research work is original

(d) **Table of Contents :** This section will give information about the various chapters, references and appendices. The table of contents provide guidelines for locating various headings within the report, it also provide the framework around which the report is organised. The titles of chapters ,major headings and sub-headings are listed along with the serial number of pages on which these are located.

(e) **List of tables :** The statistical results are generally presented in tabular form, and usually there are several such tables in a research report. In order to help the readers to locate these tables , a list of tables along with the serial numbers of pages on which these tables are located is provided.

(f) **List of figures :** In Research report if figures are included in order to make the presentation and interpretation more clear ,list of such figures should also be provided indicating the serial number of pages on which they are located to facilitate the readers.

(g) **Abstract :** The abstract is a comprehensive summary of the contents of the Research Report, the abstract is written on separate sheet of paper with the word *Abstract* at the top in upper and lower case letters and no paragraph indentation .Abstract allow the readers to survey the contents of an research work quickly. Researcher should write abstract considering the word limit which should not exceed 1000 characters that is about 100-150 words. The abstract should be self-contained and include a brief statement which includes the problem under the study, method, sample, design and procedure used for data collection, statistical applications, findings of the study and conclusions. References must not be included in the abstract. Abstract is the most important paragraph of the report reflecting accuracy, self-contained, concise, specific, coherent and readable as important characteristics.

This section deal in detail with the content part, it covers 5 or 6 chapters or sections which are follows:-

1. Introduction

2. Review of related literature and research

3. Research Design and Procedure

4. Analysis and Interpretation of data

5. Major findings, conclusions, Summary and Suggestions.

1. **Introduction:** Introduction starts on a fresh page, page from where introduction starts is not labelled with number but it is counted and research report begins with introduction. Main purpose of this section is to make the readers understand the basic nature of research study being presented in the report. Introduction also highlights need and significance of the study, justification by researcher for selecting the topic is expected. The main headings include – the problem to be investigated, the need of the study, its rationale and scope. This section begins with a general orientation to the problem area and leads directly to specific statement of the problem to be investigated. The problem should be stated directly, and wherever possible, should be stated in terms of answer to specific question or hypotheses tested. The statement must indicate clearly what has been investigated and what has been excluded. The specific terms used in the problem should be defined conceptually as well as operationally. The assumptions made should be clearly mentioned. The investigator must provide a detailed justification for conducting the reported study emphasizing its significance and implications for educational practices.

2. **Review of Related Literature and Researches:** The introduction continue with a review of previous studies that have been conducted in the area and relating to the specific issue being investigated. The reviews include the studies only that are directly related with the study undertaken. Review selected must highlight the gap in the existing knowledge which should emerge from issues that remain unsolved. In this section researcher needs to connect logically the previous body of literature with the study undertaken.

3. **Research Design and Procedure :** This section describes clearly and precisely the detailed procedure followed by researcher in conducting study. The researcher define the population in terms of its characteristics, describe the technique used in selecting the sample and its size, provide detailed description of research tools used along with justification for its use, and elaborate the statistical methods used for data analysis. All these details provide understanding about what exactly was

done and provide directions for verification and replication of study by other investigators. The sub-sections are:-Research Method ,Tools Used , Sample of the Study, Procedure of data collection.

4. **Analysis and Interpretation of Data:** This section of the Research Report highlight how gathered data tabulated and treated statistically. Researcher describe the statistical techniques used for analysis of data, for adding clarity to results, tables, figures and graphical presentation with interpretation should be presented. The tables and figures should follow their textual presentation and description should be referred to in the text by number.eg-the text should say" see table II or 2" or see "fig 3.2"

5. **Major Findings, Conclusions, Summary and Suggestions:** In this section researcher needs to enlist major findings of the research study along with conclusions based on findings. The conclusions can be simple answers to the research questions or hypotheses stated. The researcher should also discuss theoretical and practical implications of the findings and make recommendations for future. The researcher may express own opinion that may be not direct outcome of data analysis. Researcher may also discuss implication of findings for educational practices and give suggestions for further research.

iii) Reference Section:

This section of the report indicate all the sources that were directly referred before, during and after the research work and are listed alphabetically by authors last name and year of publication in parenthesis, title, place and publication according to standard format. "Reference" section begins at a new page with the label "References" at the centre. Every source cited in the report must be included in the references and every entry mentioned in the references must appear in the report which will facilitate the reader to trace the sources from where researcher drawn ideas or information. References contain books, Journal articles, weblinks, etc. For writing references different styles have been evolved. The APA style is used universally in Educational Research. The citation of the secondary sources should indicate their primary sources from which they were taken.

Let's see how to write references in APA style:

Book:

Author's name (last name first), initials. (year).Title(Edn),Place:Publisher
Single author:

Singh, A. K. (2009).Test ,Measurement and Research Methodology in Behavioural Sciences(5thEdn), Patna :Bharti Bhawan Publishers & Distributers.

More than one author:

Best,J.&Kahn,J.V.(2009). Research in Education. New Delhi: Prentice Hall of India Pvt.Ltd.

Article from Journal:

Authors name,initials.(year).Article title. Journal title. volumenumber,page numbers.

Naaz,T.S.(2019) Relationship between Educational Problems and Academic Achievement of Students of Aurangabad City, Excel's Journal of Social Science & Humanities (Vol. No. 11, pg.22-30)

Dissertation/theses:

Researcher's name, initials. (year). Title (unpublished dissertation/thesis)

Daimi,S.F.(2007).Mathematics Education at tertiary level in Marathwada region- A Study.

Electronic retrieval information may include Digital Object Identifiers (DOI) or Uniform Resource Locators (URL)

E-Book:

Author's name, initials.(year)Title . Retrieved from URL

Mitchell,J.A.,Thompson,H&Coyne,R.P.(2017).A   guide   to citation.Retrieved   from   https://www.mendeley.com//references-management/reference-manager.

E- Journal

Author's last name, initials.(year).Article title. Journal title, volume number(issue part number), page numbers. Retrieved from URL

Fatima,K(2021).A Study of awareness towards EPC(Enhancing Professional Capacities)course among B.Ed Trainees.LangLit An International Peer Reviewed Open Access Journal. Retrieved from https://www.langlit.org

Zepke, N.(2014). Student engagement research in higher education: Questioning an academic orthodoxy. Teaching in Higher Education 19 (6), 697-708.DOI:10.1080/13562517.2014.901956.

Weblinks

Reference section is followed by appendices. Appendices are essential in theses and dissertations. Appendices include raw data , tool used such as questionnaire or attitude scale, permission letter for data collection from educational institutions and data analysis sheet.

A Specimen of Table of contents in Research Report

Table of Contents

Contents	Page No
Title Page	
Acknowledgement	i
Declaration Certificate	ii
List of Contents	iii
List of tables	iv
List of figures	
Abstract	
Chapter I	
Introduction	
1.1 Background of the study	
1.2 Need and Significance of the study	
1.3 Statement of the problem	
1.4 Operational definition of the terms	
1.5 Objectives of the study	
1.6 Hypotheses of the study	
1.7 Variables	
1.8 Scope and Limitations of the study	
Chapter II	
Review of related literature and research	
Chapter-III	
Research Design and Procedure	
3.1 Research Method	
3.2 Need and Importance of method used	
3.3 Tools used	
3.4 Statistical techniques	
3.5 Sample	
3.6 Procedure of data collection	
Chapter-IV	
Analysis and Interpretation of data	
4.1 Data Processing	
4.2 Selection of Statistical techniques	

4.3	
Chapter-V	
Major findings , Conclusions, Summary & suggestions	
5.1Major findings	
5.2 Conclusions	
5.3 Suggestions	
5.4 Avenues for further research	
References	
Appendices	

Check your Progress

1. Prepare the title page by selecting any topic of your interest as per the APA guidelines.

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2. Write the importance of list of contents , tables and figures in the report.

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3. What are main element of the research report

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4. What is an abstract, why it is considered as most important paragraph in report.

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5. Enlist important characteristics of good abstract.

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4.6 CRITERIA OF A GOOD RESEARCH REPORT

Writing Research Report is a complex and creative task , in order to make research report creative writer must posses good communication skills. Research report is the final output of research task. Research report should be developed as per standard format , hence as a researcher you are required to adhere certain criteria which are helpful in making research report **Objective,Comprehensive , Authentic , Appropriate , Truthful , &Attractive**.All these criteria of good research report are discussed below:

Objectivity:

Objectivity in the context of research report can be viewed at two levels-

1. The research report should be objective in terms of its focus on the research study.It should be free from digressions and should not include anything that is not relevant to the research study. Report must be free from personal bias i.e, report must be free from ones personal likes and dislikes.All the facts must be stated boldly with justification.

2. The style of writing the research report should be such that flowery and idiomatic expressions to be avoided, writer should use vocabulary of contemporary language be it English or any other language. It should not use obsolete words and archaic phrases and must reveal bitter truth**.**

Comprehensibility:

Comprehensibility is the extent to which the text as whole is easy to understand ,when we talk about comprehensibility with regard to research report it means that research report must be complete and comprehensive covering all the aspects in detail providing complete information about the research work carried. Research report should be written following guidelines/standard format and appropriate chapter scheme should be followed as discussed in 4.5 Elements of writing research report. Each section and sub-section should provide all relevant information in concise,clear,and understandable manner.The research report should provide objective information and not to entertain reader or express opinions or talk about personal life experiences .All the information mentioned in the report obtained from various sources need to be cited. The researcher must give complete information in few words selected appropriately**. Report should be comprehensive enough so that reader must get complete idea about the work.**

Authenticity:

Authenticity in research indicates that work conducted is genuine and credible and the results obtained are of great worth and also contributing to the field.The research report must show novelty in the selection of problem that it has not been done before and research findings are helpful in the educational field. Information provided in the research report regarding methodology adopted for study and procedure used to collect data should be justifiable , avoid falsification in data collection and data analysis. Report must design in such a manner that it should address all research questions , avoid personal opinion . Results of the study should be helpful to the educational sector and report must also highlight further avenues in the light of existing work. As researcher while writing refer multiple sources , plagiarism issues should be considered . Report will be authentic if it reflect that due to review and editing report is free from language and plagiarism issues.Report must provide all the evidences in appendices for reference. No contradiction should appear in the report.

Appropriateness:

The points in the research report must be arranged in a logical sequence , step by step as per the guidelines provided and not in haphazard manner. Educational research reports follow the format set by APA (American Psychological Association) which make the job of reporting easier for researcher as well as readers. There is ample scope of creativity for the researcher to present research results appropriately as per APA standards. We have already discussed APA format in 4.5 that how should be the title page and rest of the chapter scheme , even the specimen of the title page and table of content is provided for your reference which will help you to write report appropriately.

Truthfulness:

Truthfulness in research is related with intellectual honesty in selecting original topic, preparing proposal,planning,executing and reporting research results. Researcher has an ethical duty to ensure that all above activities are done fairly, credibly and accurately without any misinterpretations. Research report must be written in the format that readers will be able to access and understand.Plagiarism ,exaggeration or understatement ,uneatable claim, bias, under or over reporting should be avoided. Researcher must also consider the matter of confidentiality , anonymity and non-traceability of the people from whom data obtained. Thus ethical principles help in all aspects and at all stages to promote truthfulness**.**

Attractive:

Research Report should be simple , attractive ,and systematic. Attractiveness include the paper quality, size of the report (size of the paper used forreportprinting), use of colour for graph & figure in the report, type & quality of binding,font size and other technical aspects should be considered for making report simple and attractive.

DO'S and DONT'S WHILE WRITING RESEARCH REPORT:

Read carefully authors guidelines prescribed by publisher for font size , writing style , footnote , referencing style, word limit etc.

Use formal language

Ensure continuity in the text and various sections

Number the tables , figures , and graphs properly

Proof read carefully to check accuracy

Avoid using pronouns (I,we,you,my)

Avoid spelling mistakes

Avoid language with negative overtone.

Check your Progress

1. What are different criteria of a good research report?

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2. Mention ethical duties of researcher while writing research report.

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3. What is attractiveness of research report?

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4. Prepare two columns and enlist Do's and Dont's for researcher while writing research report.

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4.7 CONCLUSION

Thus from above discussion we can conclude that writing research report is complex and creative endeavour as research report is a record of 'what'&' how' research activity carried out. Writing research report requires a special training or experience .For writing of a research report certain general principles have to be mastered and need to follow standard format. The research report is not only important for the researcher who is conducting research but also for other individual involved in the field. Research report is detailed and comprehensive record of all the activities undertaken by researcher right from selection of the problem ,plan of action and its execution along with the results obtained.

4.8 STUDY QUESTIONS

1. Collect at least 3 research reports from any nearby research centre , critically analyse these research reports and find out whether research reports contain required elements.

2.State the reasons for writing research report.

3.Collect reference section of few research reports and evaluate to identify errors and drawbacks if any.

4.Enlist at least 10 references as per the guidelines provided indicating-

Book

e-book

Thesis

Article

weblinks

5.Describe the criteria of a good research report

4.9 REFERENCES

Best, J. W. & Kahn, J.V.(1993).Research in Education.New Delhi: Prentice-Hall of India Pvt.Ltd.

Cohen,L. ,Manion,L.&Morrison,K.(2019).Research Methods in Education. New York:

Routledge.

IGNOU-MES-016 Educational Research Block-5(Research Reports and Applications)

IGNOU-MES-054 Methodology of Educational Research Block-6(Research Report and Dissemination)

Koul,L. (1984). Methodology of Educational Research. New Delhi:Vikas Publishing House Pvt.Ltd.

Mohan,R. (2003).Research Methods on Education.Hyderabad and New Delhi:Neelkamal Publications Pvt. Ltd.

Singh,A.K.(2009) Test,Measurement and Research Methodology in Behavioural Sciences (fifth edition) Bharti Bhawan Publishers & Distributors.

https://www.otago.ac.n2

https://apastyle.apa.org.

https://guide.lib.ua.edn

https://www.yourarticle.com/marketing-research/principal-of-a-good-research-report/48748

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5

RATING SCALE: DEFINITION, SURVEY QUESTION TYPES AND EXAMPLES

Unit Structure :

5.0 UNIT OBJECTIVES

After reading this unit student will be able to

➢   State different types of tools and techniques used for data collection

➢   Distinguish the basic difference between tools and techniques.

➢   Describe concept, purpose and uses of various tools and techniques in research.

5.1 RATING SCALE DEFINITION

Rating scale is one of the enquiry form. Form is a term applied to expression or judgment regarding some situation, object or character. Opinions are usually expressed on a scale of values. Rating techniques are devices by which such judgments may be quantified. Rating scale is a very useful device in assessing quality, especially when quality is difficult to measure objectively. For Example, ―How good was the performance? It is a question which can hardly be answered objectively.

Rating scales record judgment or opinions and indicates the degree or amount of different degrees of quality which are arranged along a line is the scale. For example: How good was the performance?

Excellent Very good   Good   Average   Below   Average   Poor   Very poor

A closed-ended survey question that uses a rating scale to express respondent input for certain features, products, or services is known as a closed-ended question. One of the most common sorts of questions for both online and offline surveys asks participants to rank a quality or feature. A rating scale is a variation on the well-known multiple-choice questions that are frequently used to collect data that offers relative information about a certain issue.

When researchers want to link a qualitative measure to the many features of a product or service, researchers employ a rating scale in their research. This scale is typically used to assess a product or service's performance, personnel abilities, customer service performances, procedures followed for a certain aim, etc. Similar to a checkbox question, rating scale survey questions ask for more information than just a yes/no response.

5.2 TYPES OF RATING SCALE

Broadly speaking, rating scales can be divided into two categories:

1. Ordinal Scale; and
2. Interval Scales.

An ordinal scale is a variable measurement scale that is used to show the order of variables rather than the differences between them. In general, these scales are used to represent non-mathematical concepts like frequency, pleasure, happiness, level of discomfort, etc. Since "Ordinal" and "Order," which is what this scale is used for, sound similar to one another, it is easy to remember how to use it.

An interval scale is a numerical scale in which both the order and the difference between the variables are known. Using the Interval scale, variables with recognisable, consistent, and calculable differences are categorised. It is simple to recall this scale's principal function as well; the word "Interval" stands for "distance between two entities," which is what the interval scale aids in achieving.

5.3 ORDINAL DATA: DEFINITION, ANALYSIS AND EXAMPLES

Ordinal data is a statistical subset of quantitative data where variables are arranged in ordinal categories that are found in nature. Ordinal data is not used to measure the gap between two groups.

An ordinal scale is used to represent an ordinal set of data in statistics, and an ordinal set of data is indicated by a collection of ordinal numbers. Ordinal data differs from nominal data in that ordinal data has a hierarchy of categories, whereas nominal data does not.

5.4 NOMINAL V. ORDINAL SCALE

Two of the four variable measurement scales are the nominal scale and the ordinal scale. Both of these measurement scales have value in surveys, polls, and the statistical analysis that follows. Due to the specifics and information that each scale has to offer, the difference between the nominal and ordinal scale has a significant impact on market research analysis methods.

The Latin word "nomalis," which means "associated to names," is the source of the term "nominal scale," which is typically used to define categories. For the analysis of the data gathered, matching numbers are assigned to each of these categories. Examples of data for a nominal scale include a person's gender, ethnicity, and hair colour.

On the other hand, an ordinal scale requires putting data in a certain order, or in relation to one another and "ranking" each parameter (variable). For instance, after making a purchase at a store, a consumer may be prompted to respond to a kiosk survey that asks, "On a scale of 1 to 5, how was your shopping experience?" –

- A score of 1 is utterly insufficient, a score of 2 is inadequate, a score of 3 is neutral, a score of 4 is satisfactory, and a score of 5 denotes utterly adequate.

- The information gathered here will be on an ordinal scale because each of the answer choices has a rank, with 2 being lower than 4 and 4 being lower than 5.

- However, since the number is only assigned for tagging purposes rather than being used for quantitative measurement, it is not necessary that the difference between

4 (satisfactory) and 2 (unsatisfactory) in the ordinal scale be the same as the difference between 5 (extremely satisfactory) and 3 (neutral).

Nominal Level of Measurement: Variables are distinguished at the nominal level of measurement by their names. There is no hierarchy or order connected with these variables.

The numbers next to the names are just tags; there is no mathematical significance to them. These parameters have a descriptive function. The easiest statistical scale to comprehend and use is the nominal scale. *These variables like Male/Female and Yes/No, have a minimum of two divisions. For instance, this scale does not have a numerical number for gender, ethnicity, race, etc.*

5.5. NOMINAL V. ORDINAL SCALES: POINTS OF DIFFERENCE

Factors	Nominal Scale	Ordinal Scale
Description	The only thing that distinguishes the variables on this scale is their naming. No inferred order of the variables in nominal scale exists.	Although there is a naturally occurring order between these variables, it is unclear what makes them different. On this scale, it is impossible to quantify the value of the difference between two variables. As an illustration, the sizes are small, medium, large, and extra-large. Contrarily, Small, Medium, Large, and Extra Large.
Degree of Quantitative Value	The variables on this scale don't have any numerical values attached to them. It is a qualitative measurement scale instead.	Although ordinal variables are linked to quantitative values, arithmetic evaluation cannot be done on these variables.
Key Differentiators	▪ There is no way to organise these variables. ▪ This scale's variables are distinct. ▪ Nominal information cannot be quantified.	▪ The variables on this scale have been given numbers. ▪ And no arithmetic calculations can be made on them. ▪ Calculating the difference between variables
Examples	▪ Sex (Male, Female) ▪ Marital Status (Married, Divorced, Unmarried, Widowed etc.) ▪ Religion (Christian, Jew, Muslim) ▪ Race (Red Indian, South-east Asian etc.)	▪ Rank in a class test (first, second or third) ▪ Customer satisfaction ratings (On a scale of 0-10) ▪ Socio-economic status ▪ Customer satisfaction degrees (Very satisfied, satisfied, neutral, dissatisfied, very dissatisfied) ▪ Education qualification

Ordinal Level of Measurement: The order of the variables is crucial in ordinal level of measurement. This measurement scale does not take into account the distinction between these variables, which has not been defined.

Along with identifying and describing the variables, a value is assigned to each one of them. Ordinal scales are used in market research to study relative views, decisions, and feedback, allowing marketers to assess consumer satisfaction or pleasure levels, decide whether to send out newsletters more frequently, etc.

In any business, the knowledge of different measurement variables is a prerequisite as it allows owners to make well-informed and statistical decisions. Every measurement scale a unique degree of detail to offer, such as Nominal scale offers basic detail and Ratio offers maximum detail.

5.6. WHAT ARE NOMINAL, ORDINAL, INTERVAL AND RATIO SCALES?

The four basic levels of measuring scales—nominal, ordinal, interval, and ratio—are used to collect data in the form of multiple-choice questions on surveys and questionnaires.

All survey question scales, including Likert, Semantic Differential, Dichotomous, and others, are derived from these four basic levels of variable measurement since each scale is an incremental level of measurement, which means it performs the same job as the scale before it. Let's take a short look at what these scales represent before we get into detail about each of the four levels of measuring scales with examples.

A naming scale is one in which variables are merely "named" or labelled, without regard to their order. Beyond just identifying them, the variables on an ordinal scale have a precise order. Labels, an order, and a specified interval are provided for each of the variable possibilities in an interval scale. In addition to having all the features of an interval scale, a ratio scale can also accept a value of "zero" for any of its variables.

The four stages of measurement in research and statistics are further described as follows: Ratio, Nominal, Ordinal, and Interval.

5.7 NOMINAL SCALES: 1ST LEVEL OF MEASUREMENT

Nominal scale, also known as the category variable scale, is a scale without a numerical value or order that is used to categorise variables into discrete groups. Of the four variable measuring scales, this one is the most straightforward. Since the alternatives have no numerical value, calculations on these variables are useless.

The numbers corresponding to the variables on this scale are solely used as labels for categorization or division in situations where this scale is utilised for classification. Because these values have no quantitative significance, any calculations based on them will be useless.

111

In research surveys and questionnaires where only variable labels have meaning, nominal scale is frequently utilised.

Consider a customer poll that asks, "Which smart-phone brand do you prefer?" Options – Apple, Samsung or One Plus.

● For the consumer research researcher, just the brand names in this survey question are significant. For these brands, there is no need for any particular ordering. The linked labels are used by researchers to conduct analysis when they collect nominal data.

● When a survey respondent chooses Apple as their preferred brand in the example above, the data submitted and related will be "1".

● This made it easier to quantify and react to the last question, which asked how many respondents chose Apple, Samsung, and One Plus, and which one had the most number of votes.

● The most basic research scale is the nominal scale, which is at the core of quantitative research.

Nominal Scale Data and Analysis

The two main methods for gathering data on a nominal scale are:

1. By posing a free-form question, the responses to which the researcher will assign a certain number or label.

2. Including a multiple-choice question with labelled answers is the other option for gathering nominal data.

In both situations, the data will be analysed using percentages or the mode, or the response that was given as a response to the question the most frequently. It is possible for a single question to have more than one mode, just as it is feasible for a target population to have two preferences that are widely shared.

5.8 ORDINAL SCALE: 2ND LEVEL OF MEASUREMENT

An ordinal scale is a variable measurement scale that is used to show the order of variables rather than the differences between them. In general, these scales are used to represent non-mathematical concepts like frequency, pleasure, happiness, level of discomfort, etc. Since "Ordinal" and "Order," which is what this scale is used for, sound similar to one another, it is easy to remember how to use it.

The distance between variables cannot be measured since the ordinal scale lacks an origin of scale while maintaining description properties and an inherent order. In addition to having a relative location of variables, the ordinal scale also contains tagging characteristics that are similar to those of the nominal scale, according to descriptive features.

There is no origin for this scale, hence there is no "real zero" or definite beginning. ORDINAL DATA AND ANALYSIS

Ordinal scale data can be shown in tabular or graphical ways, allowing a researcher to easily analyse the data they have gathered. Additionally, techniques like the Kruskal- Wallis H test and the Mann-Whitney U test can be used to evaluate ordinal data. Typically, these techniques are used to compare two or more ordinal categories.

Researchers can determine which variable from one group is larger or smaller than another variable from a randomly selected group using the Mann-Whitney U test. The Kruskal-Wallis H test, however, allows researchers to determine whether or not two or more ordinal groups have the same median.

5.9 FOUR MAIN CATEGORIES OF RATING SCALES

There are four main categories of rating scales that are appropriate for use in online surveys:

· Graphic Rating Scale

· Numerical Rating Scale

· Descriptive Rating Scale

· Comparative Rating Scale

1. **Graphic Rating Scale:** The answer alternatives are displayed on a scale of 1-3, 1-5, etc. in a graphic rating scale. A common type of visual rating scale is the Likert Scale. On a line or scale, respondents can choose a specific choice to represent their ranking. HR managers frequently use this rating scale while conducting employee evaluations.

2. **Numerical Rating Scale:** In a numerical rating scale, there are several numbers that can be selected as answers; not every number has a specific meaning or attribute. A numerical rating scale, for example, can be used to display a visual analogue scale or a semantic differential scale.

3. **Descriptive Rating Scale:** The respondents are given a thorough explanation of each response option on a descriptive rating scale. In the descriptive rating scale, the answer choices aren't necessarily correlated with a numerical number. Some surveys, like a customer satisfaction survey, require detailed explanations of each response option so that each respondent has a clear understanding of what is anticipated from the survey.

4. **Comparative Rating Scale:** As the name implies, a comparative rating scale expects respondents to react to a specific question in terms of comparison, that is, by using relative measurement or by using other organisations, goods, or qualities as a point of comparison.

5.10 EXAMPLES OF RATING SCALE QUESTIONS

In order to acquire specific data, rating scale questions are frequently employed in surveys of both employee and customer satisfaction. Examples of rating scale inquiries include the following:

- Level of Agreement: An organisation has been working to increase staff productivity. The management chooses to conduct a survey after setting up a variety of training opportunities and certifications for the staff to find out if the employees agree with the philosophy underlying these certifications. To gauge the level of agreement, they can use a rating scale inquiry like an even or odd Likert scale.

The organization invests time and money to keep the employee updated with technology.

- ○ Strongly Disagree
- ○ Disagree
- ○ Neither Agree nor Disagree
- ○ Agree
- ○ Strongly Agree

- Customer Experience: Information on the customer experience should be gathered. Real-time information regarding customers' product or service purchasing experiences must be gathered by enterprises. The management of the firm can be assisted in gathering and analysing data regarding customer experience by using a rating scale question such as a Semantic Differential Scale.

Which of the following categories best describes your last experience purchasing a product or service on our website?

	Very Pleasant	Somewhat Pleasant	Neither Pleasant nor Unpleasant	Somewhat Upleasant	Very Unpleasant
My experience was	Very Unpleasant				

- Examine client brand loyalty. Businesses rely on customer brand loyalty to succeed. However, brand loyalty is a consideration that needs to be closely watched. Organizations can get current information on customer loyalty and brand share ability by using a rating scale question like the Net Promoter Score. How likely are you, on a scale of 0 to 10, to suggest our brand to friends and colleagues in light of your shopping experience? Can be successful in keeping track of consumer loyalty and satisfaction.

Considering your _complete_ experience with our company, how likely would you be to recommend our products to a friend or colleague?

‹ Very Unlikely										Very Likely ›
0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

5.11 USES OF RATING SCALE

- Learn relative information on a given topic: In a sample size of 1000 people, each person will have a unique perspective on a subject. Collecting comparison data on customer satisfaction levels, usage patterns, brand loyalty, and many other similar parameters.

- Data comparison and analysis: Using online survey software like QuestionPro,researchers can gather unbiased data from the target population and analyse it. There is a probability that the margin of error in the data produced can be decreased or eliminated if a rating scale inquiry is utilised throughout a sizable sample size.

- Measure one key aspect of the product or service: For some surveys, particular questions must be asked in order to better understand the target market. When there are numerous significant elements that need to be assessed, rating scales can be used. For instance, to gauge satisfaction, frequency, and degree of agreement.

5.12 ADVANTAGES OF RATING SCALE

Rating scale questions are simple to comprehend and use.

- It provides researchers with a comparative study of quantitative data from the target sample so they may make well-informed choices. And since, they take the least amount of time to configure; visual rating scales make it simpler for researchers to create surveys.

- A rating scale can be used to gather and analyse a lot of data.

- The examination of the responses given in response to rating scale inquiries is swift and takes less time.

- The use of rating scales is frequently regarded as a standard for gathering qualitative and quantitative data for research.

Check your progress

1. What are rating scales in educational research?

   _____

   _____

   _____

   _____

2. Which are the different types of Rating Scales?

   _____

   _____

   _____

3. Distinguish between Ordinal Scales Vs Interval Scales.

_____

_____

_____

_____

4. What are the Advantages of Rating Scales?

_____

_____

_____

_____

5. What are Nominal, Ordinal, Interval and Ratio Scales? Give examples.

_____

_____

_____

_____

5.13 REFERENCES AND RECOMMENDED READINGS

1. **1st Edition**

1. The Assessment of Psychosis
A Reference Book and Rating Scales for Research and Practice *Edited By Flavie Waters Massoud Stephane*

2. Ian Katz & Cort W. Rudolph **In:** *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation* **Edited by:** Bruce B. Frey

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6

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INTERVIEWING TECHNIQUES

Unit Structure :

6.0 OBJECTIVES

After completing this module, the student will be able to

● List the steps taken in an interview

● Create answers to screening questions that are responsive to interviewers' real concerns.

● Record and evaluate themselves answering questions in a screening interview

● Learn how to answer the for e.g. "Tell me about a weakness question."

● Learn how to predict interview questions based on the S description

6.1 INTRODUCTION

In order to succeed in interviews, preparation and practise are necessary. The main goal of the interview is for the researcher to learn as much as they can about your perspective. This refers to both personality and values in addition to education and experiences. Finding responses that are pertinent to the topic of the inquiry is the aim of each interview.

Interviews are frequently used in the study process by researchers. Interviews can help you collect qualitative data and develop understanding of people's attitudes and behaviours.

6.2 INTERVIEW METHODS: RESEARCH

There are various tactics you can take to conduct successful research interviews, including interview strategies. As part of their study process,

many researchers interview their participants. You can learn more about people's behaviours, attitudes, and opinions by conducting interviews.

Most often, qualitative research—that is, research that places a greater emphasis on ideas and experiences than on numbers—finds interviews to be most helpful. You can select from a variety of interview techniques if you want to include interviews in your research and want to adopt a strategy that is appropriate for your particular research.

6.3 SEVEN MAJOR INTERVIEW METHODS

This is list of **seven major interview methods** that you can use in your research:

Focus Group : Focus group interviews, which involve a number of people being interviewed simultaneously, are a common technique for research interviews. Focus group moderators typically encourage member interaction while watching the group to acquire understanding of actual attitudes and viewpoints. Focus group settings tend to feel more authentic than other interview settings, thus participants often reply more at ease and naturally.

Structured Interview : Another choice is structured interviewing. Structured interviews frequently include closed-ended questions, to which respondents can only respond "yes" or "no." The interviewer often asks each interviewee the exact same questions in the same order. Because structured interviews adhere to a predetermined protocol, researchers may frequently finish them fast.

Unstructured Interview : The opposite of a structured interview is an unstructured interview, often known as an informal interview. The interviewer doesn't pose the same questions to every interviewee in an unstructured interview. Unstructured interviews, on the other hand, rely on open-ended questions, which are inquiries that invite a more in-depth response than a simple "yes" or "no." The interviewer has the option to ask follow-up questions and let respondents elaborate on their responses in unstructured interviews. An unstructured interview therefore resembles a real discussion more.

Semi-Structured Interview : Another option is to conduct interviews using a semi-structured approach, which incorporates elements of both structured and unstructured interviews. Interviewers frequently have the ability to make changes, even though they might stick to a general plan and set of questions. Because of this, interviewers may be more imaginative in gathering the information they require for their studies.

Personal Interview : A personal interview is a one-on-one conversation between the interviewer and the interviewee that takes place in person. Personal interviews are the best option if you want to talk to someone one-on-one and tailor your questions to them. To learn more, you may also follow up with more inquiries. Personal interviews are the best if you need

to collect a considerable amount of precise data because they typically have greater response rates than other interview options.

Phone Interview : Interviews can also be conducted over the phone. The use of telephone interviews can make gathering data simple. This interview technique is also reasonably priced, making it the best choice if you want to get data rapidly without using a lot of resources.

Online Interview : Another option for research interviews is online interviews. Online interviews may include surveys or programmes for video conferencing. The interviewers and interviewees don't have to be present at the same time or place while using this method. You may be able to swiftly get information from a large number of subjects in this way.

6.4 HOW TO CONDUCT INTERVIEWS IN RESEARCH

These are a few key steps to keep in mind during the process of conducting interviews as part of your research process:

A. **Choose Your Interview Method :** Selecting a method is the first step in conducting a research interview. It's crucial to select the appropriate methodology for your particular research. You can take factors like your interviewee's age and habits into account while selecting a method. This will enable you to get the data you require for your research while assisting you in determining which approach is most beneficial for your interviewees.

B. **Develop Interview Questions and Process :** Creating your interview questions and method is a crucial next step. Depending on the type of study you perform, the questions you ask may change, although many researchers like open-ended inquiries. You can make a schedule for your interview if you'd want to use it as a guide. The itinerary can include a list of the interview questions you intend to ask as well as any other crucial details.

C. **Facilitate The Interview :** You can facilitate an interview once you've arranged it. Depending on the interview technique you're employing, you might want to enlist the assistance of a second individual. For instance, if you're employing the focus group method, you might think about hiring a qualified focus group moderator to ensure the interview yields the greatest results. Throughout the interview, make sure to take notes so you can refer to them when you examine the results.

D. **Analyze Your Results :** You can examine the response information after performing your research interview. See how your data pertains to your research by going over your notes and any interview transcripts or recordings. In this step, you can also choose whether you wish to conduct additional interviews to get more data.

6.5 GUIDELINES FOR CONDUCTING INTERVIEWS IN RESEARCH

These are a few additional tips that you can use to help you conduct successful interviews:

A. **Identify Your Objectives :** Learn the purpose of your interview and the data you must obtain to guarantee success. Take a look at key performance indicators (**KPIs**) to make your interview questions more valuable. Your KPIs can help you get replies that are specific to your goals.

A few KPIs can be:

a) The number of interviewees

b) Quality responses on a certain subject

c) The time they take on each question

d) Cost to perform the interviews

B. **Select The Interview Format :** To learn how you can receive the greatest responses, pick one of the four types of interviews. The information you're looking for and the amount of time you have with each interviewee must be taken into account. Create a list of prepared questions to see if the material matches what your business wants to use. These can be a few useful indicators:

   1. **Informal Interview Format :** When you conduct an interview in a casual manner, you don't have any prepared questions to pose to the subject. This is a nice format since it makes it more likely that the interview will be conversational. Keep your queries open-ended and make sure they are answered directly. To determine how the interviewee is feeling when you pose a question, pay closer attention to their tone and body language. You can watch to see if they're at ease and record other observations in the interview notes you take.

   2. **General Interview Format:** Since you are receiving responses on the broad strokes of a subject, the general interview method is more structured. It varies from an open-ended interview in that you have the freedom to ask questions that aren't related to this topic. Even though the interview may be informal in nature, it's still a good idea to advise the candidate to get ready for it. Give them as much information as possible right away, especially if the only goal is to learn more about them.

   3. **Open-Ended Interview Format :** You ask the identical questions to every interviewee in an open-ended approach. This approach is used in research interviews, allowing you to concentrate on the information you're seeking for in interviewee responses. When interviewing, they must be as specific as possible.

4. **Closed Format :** When you give interview subjects clear options for how to respond to your questions, you are using a closed format and limiting their responses to the available possibilities. If you're trying to narrow your decision-making in a particular situation, this information may be helpful.

C. **Choose the Right Interviewees :** Analyze demographic and psychographic information to choose the best candidates for an interview. Look at the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of your organisation. It could provide you with hints on if you need to get in touch with a particular target market.

Consider the following demographic information while selecting interview candidates:

a) Age

b) Where They Live

c) Gender

d) Annual Income

e) Education

f) Job Status

g) Family Status

The list of psychographic data that you should pay attention to:

a) Personality

b) Attitudes

c) Core values

d) Interests

e) Lifestyles

f) Behaviours

D. **Finalize the Format in which they'll Answer Your Questions:** When the format of a research interview is decided, the location—such as onsite or in the interviewee's house, for example—as well as the format and interview questions are also committed. Participants in a focus group would be urged to come to the office where they could interact with the interviewer most effectively. Getting an audio recording of their comments is advised. If necessary, you can go back and review their responses later.

You can ask a variety of questions that fall into numerous categories in addition to the four interview modes. You could inquire about things like:

A. **Behaviour:** Asking behavioural questions focuses on past or present behaviour. You can get a sense of someone's future behaviour by thinking back on prior actions.

B. **Perception:** They can talk about their opinions on a subject by answering questions concerning perception. Note whether you believe they answered your question honestly and whether you believe it reflects their underlying principles.

C. **Sensory:** The five senses are related to sensory questions. To find out if you have experienced anything by sight, sound, touch, taste, or smell, you may combine all five of these senses into a single inquiry. To get thoughtful comments, find out about their past experiences.

E. **Recruit Your Interviewees :** To gauge their interest, contact the target interviews you have identified and obtain their contact information. To ensure you have the appropriate number of interviewees, obtain more contact information than you need. Make sure you introduce yourself, the business you work for, and the project in an appropriate manner. The likelihood of obtaining willing participants can be increased by explaining the aim of the information collected from the interviewers.

F. **Record Your Interviews :** Making a recording of your interviews is one suggestion for conducting productive research interviews. You can make sure you gather accurate information and don't overlook any crucial details by recording your interviews. For in-person interviews, you can utilise a camera or a voice recording programme. You might be able to use screen recording software or a video chat application's built-in recording feature for online interviews. To use it later, you can also turn your recording into a printed transcript.

G. **Be Mindful of Researcher Bias :** Being aware of researcher bias is a crucial additional piece of advice for conducting research interviews. This happens when a researcher skews their data—either purposefully or unintentionally—to support their hypothesis. Avoid researcher prejudice as much as you can because it can reduce the validity of your research. By collaborating with others and replicating your research's findings in several contexts, you can reduce the likelihood of researcher bias.

H. **Choose The Right Interview Setting :** It's crucial to pick the appropriate location for your interview. Try to choose a quiet area with few distractions. Respondents may feel more at ease and be more willing to participate honestly and genuinely as a result, which may make it possible for you to glean important information and insights from the interview.

I. **Use Your Research Question as a Guide :** You should also use your research question as a guide when conducting interviews. A research topic, which serves as the focal point for the research and serves as an attempt to answer it, is typically the first step in the research process. You may make sure you ask questions and gather data that add to your entire research by keeping your research question in mind.

6.6 INTERVIEW TYPES

There are five main types of interviews: one-on-one, group, panel, series, and telephone. You can benefit from knowing the format of the interview by doing so and becoming more prepared.

A. **One-on-One Interview**: The researcher and respondent conduct in-person one- on-one interviews.

B. **Group Interview**: In a group interview, often a number of respondents are questioned collectively. By determining which respondents are pertinent, researchers can utilise this format to choose those for further interviews.

C. **Panel Interviews**: A panel interview is when the respondent is questioned by a group of individuals at once (often five or six).

D. **Series Interviews:** During a series interview, candidates often take part in two or more interviews in succession with various individuals or groups throughout the course of the day. The interviews can take place in a panel, a group, a one-on-one setting, or a combination of all three. Each person or small group may occasionally be in charge of a certain type of interview (behavioural, etc.)

2.7 PREPARATION FOR INTERVIEW

Practice responding to interview questions before they happen. You will be able to communicate the most crucial facts more skilfully if you prepare and practise your responses beforehand.

1. Make a note of the interview's date, time, and place as well as the name and position of the interviewer.

2. To prepare ahead of time, find out how the interview will be conducted and who you will be meeting.

3. Arrive no later than 15 minutes early, but no more than 10 minutes.

4. Bring additional copies of your resume in a pad folio, and organise your papers for quick access (resume, references, transcripts, and portfolio).

5. Politely introduce yourself to the receptionist and explain why you are there.

6. Offer a solid handshake, a smile, and direct eye contact.

7. Pay attention to how you look. Be professional-looking by dressing in a conservative manner.

6.8 REFERENCES AND RECOMMENDED READINGS

1. Campion, M.A., Campion, J.E., & Hudson, J.P., Jr. (1994). "Structured Interviewing: A Note on Incremental Validity and Alternative Question Types." Journal of Applied Psychology, 79, 998-1002.

2. Kollwitz, J. & Wilson, C.E. (1993). "Structured Interviewing in Volunteer Selection." Journal of Applied Communication Research, 21, 41-52.

3. General Accounting Office. (1991). Using Structured Interviewing Techniques. Washington, D.C.: Program Evaluation and Methodology Division (http://www.gao.gov/policy/10_1_5.pdf).

4. Pawls, G.E. (1995). "The Structured Interview: Three Dozen Questions to Ask Prospective Teachers." NASSP Bulletin, 79, 62-65.

5. Watts, G.E. (1993). "Effective Strategies in Selecting Quality Faculty." Paper presented at the International Conference for Community College Chairs, Deans, and Other Instructional Leaders. Phoenix, AZ.

Check your progress

1. What is the Best Strategy to Approach an Interview?

2. What is the purpose of an interview?

3. What types of interviews exist?

4. What Goes on in the Mind of an Interviewer?

5. What psychological techniques can you use to leave the highest impression on the interviewer?

6. What does the interviewer look for?

7. What is the interviewer afraid of?

8. How should one Behave at an Interview?

    I.   How to greet

    II. How to present yourself at your highest

    III. What is the best body language?

    IV. How to convert your nervousness to your advantage

    V. How to shake hands

    VI. How to sit, how to move, where to look, etc.

9. How to Structure the Conversations

❋❋❋❋❋❋❋

7

PREPARATION OF A RUBRIC: EVALUATING AN EDUCATIONAL RESEARCH PROJECT

Unit Structure :

7.0   Objectives

7.1   Introduction

7.2   Kinds of Rubrics for Evaluating Students' Efforts

7.3   How to Make A Rubric?

7.4   Using Rubrics Effectively

7.5   Appendix: Sample Holistic Participation Rubric

7.6   References and Recommended Readings

7.0 UNIT OBJECTIVES

The students will be able to

- Clarify vague, fuzzy goals.

- Understand teacher's expectations. And Help students self-improve.

- Inspire better student performance.

- Make scoring easier and faster.

- Make scoring more accurate, unbiased, and consistent.

- Improve feedback to students.

- Reduce arguments with educators.

7.1 INTRODUCTION

A rubric is an assessment tool that clearly indicates achievement criteria across all the components of any kind of student work, from written to oral to visual. It can be used to grade homework, record class participation, or calculate final grades.

For a number of reasons, rubrics can be good tools to implement especially when evaluating students' work. If: You might think about creating and utilising rubrics, they assist in mitigating the points listed below:

- Since one is frequently retyping the identical remarks on the assignments of other kids.

- Since the marking burden is heavy, and it takes a lot of your time to write out remarks.

- Even after you've returned the marked assignment, students keep asking you about the assignment's criteria.

- Prior to and after the assignment submission, one should discuss the precise elements of the grading policy for the students and instructor's usage.

- At the beginning, middle, and end of a grading session, one can start to doubt whether the grading is being carried out fairly, and to avoid any error and ensure fairness is there.

- Lastly, if one wants to guarantee validity and inter reliability and have a team of graders.

7.2 KINDS OF RUBRICS FOR EVALUATING STUDENTS' EFFORTS

For assessing students' efforts, there are two basic types of rubrics: analytical and holistic.

A. Holistic Rubrics

Holistic rubrics group several different assessment criteria and classify them together under grade headings or achievement levels.

Sample provided in Appendix.

The Holistic Critical Thinking Scoring Rubric

In order to rate the level of critical thinking demonstrated in a vocal presentation or written material, the Holistic Critical Thinking Scoring Rubric (HCTSR) is utilised. The HCTSR can be used to score a written piece or a presentation where the presenter must be clear about their thought process. When utilised by students to evaluate the calibre of their own or another's reasoning, it is at its most valuable. The HCTSR operates on four levels, which are further explained below:

i.   **Strong:** It regularly carries out all or nearly all of the following: Interprets information (facts, claims, visuals, questions, etc.) accurately - identifies the most significant arguments (justifications and assertions) on both sides. It further carefully examines and assesses the main grounds of contention. Its reaches are justified, wise, and accurate conclusions. It discusses assumptions and explanations, and justifies important methods and findings. Fairness follows where the facts and logic take us.

ii. **Acceptable:** Mostly or a large number of the following Interprets information (facts, claims, visuals, questions, etc.) accurately. It locates pertinent arguments—reasons and claims—both for and against. Further, provides analysis and assessments of blatantly opposing viewpoints. It reaches logical, non-erroneous conclusions. Also, discusses the reasons behind certain results or processes. Lastly, fairness follows where the facts and logic take us.

iii. **Unacceptable**: Mostly a large number of the following misinterprets facts, assertions, images, inquiries, etc. fails to present compelling, pertinent opposition. It ignores or considers blatantly opposing points of view superficially. Further, draws erroneous or flawed conclusions. It rarely provides explanations on the reasons behind results or practises. Maintains or defends opinions based on self-interest or preconceptions regardless of the facts or arguments.

iv. **Weak:** It regularly carries out all or nearly all of the following: offers biased interpretations of the facts, the arguments, the arguments of others, the graphics, the questions, the information, etc. It lacks the ability to recognise or dismiss forceful, pertinent counterarguments. Further ignores or considers blatantly opposing points of view superficially. It argues using false or irrelevant justifications and baseless assertions. It neither justifies nor explains the reasons for the processes or results. Maintains or defends opinions based on self-interest or preconceptions regardless of the facts or arguments. Lastly, it demonstrates narrow-mindedness or antipathy toward logic.

B.   Analytic Rubrics

With the help of analytical rubrics, several assessment criteria can be divided and thoroughly addressed. The top axis of a horizontal assessment rubric contains values that can be stated numerically, by letter grade, or on a range from exceptional to poor (or professional to amateur, and so on). The evaluation standards for each component are listed on the side axis. Additionally, alternative weightings for various components may be allowed by analytical rubrics.

7.3 HOW TO MAKE A RUBRIC?

The following points should be kept in mind while preparing a rubric. They are as follows:

1.   Choose the requirements or components that must be present for the student's work to be of a good calibre. At this point, you might even think about choosing examples of outstanding student work to present to students while giving them homework.

2. Choose the number of performance levels you will include on the rubric and how they will connect to both your personal grading system and the definition of grades used by your school.

3. Describe in detail the performance at each degree of success for each criterion, component, or basic feature of quality.

4. Leave room for extra, personalised remarks or general opinions as well as a final grade.

5. Create interactive rubrics with your pupils.

Engaging students in the creation of the rubric can improve their learning experience. The criteria for grading the assignment are decided by the students, either as a class or in smaller groups. It would be beneficial to give pupils examples of excellent work so they could more easily recognise the criteria. In this kind of exercise, the teacher takes on the role of a facilitator, leading the students to the ultimate objective of a rubric that can be applied to their task. This practise not only enhances learning but also gives pupils a stronger sense of participation and ownership in the decision-making process.

7.4 USING RUBRICS EFFECTIVELY

Rubrics can be used effectively in the following manner:

1. **Develop A Different Rubric for Each Assignment**

    Although this initially requires some time, you'll discover that rubrics can later be modified significantly or reused. Consider Rhodes (2009) for the AAC&U VALUE rubrics, which are listed below, or Facione and Facione if you're looking for pre-existing rubrics (1994). To attain inter-rater reliability, practise with any other graders in your course whether you create your own rubric or use one that already exists.

2. **Be Transparent**

    When you give the students the performance task, give them a copy of the rubric. These requirements are not intended to be a surprise. Return the assignment together with the rubric.

3. **Integrate Rubrics into Assignments**

    Ask students to submit their assignments with the rubric attached. Before turning in their work, some teachers request that their students use the criteria to evaluate themselves or their peers.

4. **Leverage Rubrics to Manage Your Time**

    For each criterion on the rubric, circle or highlight the level of performance that was attained when you graded the work. You will save a tonne of time here because no comments are necessary.

5. **Include Any Additional Specific or Overall Comments That Do Not Fit within the Rubric's Criteria (Self-Explanatory)**

6. **Be Prepared to Revise Your Rubrics (Self-Explanatory)**

7. **Decide upon a Final Grade for the Assignment Based on The Rubric**

   You should modify the rubric for the following time you teach the course if you discover, as some people do, that the delivered work fits the criteria on the rubric but nonetheless appears to have exceeded or fallen short of the overall qualities you're looking for. Determine in advance how the assignment grade is truly determined if the work performs well in certain sections of the criteria but not others. Some assign varying weightings to distinct components using a formula, or multiplier; be clear about this directly on the rubric.

8. **Consider Developing Online Rubrics**

   You might be able to create and use an online rubric if an assignment is being submitted to an electronic drop box. The course management system's online grade book immediately updates with the results of these rubrics.

7.5 APPENDIX: SAMPLE HOLISTIC PARTICIPATION RUBRIC

Sample – 1

- Exhibits preparedness and punctuality in class/class work.
- Shows initiative and improvement without being asked.
- Seeks to understand and acknowledge others' thoughts.
- Frequently reaches full potential by challenging self.
- Exceptional content knowledge easily integrated into new problems or settings.
- Challenges his or her own thoughts and ideas.

Sample – 2

- Shows initiative and improvement with some prompting.
- Seeks to understand and acknowledge others' thoughts.
- Stretches to reach full potential when prompted.
- Open to challenges to thoughts and ideas from others.
- Usually prepared and attends most classes.
- Contributes constructively in class, works well with others, and is a team player.
- Excellent content knowledge.
- Completes all class assignments.

Sample – 3

- Occasionally prepared and regularly attends classes.

- Average content knowledge.

- Rarely or only challenges others' ideas when encouraged to do so.

- Assignments show average work.

- Occasionally an active participant in class; gets along reasonably well with others.

- Rarely accepts and responds to challenges and feedback.

Sample – 4

- Assignments are frequently turned in late.

- Assignments are incomplete, or not at all submitted.

- Low degree of subject understanding.

- Inactive participant.

- Reluctantly collaborates with others.

- Occasionally displays a close-minded attitude toward criticism and challenge.

Sample – 5

- Not present enough to judge participation and interaction, or undermining others.

- Clearly unprepared and almost constantly missing.

- No involvement or detrimental participation.

- No assignments turned in.

- No assignments accessible to assess content knowledge.

7.6 REFERENCES AND RECOMMENDED READING

A. References

Faction, P. &Faction, N. (1994). The holistic critical thinking rubric [PDF]. Insight Assessment/California Academic Press.

Rhodes, T. (2009). Assessing outcomes and improving achievement: Tips and tools for using the rubrics. Washington, DC: Association of American Colleges and Universities.

B. Resources

Responding to Writing Assignments: Managing the Paper Load

- Rubrics for Assessing Concept Maps

- Other resources

- Huba, M. E., & Freed, J.E. (2000). Using rubrics to provide feedback to students. In Learner-cantered assessment on college campuses (pp. 151-200). Boston: Allyn& Bacon.

- Lewis, R., Berghoff, P., &Pheeney, P. (1999). Focusing students: Three approaches for learning through evaluation. Innovative Higher Education, 23(3), 181-196.

- Luft, J. A. (1999). Rubrics: Design and use in science teacher education. Journal of Science Teacher Education, 10(2), 107-121.

- Stevens, D. & Levi, A. (2013). Introduction to rubrics: An assessment tool to save grading time, convey effective feedback, and promote student learning (2nd ed.). Virginia: Sylus.

- Stevens, D., & Levi, A. Introduction to rubrics companion site.

- iRubric: an online rubric design system for using, adapting, creating, and sharing rubrics.

- Association of American Colleges & Universities VALUE rubrics

Check your progress

1. What are Kinds of rubrics for evaluating students' efforts?

2. How to make a rubric?

3. How can rubrics be used effectively?

4. What are the best methods of making rubrics?

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