BASUDEV GODABARI DEGREE COLLEGE, KESAIBAHAL

BLENDED LEARNING STUDY MATERIALS

UNIT-II

DEPARTMENT :- EDUCATION

SUBJECT :-EDUCATIONAL RESEARCH

SEMESTER :- 3rd SEMESTER

CONTENT

STEPS OF RESEARCH

Learning Objectives

- To understand steps of research
- To know the steps of educational research
- To follow all the steps for research
- To know the systemization of steps

Steps to Conducting Educational Research

What are the steps to conducting educational research?

Since educational research is systematic there are basic steps to plan conduct a study. These include:

- Identifying a Research Problem
- Reviewing the Literature
- Specifying a Research Purpose
- Designing a Study
- Analyzing and Interpreting the Data
- Reporting Research

Step 1: Identifying a Problem

How to identify a problem?

A **research topic** is the *broad* subject matter addressed by the study (Creswell, 2015). Examples of medical education research topics are as follows:

- Recognizing ethical issues occurring in the clinical setting
- Evaluating physical exam skills

Identifying a **research problem** consists of *specifying* an issue to study, developing a justification for studying it and suggesting the importance of the study for select audiences (Creswell, 2015). Examples of medical education research problems are:

- Medical students are not recognizing ethical issues in the clinical setting.
- Faculty do not know what students observe during an ophthalmological exam.

These educational research problems arose from faculty members expressing concerns about the research topics.

Identification of a research problem should include evidence on why the problem is important. Evidence can come from following:

- Other researchers and experts as reported in the literature
- Experiences others have had in the workplace
- Personal experiences

After identifying a research topic and problem, a target audience should be identified. Who will read and benefit from this research

study?

Step 2: Reviewing the Literature

What is a literature review and why is it important?

A **literature review** is a summary of journal articles, books, and other documents that describes the past and current state of information on the topic of the research study. The purpose of the literature review is to document what the study adds to the existing literature and to ensure you are not "reinventing the wheel." The literature review informs the researcher on how other research studies have been conducted and help locate models relevant to the study. (Creswell, 2015).

The following are four components to conducting a literature review:

1. Identify key terms related to the educational research problem.

Note: Topic areas usually consist of two or three key words. Use these as a starting point to start your search and then use the literature to identify other key terms. I start out using PubMed and ERIC database searches. Other databases include Google Scholar, Proquest, and Web of Science

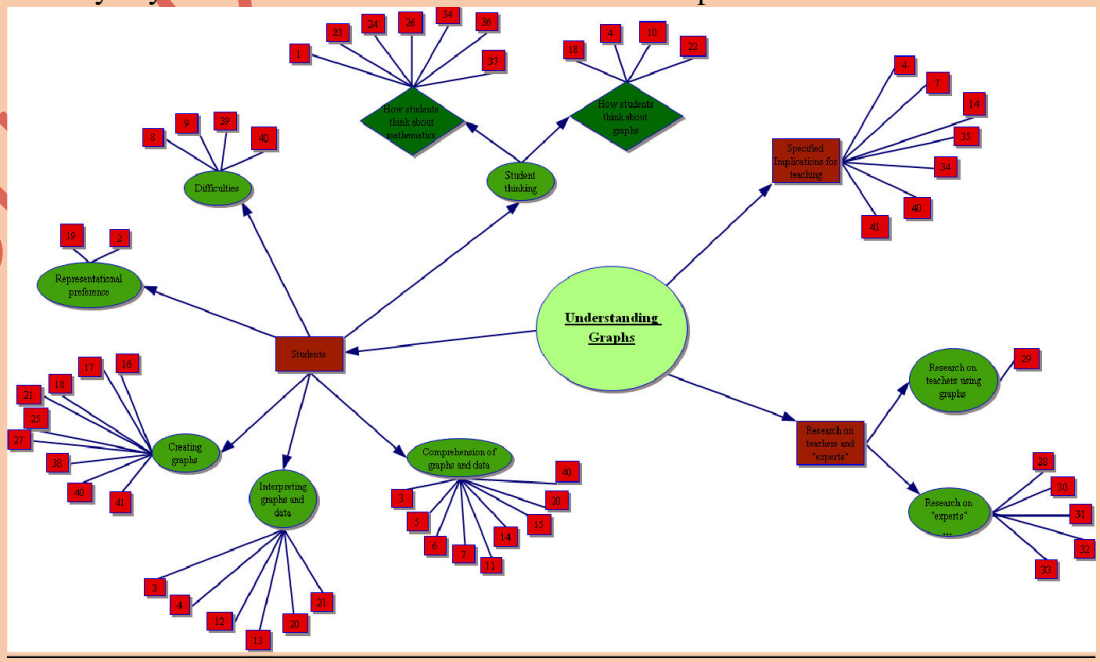
2. Locate literature about a topic by consulting several types of databases.

Note: Patty Shay in the Farha Library can help with this process, especially if it involves finding print sources not readily available in the library such as books, articles, etc.

Critically evaluate and select the literature related to the educational research problem ***Note:*** It is best to always use primary sources. **Primary sources** are literature reports by the individual who actually conducted the research. **Secondary sources** are sources that summarize primary sources. Sometimes secondary sources do not accurately reflect the primary sources.

3. Organize the literature by dividing them into broad categories.***Note:*** I have found it is best to create a diagram or outline of your literature review before implementing the project. I start with broad topics and group literature accordingly. I then break the topics down further, as shown below:

Identify key terms related to the educational research problem



This concept map is created from a software package called CMAP, a free online tool to help create maps/hierarchical designs. The numbered boxes indicate a label for individual articles. (Lee, 2010).

Step 3: Specifying a Purpose and Research Questions

Writing purpose statements, research questions, and hypotheses provide critical direction to an educational research study. They identify questions that the researcher will answer through the data collection process.

The **purpose statement** provides the overall direction or focus of the educational research study (Creswell, 2015). Below you will find purpose statements for the two previous research studies mentioned in this manual.

- The purpose of this study is to identify what, if anything, students see when they complete an ophthalmologic exam.
- The purpose of this study is to determine how direct a storyline must be for a medical student to recognize an ethical issue with a patient.

Research questions narrow the purpose statement. These questions should be developed before identifying the methods of study (Creswell, 2015). There are typically multiple research questions for each study. For example, the following are the research questions used in the ethical issue case mentioned in Step 1:

- Does the student recognize the ethical issue?
- Does the student engage the ethical principle?
- Does the student propose treatment?
- Does the student document the ethical issue as a problem?
- Does the Standardized Patient (SP) observe any difference in students?
- Do the students feel prepared to address the case?
- What in the students' training helped them be prepared for the case?

Step 4: Designing a Study

How does the researcher choose a research methodology?

At this point, a decision about what type of research is most appropriate to best answer the research questions developed in Step 3 is needed. Research can be categorized multiple ways but for this workshop, I will discuss three types of research methodologies: quantitative, qualitative, or mixed methods. **Quantitative research** is a means for testing objective theories by examining the relationship among variables. **Qualitative research** is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem.

Qualitative research is best used to understand concepts and phenomenon, especially if little research has been done on the topic and research problem. Qualitative methodology is useful if the researcher does not know important variables to examine. **Mixed methods research** is an approach to inquiry that combines both qualitative and quantitative measures. Mixed methods research is used when the quantitative or qualitative research approach by itself is not adequate

to best understand a research problem or when the strengths of both quantitative and qualitative research methodologies provide the best understanding of the research problem (Creswell, 2009). A list of strengths and weaknesses of these methodologies is provided in the tables below:

Strengths of the Three Research Methodologies		
Quantitative	**Qualitative**	**Mixed Methods**
Tests hypothesis that are constructed prior to data being collected	Responsive to changes that occur during the study and may shift focus of their studies as a result	Can use the strengths of each method to overcome the weaknesses in another method
Can generalize research findings when the data are based on random samples of sufficient size	Explain how and why phenomena occur in the participants own words	Can generate and test a grounded theory
Eliminate or reduce confounding variables	Describes complex phenomena	Answers broader and more complete range of research questions
Provides precise numerical data	Provides a tentative but explanatory theory about phenomenon	Can provide stronger evidence for a conclusion (triangulation)
Data collection time is less time consuming	Data collection is in naturalistic settings	Adds insights that might be missed by utilizing only one method
May have higher credibility with administrators, politicians, and funding agencies	Identifies contextual and setting factors as they relate to the phenomena of interest	Increases the generalizability of the results
Useful to study large numbers of people	Useful to study a small number of people	Produces a more complete knowledge necessary to inform theory and practice

(Johnson & Christensen, 2004, p. 411-414)

Weaknesses of the Three Research Methodologies		
Quantitative	**Qualitative**	**Mixed Methods**
Researcher may miss out on phenomena occurring because of the focus on theory or hypothesis testing rather than hypothesis generation (confirmation bias)	Knowledge produced may not generalize to other people or other settings	Researcher has to learn multiple methods and approaches and understand how to appropriately mix them.
Knowledge produced may be too abstract and general for direct application to specific local situations, contexts, and individuals	It may have lower credibility with administrators, politicians, and funding agencies.	It is more expensive
	It takes more time to collect data than quantitative research	It is more time consuming than other methods
	Data analysis is time consuming	Newer type of research
	Results can be more influenced by researcher's personal biases and idiosyncrasies	

(Johnson & Christensen, 2004, p. 411-414).

Who are the participants of the study?

When designing a study, the researcher needs to include a detailed description of the participants. This detailed description will include the following:

- Population characteristics (age, gender, year in medical school, etc.)
- Rationale about why the researcher will be selecting these participants
- Participant recruitment and any incentives for completing the study An example of a description of research participants might be as follows:

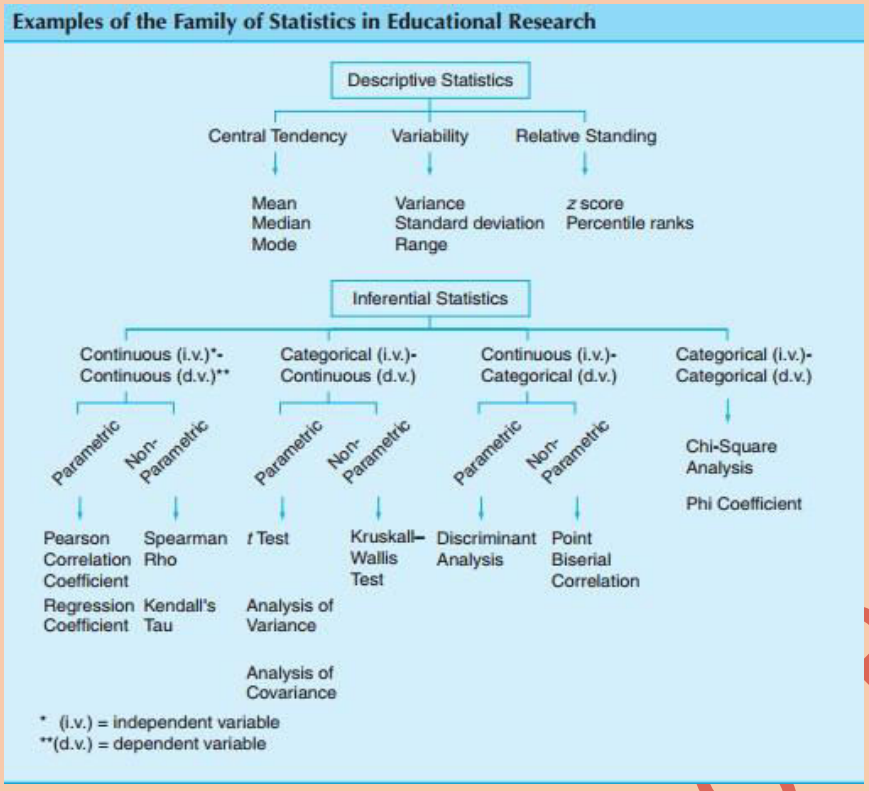
The research participants in this study will be 68 third year medical students at KUSM-W. These students are required to take a Clinical Skills Assessment (CSA) exam at the end of the third year. One of these cases will be the research case on recognizing and addressing ethical concerns. Therefore, only third year medical students will participate in this study. All 68 students will be asked for their consent to participate in this research project. All students will see the case, but only those consenting to participate in this study will have their data analyzed. Students will not receive any incentives for participating in this study and their grades will not be affected because they chose to or chose not to participate in this study.

Data Collection Plan

The researcher needs to identify data collection methods during the design of the study. These methods will depend on whether you are using quantitative, qualitative, or mixed methods research. For example, if you are using quantitative research methods a survey tool, assessment, or other quantifiable educational source can be used to collect data. If you are using qualitative research methods then interviews, open-ended survey documents, and observations are appropriate. If any these documents were created by the researcher there should be pilot study data describing steps implemented to ensure that the document was valid and reliable. The data collected in these documents should be related back to each research question to ensure that each research question will be answered with data from the study (Creswell, 2015).

Quantitative Data

In quantitative studies, there are two main types of analysis: descriptive and inferential. **Descriptive statistics** indicate general trends in data (mean, median, mode), the spread of scores (variance, standard deviation, and range), or a comparison of how one score relates to all others (z score or percentile rank) (Creswell, 2015). **Inferential statistics** infer characteristics of populations based on samples (Johnson and Christensen, 2014). In order to help determine the right inferential statistical procedure for your study, identification of the independent and dependent variable is needed. An independent variable (IV) is an attribute or characteristic that influences or affects an outcome. A dependent variable (DV) is the presumed to be influenced by one or more independent variables (Creswell, 2015). The chart below will help determine which analysis procedure is most appropriate.



Note: Rosey Zackula in the Office of Research has been instrumental with providing guidance and resources to help with choosing the correct quantitative analysis measures.

Qualitative Data

Qualitative data collection methods involve observations, interviews, documents, and audio- visual materials. Researcher created questions or documents (such as focus group scripts) should be vetted by content experts and piloted before using. Once the data has been recorded and/or transcribed, content analysis can begin. Content analysis is designed to yield valid replicable inferences from the text, retaining the context in which comments were made (Krippendorf, 2004). Content analysis by hand (traditional text analysis) is my preferred method; however computer software programs are available to complete this analysis (*Atlas.ti, HyperRESEARCH, MAXQDA, and Nvivo*). When using computer software, there is a risk of losing contextual meaning. The researcher has to be very specific when using the computer software. When analyzing qualitative data by hand, at least two qualitative researchers are needed. The researchers evaluate data and identify themes individually. The individual themes are compared and discussed between the two researchers. The researchers then agree on themes and a definition of those themes. If the two researchers cannot reach a consensus then an outside researcher should be brought in to help resolve the disagreement. Once the final themes have been identified, the qualitative data is recoded individually. When the two researchers have finished coding the second round, inter-rater reliability can be calculated using Cohen's kappa with a minimum acceptable values of 0.80 between raters (Wood, 2007).

> **Inter-rater reliability** is a statistical procedure to determine if two or more observers are similar (Creswell, 2015). The table below provides an example of multiple themes identified in a research study

inquiring about what characteristics fourth year medical students value in mentor/s.

Characteristics Fourth Year Medical Students Value in a Mentor

Theme Code	Description of Theme	Frequency
Mentee Recognizes Professional Characteristics as Important	The mentor is experienced in their specialty, recognized as an expert in their field of study, share networks and seen as career role model.	22
Mentee Recognizes Personal Characteristics as Important	These are characteristics that describe the mentors intrinsic qualities, investment of time into mentee, work/life balance, and religious interests.	17
Mentee Recognizes Peer Mentoring as Important	This is a mentor that is similar in age, power, and experience and has achieved academic success.	2
Other	These are comments not related to the question or personal experiences not answering the question.	6

(Charles, 2014)

The inter-rater reliability was 0.899 for the overall research question. While this means the researchers were not in perfect agreement, this value was above the lower limit of 0.80. The researchers discussed the discrepancies and reached a consensus on the appropriate theme for each comment.

> ***Note:*** Cari Schmidt, PhD in the Office of Research has been instrumental with providing guidance and resources to help with qualitative analysis.

Mixed Methods Approach

If the researcher is using a mixed methods approach, a decision must be made whether the data will be collected in phases or concurrently. If the data is going to be collected in phases the researcher will need to decide which phase comes first. A researcher may decide to have the quantitative results first if they would like to explore any surprising results with qualitative data. However, if the researcher would like to have qualitative data first and follow up with a quantitative methodology, it can be done. The purpose of the qualitative results first is typically to explore a phenomenon. In addition, the researcher may decide to have both quantitative and qualitative data collection occur simultaneously. The concurrent method allows for both methodologies to be compared noting if there is convergence, differences, or some combination of both (Creswell, 2009).

How does the researcher summarize the design of an educational research study?

I have found the easiest way to summarize and ensure that all research questions will be answered is to create a chart. This chart will align research questions with data collection methods, the exact location of data, and data analysis methods. See the table below for an example:

Aligning Research Questions with Data Collection and Analysis Methods

Research Questions	Data Collection Method	Exact location of Data	Analysis Method
Does the student recognize the ethical issue?	☒SP Checklist ☒Faculty PEN Checklist ☒Faculty Observation Checklist ☐ Student Supplemental Survey	SP Checklist Question # 6 Faculty Pen Note Checklist Question #1 Faculty Observation Checklist Question #6	Frequencies, Means, Inter-rater Reliability
Does the student engage the ethical principle (with the SP)?	☒SP Checklist ☒Faculty PEN Checklist ☒Faculty Observation Checklist ☐ Student Supplemental Survey	SP Checklist Questions # 5, 8, 16 Faculty Pen Note Checklist Question #2 Faculty Observation Checklist Questions #5, 8, 16	Frequencies, Means, Inter-rater Reliability
Does the student propose treatment?	☒SP Checklist ☒Faculty PEN Checklist ☒Faculty Observation Checklist ☐ Student Supplemental Survey	SP Checklist Questions #4, 17, 18 Faculty Observation Checklist Questions #4, 17, 18 Faculty PEN Note Checklist # 4	Frequencies, Means, Inter-rater Reliability
Does the student document the ethical issue as a problem?	☐ SP Checklist ☒Faculty PEN Checklist ☐ Faculty Observation Checklist ☐ Student Supplemental Survey	Faculty PEN Checklist Question #3	Frequencies, Means
Does the SP observe any difference in students?	☒SP Checklist ☐ Faculty PEN Checklist ☐ Faculty Observation Checklist ☐ Student Supplemental Survey	SP Checklist Questions # 1 – 20 and comments	Frequencies, Means, Analyze for Themes
Do the students feel prepared to address this case?	☒SP Checklist ☐ Faculty PEN Checklist ☒Faculty Observation Checklist ☒Student Supplemental Survey	SP Checklist Question # 20 Faculty Observation Checklist #20 Student Supplemental Survey Question # 1	Frequencies, Means, Analyze for Themes
What in the students' training helped them be prepared for this case?	☐ SP Checklist ☐ Faculty PEN Checklist ☐ Faculty Observation Checklist ☒Student Supplemental Survey	Student Supplemental Survey Question #2	Frequencies, Means, Analyze for Themes

Step 5: Analyzing and Interpreting Data

Once data have been collected, the researcher should prepare the data for analysis. This includes removing inconsistent or incomplete data and making sure data is in an organized manner to be analyzed by a software program or by qualitative researchers. After the data is organized, it can be analyzed using the methods identified in Step 4 of this workshop. As a researcher, check again to make sure you are completing the correct statistical analysis for each research question.

Analyzing Data for Quantitative Methods

If using quantitative methods, the researcher should conduct descriptive and inferential analysis as appropriate. If you use inferential analysis, this could potentially use several of the following procedures in addition to the ones described in Step 4. The procedures include: determining *p* values, setting a confidence interval, and calculating an effect size. **Confidence intervals** are the

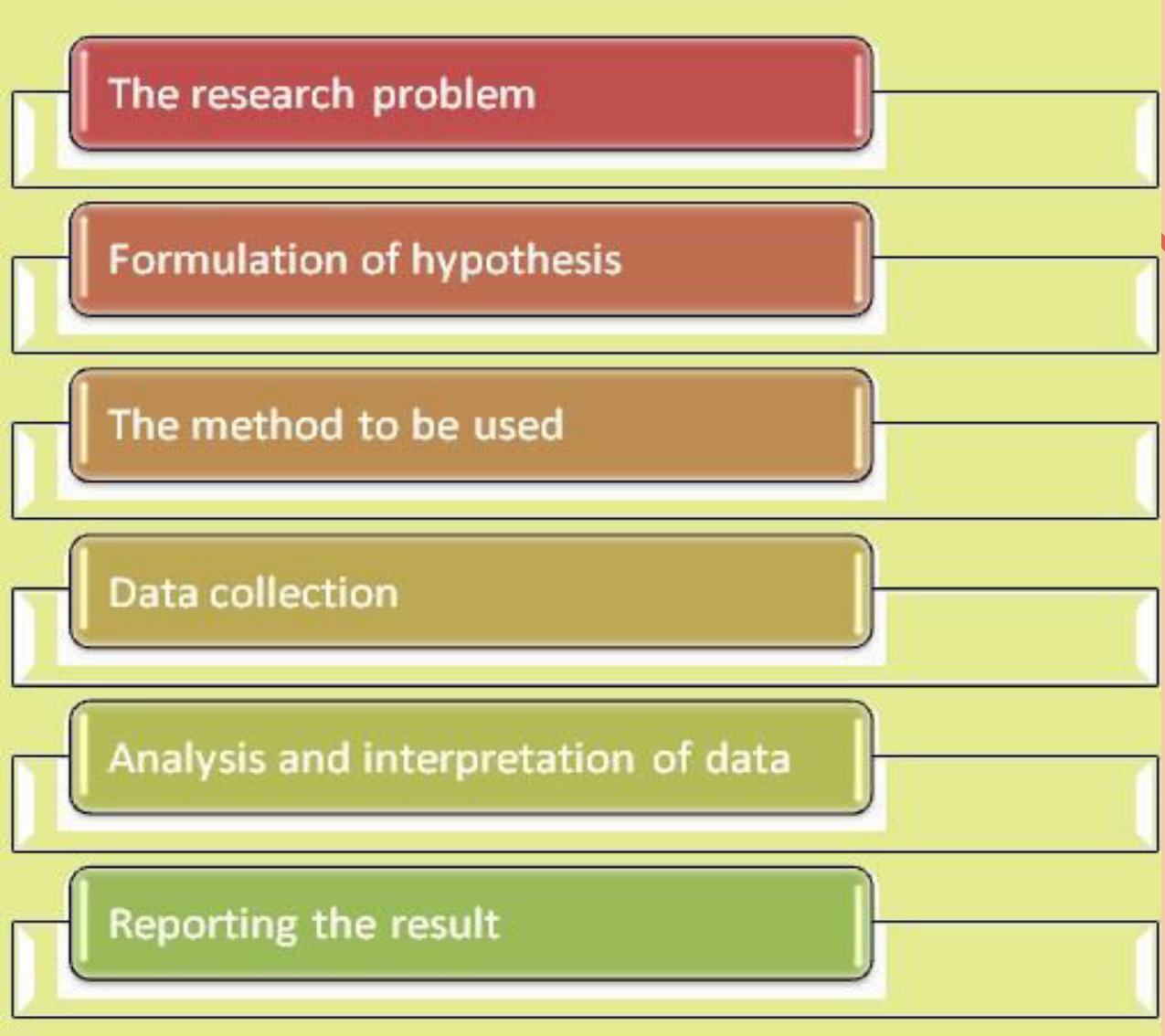
range of the upper and lower sample statistical values that are consistent with the observed data and are likely to contain the actual population mean. **Effect size** is a way to identify the strength of the conclusions about group differences (Creswell, 2015).

Note: Rosey in the Office of Research can help you calculate *p* values, confidence intervals, and effect size.

Once the data are analyzed, the researcher will need to present the results in tables and figures. A description of the results should accompany these tables and figures. This requires the researcher to interpret the results for significance. The analysis and interpretation of the results will be discussed further in Step 6 of the study design template.

Analyzing Data for Qualitative Methods

If using qualitative methods, data may need to be transcribed or organized then analyzed as outlined in Step 4. If you are using a computer program, there is still a need to make sure themes are valid and reliable. After the final analysis, make an interpretation of the results which includes developing comparisons between findings and literature and suggesting limitations and future research (Creswell, 2015). The analysis and interpretation of the results will be discussed further in Step 6 of the study design template.



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MODULE ON REVIEW RELATED LITERATURE OF EDUCATIONAL RESEARCH METHODOLOGY FOR SELF STUDY

Review of Related Literature

Learning objectives

- To know the concept of review related literature
- To understand its importance
- To know how to write

What is a literature review?

A literature review is a comprehensive summary of previous research on a topic. The literature review surveys scholarly articles, books, and other sources relevant to a particular area of research. The review should enumerate, describe, summarize, objectively evaluate and clarify this previous research. It should give a theoretical base for the research and help you (the author) determine the nature of your research. The literature review acknowledges the work of previous researchers, and in so doing, assures the reader that your work has been well conceived. It is assumed that by mentioning a previous work in the field of study, that the author has read, evaluated, and assimiliated that work into the work at hand.

A literature review creates a "landscape" for the reader, giving her or him a full understanding of the developments in the field. This landscape informs the reader that the author has indeed assimilated all (or the vast majority of) previous, significant works in the field into her or his research.

A literature review collects and analyses the published information on a particular topic or situation. The review can focus on a certain time period. Literature reviews will also show the research methodologies used to study an issue or the different monitoring and evaluation methods.

It will review all relevant documents: reports, guidelines, academic articles, news articles, journals, study notes, whitepapers. A simple literature review can be a summary of the sources, but a more useful review will organize the sources, summarize, and analyze the information relevant to your project. All sources are synthesized and re-organize to point out key information.

A Literature Review is:

- The **selection of available documents** (both published and unpublished) on the topic, which contain information, ideas, data and evidence. [This selection is] written from a particular standpoint to fulfill certain aims or express certain views on the nature of the topic and how it is to be investigated, and
- The **effective evaluation** of these documents in relation to the research being proposed. (Hart C. 1998. *Doing a Literature Review: Releasing the*

MODULE ON REVIEW RELATED LITERATURE OF EDUCATIONAL RESEARCH METHODOLOGY FOR SELF STUDY

Literature reviews do not produce any new or original information on a subject, rather they gather and illustrate the existing studies of your topic. However, they can provide new interpretations of the material and may even evaluate the literature to give advice for the reader on relevant proposal direction and/or evaluation strategy.

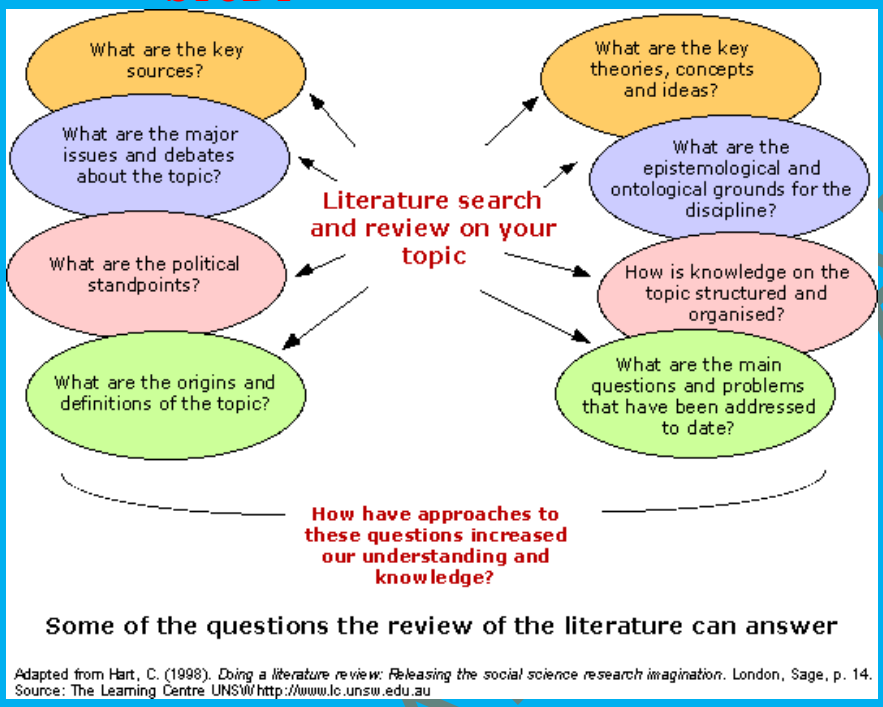
What is a literature review for?

- Literature reviews help in baseline assessments, concept notes, and conflict analysis
- To collect information on previously conducted research and practice concerning a topic
- Help you understand the situation
- Illustrate what practice has been done, what works and what does not work
- Identify gaps in the research and practice
- Help justify your project and evaluation

Why review the literature?

- Gives a quick and solid overview guide on a particular subject matter, especially when you do not have time to do a full research.
- Keeps you up to date on what is going on currently in the field.
- Shows the wide-ranging results of previous research and practice on a problem or situation.
- Allows for a broad view on an issue or situation in order to focus on the topic area.
- Finds research and practice you were not aware of and which are relevant to the

MODULE ON REVIEW RELATED LITERATURE OF EDUCATIONAL RESEARCH METHODOLOGY FOR SELF STUDY



Some of the questions the review of the literature can answer

Adapted from Hart, C. (1998). *Doing a literature review: Releasing the social science research imagination*. London, Sage, p. 14.
Source: The Learning Centre UNSW http://www.lc.unsw.edu.au

project.

Some tips for literature reviews?

- Keep your literature search narrow to limit the number of document results. Picking three or four different themes (objectives) can help narrow your search. Sum up what the literature tells you about each theme to compare the different points of view of the authors and to point out if any questions remain unanswered.
- Search for other literature reviews in the field you are working in. Finds ways you like to organize your review and synthesis.
- While relevance is important, review the most current sources. Documents between 5-10 years old are a good target.
- In Internet searches, insert your research subject with the word "review" to find articles to include in

Literature Review Example

- ***Literature Review on Effectiveness of the Use of Social Media***, 2010
- ***Theory of Change Review***: *A Report Commissioned by Comic Relief*, 2011
- ***Conflict Prevention: Methodology for Knowing the Unknown***, 2004

your synthesis.

- Use the bibliography of articles you have already read to find more articles, reports, and other documents for review.

Additional Resources

The following resources are particularly good for the development of a literature review

- Google scholar
- EBSCOhost
- JSTOR
- Lexisnexis (news articles, law journals, government reports)
- Heinonline (legal research)
- Organization's publications and research:
  - OECD DAC
  - SIPRI databases
  - ICRC
  - Mercy Corps
  - CARE
  - DCAF (security sector governance and reform)
  - Human Rights Watch
  - International Crisis Watch

DEPARTMENT OF EDUCATION
BASUDEV GODABARI DEGREE COLLEGE,KESAIBAHAL,SAMBALPUR

Identification of Research Problem

Introduction:

All research problems are driven by social problems. Problem solving aptitude is a natural quality given by the nature to all for their survival on this earth. But human being is the only creature blessed on this earth with vision, imagination, creativity and innovation. These attributes of man makes him enable to change the things surrounding him according to his wish. If man feels anything problematic only then he thinks to change them. Various research methods are used to resolve any problematic stage. Selection of research methodology depends on nature of problem.

Selection of research problem is the first step in every research. No research can undergo by the researcher, unless this first step is properly and scientifically accomplished by the researcher. Usually, it is observed that academic research work undertaken by the students or research scholars are selected on certain parameters i.e., novelty of topic, suitability of topic, convenience in data collection or on option of supervisor. Though, these considerations cannot fulfill the real objective of academic research. On other hand, if any research project is supported by the funding agencies, sometimes research problems are already designed by such agencies and researchers are expected to research on such problems. In all such cases researcher's involvement and his relation with research are not established up to expected level.

Concept of problem is basically a psychological aspect which can be caused by either physical facts or mental facts. No research can be performed by the researcher without his psychological involvement, his realization and sensitization towards the research problem. In many instances of academic research it has been observed that, without serious consideration of research problem researcher has undergone complete research

and even concluded their work. In fact there should be the proper and orderly linkage of research work start from formulation of research problem till their conclusion.
Selection of research problem is a scientific process involving certain steps on the part of researcher to be performed.

1. Learning Outcome:

After reading contents of this module readers would understand following things.

a. The origin of problem.
b. Steps involved in formulation of research problem.
c. Enabling them to analyze and make classification of research problems.
d. To make them realize and sensitized towards the real social issues to be chosen for the research.
e. To enable them to understand the scientific process involved in formulation of research problem.

2. Characteristics of Research Problem

There are some general assumptions as to any problem as "no problem comes from vacuum." "Every problem has their solution." Before discussing about the Research problem, the term 'problem' is necessary to explain. There are various subjects in the life of a man he may be dissatisfied as to any or some of them.
For example-

> *When you drive car without carrying license and immediately you find traffic police stopping vehicles for documents checking, which causes dissatisfaction and felt problem.*

'Dissatisfaction' is a mental element and it is always related to present fact. Even, if a man is worry about his future, the subject matter of his anxiety may be future but dissatisfied mental state is always present, thus the subject matter of dissatisfaction may be past, present or future which causes dissatisfaction of mind at any point of time it is perceived problematic. If a man is dissatisfied he always thinks to change his dissatisfaction into satisfaction by controlling and manipulating the facts responsible for his dissatisfaction. This is only possible if he knows or he has answer how to change the state of dissatisfaction into satisfaction one. Contrarily, if he has no answer to find out proper solution of such problem then he undergoes to research process for finding out the answer, how to resolve such problem.
It is necessary to keep in mind that selected problem should not be fictitious. It must be based on certain logical and rational observation and proposed research should reflect their significance. The significance value should also be observed as to their utility and number of beneficiaries thereof.
While selecting any problem for research its general value is to be considered. It should be analyzed that how many people are affected by such problem and after findings of

research how many people would be benefited. Generalization value increases with population increasing. A research is significant if their generalization value is greater. There are two types of research problems, viz., those which relate to states of nature and those which relate to relationships between variables. At the outset the researcher must single out the problem he wants to study, i.e., he must decide the general area of interest or aspect of a subject matter that he would like to inquire into. Initially the problem may be stated in a broad general way and then the ambiguities, if any, relating to the problem be resolved. Essentially, two steps are involved in formulating the research problems, viz., understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view. Often the problems are taken in general terms and it is up to the researcher to narrow it down and phrase the problem in operational terms.[1]

3. Steps of Formulation of research problem

Every research problem has to be screened on following steps as-

4.1 Realization of Problem

4.2 Identification of problem

4.3 Analysis of Problem

4.4 Statement of Problem

4.1 Realization of Problem:

This is the first stage when researcher realizes the existence of problem. Mere statement or discussion regarding the problem does not suffice for selecting any problem for research unless researcher realizes or sensitized with the existence of any problem. Generally, victims of any problem can better realize the existence of problem. It does not mean that only victims can be the good researcher. Anybody, whoever be either victim, stakeholder or others, who understand the pain or difficulties of life caused by such problem. If researcher undertakes any research without his realisation of problem, he may undergo with the research but cannot formulate the research objectives and purposes pin pointed towards the satisfaction of objectivity of research. Even he cannot test veracity of solutions suggested on the basis of results.

Realisation is a cognitive process. When man perceives any stimulus, fact or phenomenon which is received by his receptors of mind and thereafter cognitive process starts in his mind to identify such stimulus on the basis of his experience, knowledge and insight. Whatever is the nature of experience, knowledge or insight he possess outcome of his mind will be respectively positive or negative. The positive sign

provides the state of satisfaction and negative sign causes dissatisfaction. In turn dissatisfaction proceeds for alteration, amendment, improvement and replacement. Such realisation stimulates the researcher to feel about their negative attributes or something lacking.

Interest of researcher is also an important aspect for establishing relation of researcher with such problem. Since the researcher has to spend a long time with research study if he would have interest in the subject of research only then he can continuously work on it otherwise not.

4.2 Identification of Problem:

After realisation of any problem next necessary step or process is the identification of problem. Researcher has to make him sure that what he feels to exist problematic is true or not? Sometimes there may be the illusion or delusion as to any facts and formed wrong opinion. Before formulation of problem, there must be corroboration of opinion as to the existence and nature of problem. Researcher should discuss his observation regarding problem with stakeholders and experts, and to invite their opinions on such problem. The researcher must at the same time examine all available literature to get himself acquainted with the selected problem. He may review two types of literature – the conceptual literature concerning the concepts and theories, and the empirical literature consisting of studies made earlier which are similar to the one proposed. The basic outcome of this review will be the knowledge as to what data and other materials are available for operational purposes which will enable the researcher to specify his own research problem in a meaningful context. After this the researcher rephrases the problem into analytical or operational terms.

In academic research a very familiar term 'Review of Literature' is used. Review of literature is basically, a step of corroboration of opinion with earlier observations propounded by researchers in previous studies on same subject matter. It is mandatorily a formal step to be followed in every research. Researcher has to consult as possibly as with all relevant literature containing information regarding subject matter of research. After analysing such facts, information and principles he can sharpen his vision towards the problem. Now his perception towards the problem would be more accurate. Corroboration of opinion or Review of literature is necessary before selection of problem. Because, there may be the possibility of finding answers for which research is proposed and without undergoing the research process he can get intended knowledge necessary to resolve his problem.

4.3 Analysis of Problem:

Any phenomenon arising problematic state for example - poverty, crime, unemployment, corruption etc. The first step towards the problem solving, there can be a detailed description of the circumstances under which it occurs (nature, symptoms,

progression and frequency etc.) and their analysis becomes necessary. This will help to understand the contexts, nature and effects of such problem. In easy way of addressing any research problem contain three major steps – description of problem, understanding of problem and explanation thereof.[3]
Researcher has to analyse the problems on following aspects as-

- Whether problem is of temporary or permanent nature?
- What are the constituents of problem?
- Determination of relevant variables.
- What factors are responsible for causing such problem?
- Whether such factors are internal or external one?

Many times in our life we come across to such circumstances which are dissatisfactory for us and after passing them we neither go to look into such problem nor interested to research on such matter. Because, we are well assured that such happening was by chance or incidental only which would not occur again and losses caused by such incidence are not very high. Such problems are of temporal nature which does not affect our life very seriously and not exist persistently. These problems are not researchable since the research results may be beneficial to know about the nature and causes of problem, but it would not serve any purpose unless there is any possibility of their repetition in our life. Thus, the coast paid for searching such knowledge which is only informative, has no immediate utility is not beneficial. Therefore, while selecting any research problem, researcher must see that problem should not be of temporary nature it should be of permanent nature which requires human interception.

No problem comes from the vacuum. Every problem has its history and components which constitute such problem. Researcher has to search and analyse all those facts which are the part of any problematic incidence, phenomenon or transaction. This process is called 'crystallisation of problem'. In diagnostic research, crystallisation process is very important; sometimes the causes of problem are directly highlighted through analysis. Another philosophy behind crystallisation of constituent is directive approach which suggests that the facts constituting the phenomenon must be keenly observed.

There are two types of research problems, viz., those which relate to nature and those which relate to relationships between variables. After crystallisation of problem, researcher has to determine the relevant variables or relevant facts among all constituting variables or facts to ascertain that what may be the important facts responsible for occurrence of any problem. Because there is a principle that any problematic phenomenon, transaction or incidence perceived problematic may occur due to composition of facts in certain manner. But such problem cannot subsist long unless nurtured by other factors. Such nurturing factors may be internal or external. Internal factors are those factors which are hidden in problem itself and they can be searched by crystallisation of problematic phenomenon. Whereas external factors are those factors which do not participate as constituent of problem and they cannot be seen by crystallisation of phenomenon. But they externally influence such phenomenon. It constitutes the relation of existence of problem depending on other factors

factors are called 'Independent Variables' and Problem is called 'Dependent variables'. Resorting actions for eradication of problem cannot succeed without controlling and manipulating independent variables.

In Legal research, analysis is used in a broad sense to refer the process of identifying the issue or issues in given facts and to determine rules, principles and theories of law to be applied. It is an organized approach that helps to develop research skills. It makes legal research easier, saves time, and establishes reliability and validity of results. The most common approach to legal analysis involves a four-step process: Issue, Rule, Analysis/ Application and Conclusion. It is important to keep in mind the crucial role the facts play in analytical process. The four steps of the analysis process involve the facts in each step:[4]

a. Issue: The key facts are included in the issue. The issue is the precise question raised by the specific facts.
b. Rule: Determination of which the law governs the issue is based on the applicability of the law to the facts in issue.
c. Analysis / Application: This step is the process of applying the rule of law to the facts. Without the facts, the law stands in a vacuum.
d. Conclusion: The conclusion is a summation of how the law applies to the facts, a recap of the first three steps. It too requires the facts.

Two main steps are required to be followed in formulating research problem viz., understanding the problem thoroughly, rephrasing the same into meaningful terms from an analytical point of view. Researcher accepts the problem in general terms and it is up to him to narrow it down and phrase the problem in operational terms.[5]

4.4 Statement of Problem: This is the final stage when research problem comes into the shape of statement. Whatever be the understanding and perception made by researcher after crystallisation and keen analysis of problem thereafter he makes the statement regarding existence of problem. Statement must convey the real nature of problem as it is as realised and felt by researcher. While formulating research problem, researcher has to be very careful as to the use of language and grammar. Language should be clear, easy and unambiguous.

A research problem must be identified without any ambiguity and each selected research problem must be clearly defined. There may be a situation in which the researcher is fully aware of the symptoms relating to certain problem in achieving his goal. But, He/ she may not be in a position to clearly spell out the problem which is causing such deficiency. Unless it is clearly identified, it will not be possible to proceed further to carry out the project. If a researcher proceeds with ill defined problems, he/ she may end up with misleading conclusions.[6] *Research problem should be clearly defined in statement of researcher. "Defining a research problem is the fuel that drives the scientific process, and is the foundation of any research method and experimental*

design, from true experiment to case study."[7] Statement of problem should convey the major objective of research and type of research objectives. Topic should be little known, important for group, public, society, nation or world. It should contain specific, unsolved practical or theoretical problem; or phenomenon not yet adequately understood.[8] This task of formulating, or defining, a research problem is a step of great importance in the entire research process. The problem to be investigated must be defined unambiguously for that will help discriminating relevant data from irrelevant ones. Care must be taken to verify the objectivity and validity of the background facts concerning the problem. Prof. W. A. Neiswanger states that the statement of the objective is of basic importance because it determines the data which are to be collected, the characteristics of the data which are relevant, relations which are to be explored, the choice of techniques to be used in these explorations and the form of the final report.[9]

All the above steps are the major and necessarily be followed for formulation of research problem. There can be sub classification under every step according to objective and subject of study. Research problems can be classified on the basis of their objectives which have been discussed under Module – I under 'Classification of Researches'. Those researches, where relations of variables are searched, cause and effect relationship is shown or in diagnostic researches problems can be classified on the basis of their variables.

4. Kinds of Research Problem: On the basis of variables, research problems can be classified as:

5.1 Uni-variable Problem
5.2 Bi-variables Problem
5.3 Multi- variables Problem
5.4 Opponent variables Problem

5.1 Uni-variable Problem: Where problems are formulated after following certain hypothesis as to the relation of problem with single Independent variable.
For example-

> *'Illiteracy is the cause of Criminal behaviour' or 'Effect of illiteracy on criminal behaviour'. Here problem of research is criminal behaviour, for which illiteracy is the alleged cause. Only single variable is held responsible for the problem.*

Researcher focuses his investigation centric only on that independent variable not on any other. After undergoing research, formulated hypothesis is either proved or disproved.

5.2 Bi-variable Problem: Where hypothesis suggests inference on two different independent variables responsible for occurrence of the problem is called Bi-variable problem. Researcher has to focus his attention on these two variables simultaneously.

For example –

> *Question is who has caused the death of A? It is shown that death was caused by either B, C or both. Here investigator has to investigate the antecedents of B and C both and he has to study the relations between A and B; A and C; and between B and C. After searching and analysing the facts relating to both variables hypothesis can be tested in the light of findings.*

If data shows that only one variable is responsible for occurrence of problem, the other fact will be given up from study. If data shows that both the variables have relation with the problem then researcher has to determine the major and minor variable between them. The variable which is more responsible than other for such happening is called major variable. The minor variable is that which participated for the occurrence of problem but has not contributed up to the level as contributed by another.

Another premise is that both variables can be equally accompanied and contributed towards the problem.

5.3 Multi-variable Problem: Where more than two variables are shown in hypothesis responsible for problem is called multi-variable problem. Difficulty level and complexity in study increases with increasing number of independent variables. Researcher has to give keen attention on all variables equally. Gradually with the study he moves from multi-variability to individual variables and comes to conclusion whether all variables stated in hypothesis are causing problem or some of them, or none of them. Among independent variables shown as responsible for the problem what are the chief variables among them? It is necessarily be established. Since the strategy of controlling effects shall be made accordingly.

5.4 Opponent variable Problem: Where there is a question between two or more inconsistent variables whether A is the cause of problem or B is the cause. Where A and B cannot stand together in such cases two hypothesis are formulated. First alleges the role of A variable and second on B. On proving one hypothesis other is rejected.

For example-

> *Court has to decide paternity of X it is shown that either P or Q may be the father of X. There is no possibility in the course of nature that P & Q both can be the father of X. Such phenomenon contains opponent variables problem.*

While considering the opponent variables problem, researcher has to be very balanced and to control his own attitude for an impartial and pure unbiased judgement among two inconsistent variables.

5. Summery: Formulation of research problem is the first step of research process. Such process should be systematically, scientifically and objectively followed. Research problem can be selected after analysing the nature and effect of problem.

Problem is a stage of dissatisfaction of mind. This is the natural cognitive process that man wants to change his dissatisfaction into satisfaction. If he knows how to turn into stage of satisfaction, he can immediately switch towards satisfaction. But if he has no experience and knowledge of problem solving he prepares to get knowledge through research process. The problem selected for research is called research problem.

Selection of research problem is a scientific process containing certain steps for their final formulation. Their beginning from realisation o satisfaction f problem, identification of problem, analysis of problem and finally formulation of problem. Realisation is a psychological process of researcher which plays an important role to seek his interest. Identification is a functional part towards corroboration of opinion includes review of literature. Analysis of problem requires study of facts composing problem on three parameters as 'What facts are involve?' 'When did facts got involve?' and 'How facts related to problem?' It includes historical, phenomenological and crystallised analytical approach towards the problem and their components.

The last stage when statement of problem is formulated in words written or verbal. It should convey in easy and accurate language for communication of real nature of problem formulated after realisation, identification and analyses of researcher.

On the basis of analysis of variables, chief independent variables are determined and their relation with problem is shown in hypothesis and research study is directed in the light of such variables and problem. On the basis of number of variables research problems can be classified as 'Uni-variable problem', 'Bi-variable problem', 'multi- variable problem' and 'Opponent variable problem'. Research designing is made according to nature of problem.

HYPOTHESIS

Learning Objectives

In this module, you will learn:

- The meaning and definition of Hypothesis.
- The Nature of Hypothesis.
- The Importance and use of Hypothesis in research Methodology.
- The Sources of Hypothesis.
- The Relationship between Variables and Hypothesis.
- The Types of Hypothesis.
- Formulating a good Hypothesis.
- Characteristics of a good Hypothesis.
- Hypothesis Testing.
- Errors in Hypothesis Testing

1. **Introduction**: Hypothesis is usually considered as an important mechanism in Research. Hypothesis is a tentative assumption made in order to test its logical or empirical consequences. If we go by the origin of the word, it is derived from the Greek word- 'hypotithenai' meaning 'to put under' or to 'to suppose'. Etymologically hypothesis is made up of two words, "hypo" and "thesis" which means less than or less certain than a thesis. It is a presumptive statement of a proposition or a reasonable guess, based upon the available evidence, which the researcher seeks to prove through his study. A hypothesis will give a plausible explanation that will be

   tested. A hypothesis may seem contrary to the real situation. It may prove to be correct or incorrect. Hypothesis need to be clear and precise and capable of being tested. It is to be limited in scope and consistent with known or established facts and should be amenable to testing within the stipulated time. It needs to explain what it claims to explain and should have empirical reference.

2. **Definition:**
   "A hypothesis can be defined as a tentative explanation of the research problem, a possible outcome of the research, or an educated guess about the research outcome." [1] Goode and Hatt have defined it as "a proposition which can be put to test to determine its validity". [2]

"Hypotheses are single tentative guesses, good hunches – assumed for use in devising theory or planning experiments intended to be given a direct experimental test when possible"[3].
According to Lundberg, "A hypothesis is a tentative generalisation, the validity of

3. **Nature of Hypothesis:**
   The hypothesis is a clear statement of what is intended to be investigated. It

should be specified before research is conducted and openly stated in reporting the results.

This allows to:

- Identify the research objectives.
- Identify the key abstract concepts involved in the research.
- Identify its relationship to both the problem statement and the literature review.
- A problem cannot be scientifically solved unless it is reduced to hypothesis form.
- It is a powerful tool of advancement of knowledge, consistent with existing knowledge and conducive to further enquiry.
- It can be tested – verifiable or falsifiable.
- Hypotheses are not moral or ethical questions.
- It is neither too specific nor to general.
- It is a prediction of consequences.
- It is considered valuable even if proven false.

4. **Importance of Hypothesis:** Hypothesis though an important part of research may not be required in all types of research. The research which are based on fact finding (historical or descriptive research) do not need hypothesis. Hillway also says that "When fact-finding alone is the aim of the study, a hypothesis is not required.[5]" Whenever possible, a hypothesis is recommended for all major studies to explain observed facts, conditions or behaviour and to serve as a guide in the research process.

- Hypothesis facilitates the extension of knowledge in an area. They provide tentative explanations of facts and phenomena, and can be tested and validated. It sensitizes the investigator to certain aspects of the situations which are relevant from the standpoint of the problem in hand.
- Hypothesis provide the researcher with rational statements, consisting of elements expressed in a logical order of relationships which seeks to describe or to explain conditions or events, that have yet not been confirmed by facts. The hypothesis enables the researcher to relate logically known facts to intelligent guesses about unknown conditions. It is a guide to the thinking process and the process of discovery.
- Hypothesis provides direction to the research. It defines what is relevant and what is irrelevant. The hypothesis tells the researcher what he needs to do and find out in his study. Thus it prevents the review of irrelevant literature and provides a basis for selecting the sample and the research procedure to be used in the study.
- Hypothesis implies the statistical techniques needed in the analysis of data, and the relationship between the variables to be tested. It also helps to delimit his study in scope so that it does not become broad or unwieldy.
- Hypothesis provides the basis for reporting the conclusion of the study. It serves as a framework for drawing conclusions. In other word, we can say that it provides the outline for setting conclusions in a meaningful way.

So, Hypothesis has a very important place in research although it occupies a very small place in the body of a thesis.

5. **Sources of Hypothesis:** A good hypothesis can only be derived from experience in research. Though hypothesis should precede the collection of data, but some degree

of data collection, literature review or a pilot study will help in the development and gradual refinement of the hypothesis. A researcher should have quality of an alert mind to derive a hypothesis and quality of critical mind of rejecting faulty hypothesis. The following sources can help the researcher in coming up with a good hypothesis:

- Review of literature.
- Discussion with the experts in the given field to understand the problem, its origin and objectives in seeking a solution.
- Intuition of the researcher also sometimes helps in forming a good hypothesis.
- Previous empirical studies done on the given area.

6. **Understanding Types of Hypothesis:**
Research Problems are too general by themselves to enable us to carryout meaningful analysis. They need to be specified in a more focussed way. Hypotheses are specific statements that relate to the problem, the answers to which are likely to be yes or no, depending upon what is uncovered from the research. Examples of Hypothesis can be:
    - Suicide is related to general level of religiosity/secularisation of society.
    - Alienation and political participation are negatively related.

Such statements specify links between different phenomena, in order to explain different patterns of behaviour that appear to occur. However, such patterns of association do not necessarily demonstrate that a causal relationship exists. We cannot for an instance say, 'socio-economic deprivation causes suicide.' If that was the case, then all those in Britain defined by various yardsticks as living in a state of relative poverty would inevitably commit suicide. This is very unlikely to happen.

7.1Variable

So. to understand the types of hypothesis, we need to understand the concept of variables first. The variables are empirical properties that take two or more values or in other words a variable is any entity that can take on different values. In simple terms, anything that can vary or that is not constant can be considered a variable. For instance, age can be considered a variable because age can take different values for different people or for the same person at different times. Similarly country can be considered a variable because a person's country can be assigned a value.

A variable is a concept or abstract idea that can be described in measureable terms. In research, this term refers to the measureable characteristics, qualities, traits, or attributes of a particular individual, object or situation being studied. Variables differ in many respects, most notably in the role they are given in our research and in the type of measures that can be applied to them. The statement of problem usually provides only general direction for the research study. It does not include all the specific information. There is some basic terminology that is extremely important in how we communicate specific information about research problems and research in general. So, weight, height, income are all examples of variables.

In Research, there is a need to make a distinction between various kinds of variables. There are many classifications given for variables. We will try to understand only the Dependent Variable and Independent Variable.

Independent Variables: The variables which are manipulated or controlled or changed. These are also known as manipulated variables. Researchers often

mistake independent variable and assume that it is independent of any manipulation. It is called independent because variable is isolated from any other factor. In research, we try to determine whether there is a cause and effect relationship. In fact, when you are looking for some kind of relationship between variables you are trying to see if the independent variable causes some kind of change in the other variables, or dependent variables.

Dependant Variables: Dependent variables are the outcome variables and are the variables for which we calculate statistics. The variable which changes on account of independent variable is known as dependent variable. It is something that depends on other factors. For example, a test score could be a dependent variable because it could change depending on several factors such as how much you studied, how much sleep you got the night before you took the test, or even how hungry you were when you took it. Usually when you are looking for a relationship between two things you are trying to find out what makes the dependent variable change the way it does.

As we have discussed that a variable is an image, perception or concept that can be measured, hence capable of taking on different values. The variables that you wish to explain are regarded as dependant variables or criterion variables. The other variable expected to explain the change in the dependant variable is referred to as an independent variable or predictor variable. The dependant variable is the expected outcome of the independent variable and independent variable produce dependant variables.

Variables can have three types of relationships among them.

- A positive relationship is one where an increase in one would lead to increase in the other.
- A negative relationship is one where an increase in one variable lead to decrease in the other.
- A zero relationship is one which shows no significant relationship between the two variables.

Once we have understood variables, we can discuss the various types of hypothesis.

The Types of Hypothesis:

Research Hypothesis: The Research Hypothesis could be understood in terms of Simple Research hypothesis and Complex Research Hypothesis. A simple research hypothesis predicts the relationship between a single independent variable and a single dependent variable. A Complex hypothesis predicts the relationship between two or more independent variables and two or more dependent variables. A research hypothesis must be stated in a testable form for its proper evaluation and it should indicate a relationship between variables in clear, concise and understandable language. Research Hypothesis are classified as being directional or non-directional.

- **Directional Hypotheses** - These are usually derived from theory .They may imply that the researcher is intellectually committed to a particular outcome. They specify the expected direction of the relationship between variables i.e. the researcher predicts not only the existence of a relationship but also its nature.
- **Non-directional Hypotheses -** Used when there is little or no theory, or when findings of previous studies are contradictory. They may imply impartiality. Do not stipulate the direction of the relationship.

Associative and causal Hypotheses

-Associative Hypotheses -Propose relationships between variables - when one variable changes, the other changes. Do not indicate cause and effect.

- Causal Hypothesese- Propose a cause and effect interaction between two or more variables. The independent variable is manipulated to cause effect on the dependent variable. The dependent variable is measured to examine the effect created by the independent variable.

- **Null Hypothesis**: These are used when the researcher believes there is no relationship between two variables or when there is inadequate theoretical or empirical information to state a research hypothesis.The null hypothesis represents a theory that has been put forward, either because it is believed to be

true or because it is to be used as a basis for argument, but has not been proved. Has serious outcome if incorrect decision is made. Designated by: Ho or Hn.

Null hypotheses can be:

- simple or complex;
    - **The Alternative Hypothesis**: The alternative hypothesis is a statement of what a hypothesis test is set up to establish. Designated by: H1 or Ha. It is opposite of Null Hypothesis. It is only reached if Ha is rejected. Frequently "alternative" is actual desired conclusion of the researcher.

We give special consideration to the null hypothesis. This is due to the fact

- **Statistical Hypothesis:** To test whether the data support or refute the research hypothesis, it needs to be translated into a statistical hypothesis. It is given in statistical terms. In the context of inferential statistics, it is statement about one or more parameters that are measures of the population under study. Inferential statistics is used for drawing conclusions about population values. To use inferential statistics, we need to translate the research hypothesis into a testable form, which is called the null hypothesis**.** A testable hypothesis contains variables that are measurable or able to be manipulated. They need to predict a relationship that can be 'supported' or 'not supported' based on data collection and analysis.

that the null hypothesis relates to the statement being tested, whereas the alternative hypothesis relates to the statement to be accepted if when the null is rejected. The final conclusion, once the test has been carried out, is always given in terms of the null hypothesis. We either 'reject Ho in favour of Ha' or 'do not reject Ho'; we never conclude 'reject Ha', or even 'accept Ha'. If we conclude 'do not reject Ho', this does not necessarily mean that the null hypothesis is true, it only suggests that there is not sufficient evidence against Ho in favour of Ha; rejecting the null hypothesis then, suggests that the alternative hypothesis may be true. For example:

Ha= the males visited cinema more than females.

Ho= the males and females do not differ in respect of the frequency of seeing cinema.

So, Alternative hypothesis is usually the one which one wishes to prove and the Null hypothesis is the one which one wishes to disapprove.

8 Formulating a Hypothesis: There are no precise rules for formulating hypothesis and deducing consequences but there are some difficulties that arise in formulating the hypothesis. However, there are certain necessary conditions that are conducive to their formulation. They are:

-*Richness of background knowledge*: In the absence of knowledge concerning a subject matter, one can make no well founded judgement of relevant hypothesis. Background knowledge is essential for perceiving relationships among the variables and to determine what findings other researchers have reported on the problem under study. New knowledge, new discoveries and new inventions should always form continuity with the already existing corpus of knowledge and therefore it becomes all the more essential to be well versed with the already existing knowledge.

Hypothesis can be formulated correctly by persons who have rich experience and academic background, but they can never be formulated by those who have poor background knowledge.

-*Logical and Scientific approach*: Formulation of proper hypothesis depends on one's experience and logical insight. Hypothesis does not have a clear cut and definite theoretical background. Partly, it is a matter of lifting upon an idea on some problem and it is not always possible to have complete information of, and acquaintance with the

- scientific methods for formulating hypothesis. This lack of scientific knowledge presents difficulty in formulation of hypothesis. A researcher may begin a study by selecting one of the theories in his own area of interest and deduce a hypothesis from this theory through logic which is possible only when the researcher has a proper understanding of the scientific method and has a versatile intellect. At times, conversations and consultations with colleagues and experts from different fields are also helpful in formulating important and useful hypothesis.
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- **9. Characteristics of A Good Hypothesis:** Hulley says a good hypothesis must be based on a good research question. It should be simple, specific and stated in advance[6]. So a hypothesis could be called as a good hypothesis if it possesses the following characteristics:
-
- i) Hypothesis should be simple so that it is easily understood by everyone.
-
-
- As we have discussed the Null hypothesis (Ho) and Alternative Hypothesis (Ha) earlier so while testing hypothesis we generally proceed on the basis of Null hypothesis (Ho), keeping the Alternative hypothesis in view. We do so because on the assumption that Null hypothesis is true, one can assign the probabilities to different possible sample results, but this cannot be done if we proceed with the Alternative hypothesis. Hence the use of null

Hypothesis is quite frequent. While testing the Hypothesis the following things to be kept in mind:

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ii) Hypothesis should be clear, specific and precise. If the hypothesis is not clear and precise, the inferences drawn on its basis cannot be taken as reliable.

ii) Hypothesis should be capable of being tested.

iii) Hypothesis should state relationship between variables.

iv) Hypothesis should be consistent with most known facts. i.e. it must be consistent with a substantial body of established facts.

v) The hypothesis must explain the facts that gave rise to the need for explanation. It must actually explain what it claims to explain.

10. Hypothesis Testing: When the purpose of the research is to test a research hypothesis, it is termed as hypothesis-testing research. It can be of experimental design or the non-experimental design. Research in which the independent variable is manipulated is termed 'experimental hypothesis-testing research' and a research in which an independent variable is not manipulated is called 'non-experimental hypothesis testing research'.

- Level of significance: This is a very important concept in the context of hypothesis testing. It is always some percentage (usually 5%) which should be chosen with great care, thought and reason. In case we take the significance level at 5%, then this implies that Ho will be rejected when the sampling result (i.e observed evidence) has a less than 0.05 probability of occurring if Ho is true. In other words, the 5% level of significance means that researcher is willing to take as much as a 5% risk of rejecting the Null hypothesis when it happens to be true. Thus the significance level is the maximum value of the probability of rejecting Ho when it is true and is usually determined in advance before testing the hypothesis.
- Declaration rule or test of hypothesis: Given a Null hypothesis (Ho) and Alternative hypothesis (Ha), we make a rule which is known as decision rule according to which we accept Ho (i.e reject Ha)or reject Ho(i.e accept Ha). For instance, if Ho is, that a certain lot is good (there are very few defective items in it) against Ha that the lot is not good (there are too many defective items in it), then we must decide the number of items to be tested and the criterion for accepting or rejecting the hypothesis. We might test 10 times in the lot and plan our decision saying that if there are none or only 1 defective item among the 10, we will accept Ho otherwise we will reject Ho (or accept Ha). This sort of basis is known as decision rule.
- Two-tailed and one-tailed test: In the context of hypothesis testing, these two terms are quite important and must be clearly understood. A two-tailed rejects

the Null hypothesis if, say, the sample mean is significantly higher or lower than the hypothesized value of the mean of the population. Such a test is appropriate when the Null hypothesis is some specified value and the Alternative hypothesis is a value not equal to the specified value of Null hypothesis. In a two-tailed test, there are two rejection regions, one on each tail of the curve which can be illustrated as under:

If the significance level is 5% and the two-tailed test is to be applied, the probability of the rejection area will be 0.005 (equally divided on both tails of the curve is 0.0025) and that of the acceptance region will be 0.95.

But there are situations when only one-tailed test is considered appropriate. A one-tailed test would be used when we are to test, say, whether the population mean is either lower than or higher than some hypothesized value. We should always remember that accepting Ho, on the basis of sample information does not constitute the proof that Ho, is true. We only mean that there is no statistical evidence to reject it.

11. Errors in Testing of Hypothesis: There are basically two types of errors we make in the context of testing of Hypothesis. These are called as Type-I error and the Type-II error. In type-I error, we may reject Null hypothesis when Null hypothesis is true. Type-II error is when we accept Null hypothesis when the Null Hypothesis is not true. In other words, Type-I error means rejection of hypothesis which should have been accepted and Type-II error means accepting the hypothesis which should have been rejected. Type-I error is denoted by alpha known as alpha error, also called the level of significance of test and Type-II error is denoted by beta known as beta error.

	Accept Null hypothesis	Reject Null hypothesis
Null hypothesis (true)	Correct decision	Type-I error (alpha error)
Null hypothesis (false)	Type-II error (beta error)	Correct decision

The probability of Type-I error is usually determined in advance and is understood as the level of significance of testing the hypothesis. If Type-I error is fixed at 5%, it means that there are about 5 chance in 100 that we will reject Null hypothesis when Null hypothesis is true. We can control Type-I error just by fixing at a lower level. For instance, if we fix it

at 1%, we will say that the maximum probability of committing Type-I error would only be 0.01.

But with the fixed sample size, when we try to reduce Type-I error, the probability of committing Type-II error increases. Both types of errors cannot be reduced simultaneously. There is trade off between two types of errors which means that the probability of making one type error can only be reduced if we are willing to increase the probability of making the other type of error. One must set a very high level for Type-I error in one's testing technique of a given hypothesis. Hence, in the testing of hypothesis, one must make all possible efforts to strike an adequate balance between Type-I and Type-II errors.

UNIVERSE OR POPULATION

Learning objectives

- **To know the concept of population**
- **To know the concept of sample**
- **To understand the relationship between population and sample**

Population, compilation, or set of things, items, or quantities (grouped together on the basis of common or defining descriptions or characteristics) from which a representative sample is drawn for relationship, comparison or measurement. The population or universe embodies the entire group of units which is the centre of the study. Thus, the population could consist of all the persons in the country, or those in a particular topographical position, or a special cultural or economic group, depending on the rationale and exposure of the study.

Thus, it is a total set of elements (persons or objects) that share some common features defined by the sampling criterion established by the researcher. Population is Comprised of two groups - target population & accessible population.

TARGET POPULATION

Target population is the total group of population units from which the sample is to be drawn. A sample is the group of units who took part in research. Generalisability refers to the degree to which we can correlate the findings of our research to the target population we are concerned.

ACCESSIBLE POPULATION

Accessible population is the population in research to which the researchers can correlate their conclusions. This population is a split or subset of the target population and is also known as the study population. It is from the accessible population that researchers draw their samples. Sample Group or Sampling.

SAMPLE

Sample is a subset of population containing same characteristics of a larger population. Samples are used in statistical testing when population size is too big for the test to

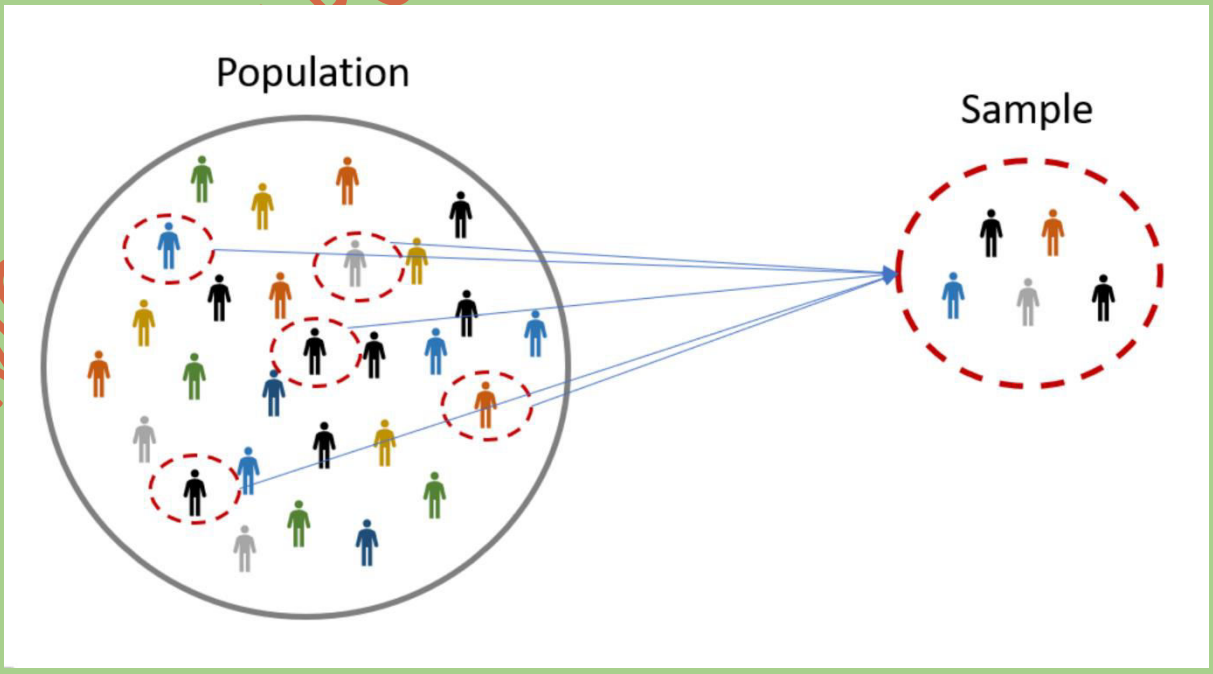
include all members for observation. Sample should stand for the whole population and not reflect prejudice toward a precise feature.

In the research methodology, realistic formulation of the research is important and should be done very cautiously with proper attentiveness and in the occurrence of a very good supervision.

But during the formulation of the research on the sensible grounds, one likely to go through a large number of problems. These problems are normally related to the perceptive of the descriptions of the universe or the population on the basis of studying the characteristics of the exact part or some portion, generally called as the sample.

Thus, sampling is defined as the method or the practice consisting of selection for the study of the part or the piece or the sample, with a view to describe conclusions or the solutions about the universe or the population.

According to Mildred Parton, "Sampling method is the process or the method of drawing a definite number of the individuals, cases or the observations from a particular universe, selecting part of a total group for investigation."



MODULE ON SAMPLING

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SAMPLING

Objectives:

After reading this module, the learners will have a clear picture of

(i) Concept of sampling;
(ii) Various techniques of sampling;
(iii) Steps to prepare a sample design;
(iv) Importance of sampling

I. Meaning of Sampling

As the name suggests, 'sampling' is the procedure 'to sample' something. In layman terms, a sample is a part of a thing and it has the ability to display the qualities and features of the thing, of which it is a part. In other words sample is a part of a thing that acts as a specimen or an example forthat thing. For example, before launching a new soft-drink in market the company wants to test consumer feedback for the product. The company may set up temporary vendors at an amusement park and let the consumers try the samples of soft drink to collect their feedback. Each of those soft drinks will be called as a 'sample'. Sampling is the most important step in the direction of carrying out research, once the hypothesis and objectives of research are understood. Sampling is a vital procedure in quantitative research, wherein the researcher first identifies the population to be studied. However studying each and every item or member of the entire population is not only cumbersome and costly, but also wasteful of time. Therefore it is an accepted method to carve out a body of the items out of that population in such a way that the results derived from studying those items can be generalized to the whole population. This collective body of items that can be studied in lieu of studying the entire population is called a sample. Sampling is the method or technique that is used to draw out a sample, which reflects the qualities possessed by the population.

Thus 'sampling' may be defined as a method of picking out a representative sample from the population to be studied, by using a definite technique. Technique is an essential thing while doing sampling because the sample that is taken must be appropriate in size as well as features, to be suitable for drawing inferences that can be generalized to the whole population. The first step in sampling is to determine the population to be studied. Then next step is to ascertain the qualities of the population that the researcher wants to study. On the basis of the qualities to be studied and the size of the population, the researcher can decide the appropriate proportional size of the sample. The qualities to be studied will also give the parameters for choosing a sample from the population. As has already been said that the sample must be representative of the whole population, the researcher must ensure that the qualities of the population to be studied are seen in the sample also.

Sampling comes into the picture from the point of research design itself. It helps in streamlining the path of research. Once the samples are fixed using a sampling technique, the collection of data from respondents becomes easier and cost-

effective. The researcher can collect data from a portion of the population only, i.e. the sample, and at the same time he/she can generalize the results arrived at. Sampling is a step that has a bigger role in quantitative research than purely doctrinal research. Such a research in legal field is often called as 'socio-legal' research because the researcher examines the execution of legal principles in society. For example a socio-legal researcher wants to study the level of awareness of consumer rights among educated people in a city in Maharashtra, say Pune. Since Pune is a big city, he divides it into different areas and then proceeds to determine the number of people he will approach for data collection in each of those areas. He first finds out the latest census information about population in Pune and finds out a number that would proportionately represent the population.[1] The researcher in this example can also randomly choose the respondents for his questionnaires, like the members of his family or his friends, neighbours, colleagues, etc. However that will not establish the credibility of his research, because respondents chosen according to the researcher's personal wish cannot yield results that can be called illustrative of the whole population.

It is not possible to identify each and every unit to decide whether or not the unit should be part of the sample. It is also ineffective to just randomly choose any group of population units and label them as 'sample'.[2] There are certain techniques that have been developed by researchers over time. There are also many practical and technical considerations to be kept in mind for choosing the sampling technique. These techniques and the intricacies associated with it will be dealt-with in this module later. First let us understand the meaning of some important terms that are associated with sampling and will be used frequently in this Module.

II. Important Terms

There are some key terms that are associated with sampling. These are discussed below in detail.

- **Universe**

The first step in sampling is to identify and locate the 'population' to be studied. Population, also called as 'universe', is the entire collection of people on whom the study is to be conducted. The people to be taken as 'population' are decided on the basis of factors to be studied. For example a study is proposed to assess the access to government provided amenities like electricity, water, etc. to people living in suburbs in NCR India. The researcher proposes that the results of the study will be determined according to the responses of the people receiving the amenities. Thus the 'population' or 'universe' of the study will be the persons living in suburbs in and around NCR of India. Let us further suppose the researcher wants to conduct the research limited to a particular area of NCR, then the 'population' will be the residents of that area.

Not only the factors but also the probability of obtaining data from the respondents is to be taken into consideration. For example a study is proposed to assess the level of drug abuse among teenage school-going students in Noida. The 'universe' will have to include only teenagers, who go to schools in Noida. But in this study it may be predicted by the researcher that obtaining honest and genuine responses from school children is tricky, the researcher will have to expand the population size to include school authorities, parents of the school teenagers. For authentication of the study the researcher may also include counselors who treat teenagers undergoing treatment for substance abuse. While making a choice of population for the study it is important not only to narrow down the respondents on the basis of aspects to be studies, but also by making speculations about the authenticity of responses that shall be collected.

'Finite' and 'Infinite' Universe:

Universe may be 'finite' or 'infinite'. A finite universe is one having a limited population or limited number of units. Infinite universe is one which has an unlimited interminable number of units or the number of units is so large that it cannot be counted accurately. Thus a study conducted in a particular educational institution or a fixed number of educational institutions will be considered to be having a finite population. While a study conducted on the entire population of a country is an infinite universe. Generally research studies conducted by individual researchers are conducted on finite universe. Infinite universe requires more time and is costly as it generally requires number of field researchers.

'Heterogeneous' and 'Homogeneous' Universe:

Universe is as categorized as homogeneous and heterogeneous universe depending upon the consistency of the nature of elements present in it. Homogeneous population is one where the features of the units of population are similar; heterogeneous population is one where the population carries varying features. In research, homogeneity is seen in numbers in addition to in attributes, that is, empirically as well as qualitatively. Thus, in sociological and socio-legal research population may be called as homogeneous where the members of group chosen for study are identical to one another. The population chosen for study is called heterogeneous if members have different features.

The homogeneity or heterogeneity of a population comes into question on a quantitative basis of distribution of members, i.e. how scattered or clustered is the population; homogeneity or heterogeneity may also be on the basis of attributes of members, i.e., how similar or dissimilar is the population. It is important for the researcher to know the level of homogeneity of the population for choosing the most suitable sampling technique. On the basis of homogeneity of the population the researcher chooses the sampling in such a manner that all the features of the population are well represented in the sample.

- **Sample**

  Once the population is fixed the next step is to carve out a fixed portion out of the population for purposes of the study. Sample is drawn out of the universe using sampling techniques. The most important characteristic of a sample is that it should have all the distinguishing qualities of the universe. That is to say that even though the universe may have diverse and randomly distributed members, yet the sample should be chosen in such a manner that those aspects of the universe that are important for the study are not left out. A sample is always a subset of the universe, that is, it may be smaller in size than the entire population but the characteristics of the sample are same as that of the entire population. There might be a situation where the desired universe of the researcher may consist of haphazard units. In such a case the sample must be chosen in such a manner that it consists of all the desired characteristics to be studied. Thus representativeness is the most important characteristic of a sample. If care is not taken to ensure that the sample is not consisting of all the characteristics to be studied, then the results obtained may not be illustrative. That puts a question on the validity of the research.

  The sample to be chosen must also represent the universe in a proportionate manner, for substantial dependence on it for results. Proportion in choosing the sample ensures maximum accuracy of the study results. Thus adequacy of the sample is another important characteristic of the sample. All the units selected to be included in the sample must be independent of each other's presence. That is to say, the inclusion of one unit in the sample must not be dependent on inclusion of another unit.

- **Sampling Units**

  Each entity or person or thing which forms the entire universe is called as sampling unit. It is the most basis thing in the universe from which data is to be collected. For example in a study proposed for assessing the violation of human rights among hand-rickshaw pullers in the city of Kolkata, each of the rickshaw-puller is the 'sampling unit'. Herein the universe will be the entire body of rickshaw pullers in Kolkata.

  In some studies more than one sample is drawn out of the universe for making a sound research. In such cases each body of units is called as 'unit' and the entities or persons from whom data is collected are called as 'sampling elements'. For example a Dish TV company wants to conduct a study to gather feedback from families that have subscribed to the Dish connection. The universe is located in a particular area composed of different societies. Each family who have subscribed to the connection is the sampling element. Group of families located in one society will be the sampling units.

- **Sampling Trait**

  As we have understood above, samples are drawn out of the universe based on the attributes and factors to be studied. Each of these factors or c haracteristics that govern the process of sampling, are called as 'sampling traits'. Sa mpling traits may be 'qualitative' or 'quantitative' depending on the nature and requirement of the study. Qualitative traits are the unchangeable features, e.g. religion of persons, gender of persons, etc. These

  traits cannot be categorised into a range or scale. Quantitative traits are varying, like income of family, crime rate in an area, pollution level, etc. In research, quantitative traits are also called 'variables' as they change and can more easily be divided into range.

- **Target Population**

  All the units present in the universe cannot be the target of the study. As has already been mentioned above, the researcher has to choose to include in his sample only those units that mark the characteristics to be studied by the researcher. Thus, in the above example of study of drug abuse among school children, the teenage students of school are the population, while only students who have suffered from or are suffering from the drug abuse problem are included in the 'target population'.

- **Sample Size**

  Deciding the size of a sample is a major concern for a researcher. Size of the sample is the total number of sampling units that the researcher will include in the sample. The sample size cannot be too huge because then the whole purpose of studying a sample rather than the whole universe is lost. The sample size cannot be too small that it does not adequately represent the universe population.

- **Biased Sample**

  Even after taking utmost care it is possible that a sample chosen by the researcher represents some characteristics of the population more than the others. Such a sample is called as a biased sample. It is important for the researcher to be aware and make sure that his sample is not biased to avoid sampling errors as well as

authenticate his research. Such a situation may not always arise due to carelessness of the researcher, but also due to constraints to choose from the population. For example, a study may require for require for collecting responses from residents in an area where there are people of one religion living together in cluster. So if the researcher does not take care, he may end up with a sample that contains more respondents from one religion and that may lead to bias in his research results.

- **Sampling and Non-Sampling Error**

  No human efforts can be wholly flawless and without errors. Research is also bound to be ridden by some mistakes, small and big. It is a customary practice to mention in the research the loopholes in the results of the results. It shall make the research honest and also serves as a disclaimer for the reader to not treat the results whole and sole analysis on that study. The loopholes in the research may be as a result of wrongly taken sample or due to other technical obstacles. The errors in the research that are caused due to sampling are called sampling errors; while those errors that are caused due to other than sampling faults are called non-sampling errors. While sampling errors can be predicted quite precisely as they can be calculated, non-sampling errors can only be instinctively guessed by the researcher.

  Sampling errors arise due to a wrongly selected sample. A sample is a representative part of the universe. One of the commonest problems faced by researchers is the sample size. Often the researcher selects a sample size out of convenience, but it turns out to be too small to apply the results to the universe. The sample size has to be just adequate, to integrate all the requisite characteristics of the universe. But it cannot be too big, as then the whole purpose of studying the sample from the universe is lost. Another sampling error that is commonly faced is that of proportion. Often the population to be studied is composed of heterogeneous components that are not evenly distributed in the population. Where the sample does not include those components in the same ratio as in the universe, the validity of the study comes into question.

  Sampling errors can be avoided by being cautious in choosing the sampling technique. As is discussed below, sampling design must be made before beginning to sample. A sampling design gives the researcher a lighted pathway to carry out sampling. The objectives of the study must be reflected in sample. A researcher must have good knowledge of various sampling techniques, so that the most appropriate technique may be selected.

  Non-sampling errors are the errors in results that arise as a result of pre or post sampling processes. Although non-sampling errors are not connected with the process of sampling, yet all steps in research are closely connected with each other and influence one another. Non-sampling errors occur at stages like research design, data collection, data analysis, etc. Thus, errors that occur without corresponding to the sampling process are called non-sampling errors. Together sampling and non-sampling errors gives an imperfect sample, and therefore, a faulty study result.

We have familiarised ourselves with the important terms that we come across in conducting sampling. These terms shall be better understood in light of description of various sampling techniques, further discussed in this Module.

III. Sampling Design

Before embarking upon the process of sampling, it is desirable to first draw a plan to do the same. The way a research design is framed prior to the research itself, a 'sample design' is framed before beginning to form samples for the research. There are many methods and techniques of conducting sampling, and a sample design serves to guide the researcher to choose the most appropriate sampling technique. Sample design is the light under which the further steps are taken. It is designed by the researcher, and so it is his discretion to put the guiding steps for the research. Below are given some indicative points that form part of a sample design.

i. Objective of Study

The foundational step in forming a sample design is to spell out very clearly the objectives of the research. The objectives also from part of the research design. This step assists the researcher to gauge the nature of sample that is required.

ii. Universe

The objectives of the study once clearly defined, the researcher must now clearly define the universe that is proposed to be studied. The nature and characteristics of the population must be spelled out. Also the sampling units must be decided by the researcher in clear terms, including the characteristics that are required in the units.

iii. Sample Size

Once the size of the universe is known, the researcher must delimit the size of the sample. A further reading into the sampling techniques further in this Module would offer a clear understanding as to how size can be decided prior to beginning sampling.

iv. Population Parameters

The parameters, i.e. basic information of the population must be noted down by the researchers. This will also help in choosing the appropriate sampling technique. Parameters of the population include vital statistics like census figures, gender ratio, population figures according to region, etc.

v. Budgetary and Time Constraints

Every research, especially the ones conducted on individual level have time and budget constraints. It is beneficial for the research to accurately define these constraints, so that the sampling technique is chosen accordingly.

vi. Sampling Technique

The final step is to choose the appropriate sampling technique. Taking into consideration all the above steps in sampling design and after understanding the various sampling techniques discussed ahead, the researcher will be able to select the appropriate sampling technique accordingly.

IV. Purpose of Sampling

A researcher often wonders the need for conducting sampling as opposed to conducting the study on the whole population. It would be much easier to select any number of respondents on a arbitrary basis, and call it our sample. Following a sampling procedure has some purpose. Let us now look at why we need to do sampling.

1. Accuracy of Results

   Studying a smaller portion out of a large number of items offers better accuracy than conducting study on a huge population. The study not only gets conducted smoothly but also it is not troublesome to arrive at the results. The lesser the amount of data, the more are the chances of obtaining accurate results.
2. Time efficient

   Sampling allows the researcher to conduct the research in a time-bound manner. Imagine the amount of work if a researcher has to map the entire India for his research, and collect responses from each and every citizen of India. Conducting study on a sample allows researcher to finish the work in shorter span of time than as compared to the whole population.
3. Cost effective

   Cost-effectiveness is a primary incentive for rese rchers, as many researches are conducted by individuals, like researches conducted as partial fulfilment of course work in an academic institute. Sampling offers cost effectiveness in that the data to be collected is to be collected from a smaller portion of population.
4. Convenience

   Most motivating reason for conducting sampling is because of the convenienc it offers. Conducting the research on a sample is anytime convenient than conducting it on the entire selected universe. Research work is generally related to studying a large population. It is difficult to cover the entire population with each and every of its unit. Sampling enables us to conduct the research in a more focussed manner, by concentrating on the sample rather than the whole chunk of population. A basic assumption in sampling is that the sample is representative of the entire population and so the results obtained from studying the sample can be generalised to the universe. Based on this assumption a researcher proceeds to study the sample in place of the whole 'universe'.

We have understood why sampling is required in research. The following are the advantages or merits of conducting research on a sample than conducting it on the universe:

1. A universe selected for study is generally composed of a large number of people (sampling units). Sampling reduces the number of people to be

studied, while at the same time preserving the essence of the factors to be studied.

2. The lesser the number of people to be studied, the more is the convenience of conducting the study. Imagine conducting a study to gauge response of general public of India to a newly introduced Bill in the Parliament. If the researcher goes on to collect responses from every nook and cranny of India it would take a large number of researchers to compile the data and finally a whole other set of people to compound the data and analyse. Sampling allows research to be conducted conveniently. It is easier to supervise lesser number of respondents, to conduct data collection from them, and also achieves better rate of responses.
3. Sociological and socio-legal studies that are conducted empirically generally involve dealing with variables. Results of the study are obtained by drawing inferences from data analysis, which becomes complicated if the sample size is huge with a large number of units. Lesser number of subjects to be studied increases prospects of obtaining accurate results.
4. Conducting research on a sample saves time and expenditure than conducting the same study on the whole universe of study. We can say it is cost-cost-effective and time-efficient.
5. Large scale researchers require elaborate resources and field researchers that call for ins titutional sponsorship. Sampling encourages and incentivises individual researchers to conduct empirical researchers.

V. Classification of Sampling

Not all the units of the universe can be included in the sample. Researcher has to take care to include the units of the universe in the sample in a methodical manner. Sampling provides for a chance of including the sampling units in the sample. The appropriate sampling technique for a study has to be chosen keeping in mind the advantages and disadvantages of the technique. There are various techniques to do sampling. These techniques are discussed in detail further in this Module. All sampling techniques may be classified based on the likelihood of the units to be selected in forming the sample. There are mainly three kinds of sampling. Let us understand these kinds as follows:

1. **Probability Sampling:** Where the sample is chosen in such a manner that all the elements present in the universe have an equal chance of being represented in the sample, then it is called as 'Probability Sampling'. The sampling techniques that come under 'probability sampling' are used in the cases where population is homogeneous. In probability sampling, all the units of the universe have an equal chance of being included in the sample; and when the population is homogeneous, there is no risk of missing out on any aspect of the population. For conducting probability sampling it is imperative to know the size of the

universe and the complete list of units in it. Also the researcher must decide the size of the desired sample beforehand.

2. **Non-probability Sampling:** In 'Non-probability sampling', all the units do not stand a chance to be included in the sample. Non-probability sampling does not guarantee representativeness. It is also called as 'decisive sampling' or 'purposive sampling' as the basis of sampling is the free will of the researcher. Purposive sampling is used where the size of the universe is unknown or indefinable. It is an oft repeated and established practice to use purposive sampling where the objective of research is qualitative analyses and descriptive or exploratory.

3. **Mixed Sampling:** There are some sampling techniques which do not fall under the above two mentioned categories strictly. These techniques display some characteristics of a 'probability sampling' and some characteristics of a 'non-probability sampling'. Such sampling techniques may be called as 'mixed sampling'.

VI. Sampling Techniques

As we have understood above, sampling means to pick units from the universe to form a sample (or samples, depending on the study) for conducting research. Sampling can be done using some techniques that have been developed over time by researchers. The various techniques that are known and used widely have been discussed as follows.

1. Simple Random Sampling

As the name suggests 'simple random sampling' refers to sampling done in a simple manner where sampling units are chosen randomly. In simple random sampling there is no procedure followed for sampling, thus it is called 'simple'. Also units are selected to be in the sample in a random fashion. There is no systematic choosing. Simple random sampling falls under the category of 'probability sampling'. There are various ways of doing simple random sampling. As already explained above, probability sampling requires that complete list of units in the universe must be known. Researcher may use a computer to make the list or make a manual list, before proceeding for selecting units for sample. Before proceeding for simple random sampling, the desired size of the sample must be finalised. Researcher can be innovative to create a manner of doing simple random sampling, as there is no system to be followed. However following are the most known methods of doing simple random sampling:

i. Lottery

Lottery means where lots are blindly picked, and it is a matter of chance that which lot gets picked. Lottery is the simplest way of conducting sampling. In this method a number is given to all the units in the universe.

All these numbers are then written down on small pieces of paper, which are then put together. Since the desired size of sample is known, the requisite numbers of units are then picked out of the stack of paper. Whichever number appears in the picking, are the units to be included in the sample. The researcher may himself draw the chits of paper or may ask someone else to do it.

ii. Tippet's Table

While the lottery method was popularly used for a long time for sampling, various scholars pointed out a fact that even though lottery method ensured a random way of sampling. These researchers have come up with various tables consisting of random numbers. Of these, the table formed by a researcher and scholar named Tippet, is most widely used in social researches. Tippet has formed a table of 10,400 numbers having 4 digits. The method of using this table is to first assign numbers to the complete list of units in the universe and the randomly select any number in the Tippet's table. Thereafter go on selecting the units from the list as per the numbers given in the table. A portion of Tippet's table is reproduced below to provide an understanding of how the table works:

2952	6641	3992	9792	7979	5911
3170	5624	4167	9525	1545	1396
7203	5256	1300	2693	2370	7483
3408	2769	3563	6107	6913	7691
0560	5246	1112	9025	6008	8126

For example a study is to be conducted on those rickshaw pullers who have migrated to battery run rickshaws, in the area of Noida, NCR of India. Let us assume the researcher has found out that there are 900 of them, and he wants a sample containing 500. Now since 200 is a 3 digit number, and Tippet's table contains 4 digits, the researcher shall assign four-digit numbers to the list of people to be studied, say from 3001 to 3900. Now all the researcher needs to do is to select any random number from the table, and there onward go on marking the units on the list as per the numbers in the table. Tippet's table is a random method of sampling and its advantage over lottery or blind method is that it can be used even for a large amount of population.

The advantages of using 'simple random sampling' are:

a. It is hassle-free method of sampling population is homogeneous.
b. There is no chance of personal bias of the researcher to influence sampling.
c. This is a simple method requiring no computation of any sort.

The following are the disadvantages of using 'simple random sampling':

a. It cannot be used in heterogeneous population.
b. It does not make use of any special and particular circumstances that may be present in a population.
c. It cannot be used where researcher wants to conduct a mini-comparison within the universe by studying the sample in divisions.
d. It requires basic knowledge of the universe, to make a list to be able to choose from.

2. Interval Sampling

This kind of sampling may be characterised by its systematic nature of uncertainty. Interval sampling is random in the sense that there is no basis for deciding the units to be chosen, yet it follows a systematic format of choosing the uncertain units. The prerequisite of interval sampling is to have a list of all units in the universe. The researcher randomly chooses one of the units that may or may not be the first one in the list. Thereafter the units following after an interval of a certain 'n' number will be chosen. That is to say, every 'n^{th}' unit will be chosen for the sample. This 'n' number may be any number of the researcher's choice.

Interval sampling is not purely Probability Sampling, as all the units do not stand an equal chance of being represented in the sample. Once the researcher decides the gap, then the units falling in between the intervals straightaway lose their chance of being in the sample. This is the reason Interval Sampling cannot be considered purely Probability Sampling. However it is not Non-Probability also, as there is no discretion of the researcher to choose the units, except that the researcher chooses the number of interval after which the units shall be selected. Thus, Interval Sampling is a form of 'Mixed Sampling'.

Advantages of using interval sampling:

a. This method is easy to understand and use.
b. This method involves least number of steps.
c. There is least chance of influence of personal bias of researcher.
d. No knowledge of the universe is required before sampling.

Following are the disadvantages of using interval sampling:

a. Every unit in the universe does not have equal chances of being selected in the sample as the selection depends on the 'n' number chosen.
b. It is not an effective sampling method in case of heterogeneous population.

3. Stratified Sampling

The universe to be studied by the researcher is not always homogeneous. Heterogeneous population is often formed in such a way that it can be divided into different strata of homogeneous population. Stratified Sampling is helpful for doing drawing samples out of such a population. First the population is divided into different strata or layers and then samples are drawn out of each stratum. The units

from each sample from the various strata form the final sample for carrying out the research.

Strata can be purposely formed by the researcher, by putting together the units having common characteristics. Thus each stratum will be a mini-universe composed of homogeneous population. Any technique may be used to draw out sample from the strata. Since the population in the strata is homogeneous, simple random sampling or Interval Sampling is the most preferred choice. Stratified sampling is also a form of 'Mixed Sampling' as it is neither purely Probability Sampling nor purely Non-Probability Sampling'.

Samples from each stratum may be selected by the researcher proportionate to the strata or randomly. That is entirely the choice of the researcher. However, if samples are selected proportionately, the representation of each stratum in the final sample is more authentic. For example for a study of 1,000 persons, the population consists of persons belonging to four different religions in this manner: 400 people in Religion A, 300 people in Religion B, 200 people in Religion C and 100 people in Religion D. the researcher decides to create a sample of 200 people, that is 20% of the population. Now for the final sample to proportionately represent each stratum, the researcher must draw out 20% of sample from each stratum as well. Thus, there will be 80 persons from Religion A, 60 persons from Religion B, 40 persons from Religion C and 20 persons from Religion D. The researcher may also draw equal number of units from each strata-sample to form the final sample. However that would not represent the strata adequately. Thus, 'stratified sampling may be done in two ways:

- 'Stratified Random Sampling', and
- 'Stratified Proportional Sampling'.

Stratified Sampling is useful for population which is divisible into homogeneous sub-groups. The advantages of using Stratified Sampling are as follows:

a. There is better representation of the different characteristics of the population.
b. The researcher can use results from different strata to compare results within the universe.

However a disadvantage of stratified sampling is that it involves more time as samples are to be taken out from each strata to form the final sample.

4. Purposive Sampling

Purposive sampling is also known as 'Judgment Sampling', as it relies entirely on the wish and judgment of the researcher. This is the purest form of Non-probability Sampling. No unit in the universe stands any chance of being included in the sample except the ones that the researcher himself/herself chooses. That is to say all the units in the universe do not have an equal chance of being included in the

sample. In purposive sampling the researcher purposely selects units to include in the sample. The basis for selection of the units is entirely the wish and judgment of the researcher.

Purposive sampling is generally used where the population is smaller. Purposive sampling also is useful where the results of the study depend less on empirical analysis and more on qualitative investigation. For example a researcher proposes to conduct a socio-legal study on drug abuse among children of divorced parents. The universe is all the children of divorced parent who are in custody of one of them. The researcher does not wish to obtain empirical results, but is more interested in investigating the sociological aspect of the problem, so the researcher may conduct study on any persons out of the universe, as he deems fit.

The advantages of purposive sampling are:

a. It is easy on the pocket, as the researcher chooses the units himself/herself. There is no cost involved in selecting units for sample.
b. No prior knowledge of the universe is required before embarking upon the sampling.

However purposive sampling has the following disadvantages:

a. Representativeness of the sample is questionable.
b. It is not useful in cases of heterogeneous population.
c. Sampling may be influenced by the personal bias of the researcher.

5. Convenience Sampling

Convenience sampling is the most random of all techniques of sampling. This sampling is a pure form of Non-probability sampling, because all units do not have an equal chance of being included in the sample. It is only a matter of chance that a unit may be convenient for the researcher to sample and others are not. The most suitable example is the feedback surveys conducted for any product in the market, let us say a car. The researchers would not first demarcate the universe, next make a sample and then conduct study. Sample would be composed of any person who is most convenient to approach. The only knowledge required would be the nature of universe, and where the respondents would be found. Convenience sampling is similar to purposive sampling to some extent, as this also involves the judgment of the researcher to select or deselect a person for the sample. The only difference is that while the researcher employs some bit of judgment to base the selection in purposive sampling; in convenience sampling the researcher selects any unit in the universe out of pure convenience.

The advantages and disadvantages of convenience sampling are same as that of purposive sampling. Convenience sampling as well as purposive sampling is best suited for those researches which are preliminary or pilot projects, and which will be supplemented with further probability sampling research.

6. Cluster Sampling

Cluster sampling involves drawing samples from smaller clusters that the population is divided into. It should not be confused with stratified sampling. In cluster sampling, the population is either studied in multi-phase method, in different clusters, or samples are drawn from each cluster. This type of sampling is useful only where the population can be looked at, in a cluster. Unlike stratified sampling, cluster sampling does not require the population to be divided into homogeneous groups; that is to say the clusters may be heterogeneous. For example, an accrediting study is to be conducted on a private university in India. A university is a collection of students, teachers, visiting faculty, office staff, etc., and it cannot be divided into strata because it is best to be seen in its functional mode. But the University has various departments, which can be considered each as a cluster. The clusters may be studied one by one in multi-phase method or else samples may be formed out of each of the clusters, and studied together, just like we saw in Stratified Sampling. Cluster sampling is part probability sampling and part non-probability sampling, so it may be classified as mixed sampling.

Cluster sampling has the following advantages:

a. It is useful where the population is divisible into clusters, even heterogeneous clusters.
b. Cluster sampling is useful in large geographical areas.
c. This sampling allows researcher some bit of flexibility, as division of clusters is not dependent on them being homogeneous. Therefore, more than one characteristic can be studied in one cluster.
d. There is no need to have a prior knowledge of the population.

Cluster sampling has the following disadvantages:

a. The clusters are not equal in size, so the final sample may not represent the population proportionately. Even if the study is conducted in multi-phase manner, the clusters do not offer a comparative analysis.
b. There is a possibility that a same person may form part of more than one cluster. This will lead to over representativeness.
c. Formation of the clusters may or may not depend on the choice of the researcher, and thus, there is a possibility that some clusters may be homogeneous while other may be heterogeneous.

7. Sequential Sampling

Sequential sampling is also known as 'snowball sampling'. Snowball, as the name refers to, is the practice of doing a work in an on-going manner. Thus, sequential sampling does not end before the beginning of data collection. It is an on-going process, wherein the researcher goes on collecting data even as s/he draws samples as required. For example for a study on access to human rights for the LGBT community in India the researcher may not be able to define the universe to draw out a sample, owing to the repressed state they live in India. The researcher may find out where he may be able to access the potential respondents and thereafter conduct

sampling as he goes on with data collection. This is a non-probability sampling, as all units in the universe do not stand an equal chance of being included in the sample.

This method of sampling is advantageous where it is difficult to demarcate the universe. Another advantage of this sampling is that it is cost-effective. It is useful where the nature of analysis is qualitative. A very big advantage of this sampling is the flexibility it offers to the researcher to adjust and correct the research as he goes on.

However it is ineffective where the universe is huge and heterogeneous. An obvious disadvantage of sequential sampling is its failure to be representative of the entire population. The results obtained from the study cannot be generalised to the entire population.

8. Quota Sampling

Quota sampling is a very useful method of sampling where a large body of persons is to be studied. In quota sampling the population is divided into different categories on the basis of some characteristics, and selection of units in the sampling is done according to the proportion that group represents in the entire population. For quota sampling the researcher must first define the characteristics on the basis of which the population shall be divided into groups. The researcher must have knowledge about the proportion that each characteristic group possesses in the population. The sample drawn from the universe would proportionately represent the characteristics in the population

Quota sampling is a non-probability sampling, because all units do not have the same chance of being included in the sample. The units to be chosen from each quota are the choice of the researcher. He may use purposive sampling or any technique of non-probability sampling. For example quota sampling can be used in a study of pre-teen and teenaged children of imprisoned parents in the state of Bihar. The universe is divided into boys and girls, and the researcher finds out that there are 750 boys and 500 girls. The researcher decides to draw a sample of 250 children. The researcher further divides the universe into age groups. Let us say the composition of the universe is the following:

Gender	Below 6 yrs (Age Group I)	6 to 12 yrs (Age Group II)	13 to 19 yrs(Age Group III)	Total
Boys	250	300	200	750
Girls	150	200	150	500
Total	400	500	350	1250

Now that the proportion of each quota is found out, the sample can be drawn out according to the proportion each quota holds in the population. The researcher wants a sample of 250, which is 20% of the total population. So the researcher shall

take 20% from each quota, i.e., 50 boys from age group I, 60 from age group II and so on...

Quota sampling is similar to stratified sampling, when it is done in proportional manner, i.e., Stratified Proportional Sampling. The only difference is that in Quota Sampling the focus is not to achieve groups of homogeneous groups, but only to divide the population into quotas, for comparison sake. The advantage of quota sampling is its cost and time efficacy. It is one of the most effective sampling, for small scale as well as large scale sampling.

9. Multi-stage Sampling

Multi stage sampling, as the name suggests, is sampling carried out in multiple stages. Different techniques at each stage may also be used. For example, for a study on the crime rate in India, the country is divided into different zones, North, West, South and East. This is the first stage of sampling wherein stratified sampling is used, each zone being a stratum. The states in each zone serve as clusters, so the second stage of sampling is cluster sampling. Finally samples from each state are drawn out using purposive sampling. This is a simple example to illustrate the method of doing multi-stage sampling. Multi-stage sampling is a cost effective in large scale projects. It is not necessary to use different sampling techniques at each stage; it is entirely the judgment call of the researcher.

10. Multi-phase Sampling

Multi-phase sampling is quite similar to multi-stage sampling, barring some technical differences. The procedure for carrying out sampling is similar, but in multi-phase sampling, the aim is not to create a final sample. Study is done continually in various phases. Unlike multi-stage sampling, each sample is first studied as a sample, before further drawing sample out of it. An advantage of doing this sampling is that in-depth investigation is possible, as the universe is studied at different stages, and further samples are drawn out of it. This sampling has a high degree of representativeness. But a disadvantage of it is its lengthy process, which also escalates cost. This is often a preferred choice in large scale research studies that are institutionally sponsored.

11. Volunteer Sampling

Volunteer sampling is close to the convenience sampling, as in this type of sampling also the researcher chooses the respondents as per convenience. The only difference is that in this sampling, the researcher himself is a volunteer for the sample; that is to say, the researcher himself participates in the research as a sample. However, it is not considered an objective form of sampling, as personal bias of the researcher has access into the data collection. Also, representativeness of the sample is very questionable. This type of sampling is only done in very small scale

researches where empirical verifiability can be set free, so as to make way for qualitative conclusions.

VII. Principles and Precautions of Sampling

Now that we have learnt the ways and techniques of doing sampling, it is imperative to also pay attention to some key cautionary points. These are the sampling principles. These precautions are to be taken at some specific points during the sampling procedure.

An essential tenet to be kept in mind is that the basic motive behind sampling is analysing the units in the sample and deduce results from the study, which can be generalised to the universe from which the sample was drawn. Sample is representative of the universe. Research conducted on the sample is for making inferences about the universe. Sampling technique should be chosen with care and caution, so as to obtain most appropriate sample for study.

The following things must be borne in mind while choosing samples and sampling technique:

- The universe must be clearly defined.
- The sampling units must be distinct and independent of each other.
- A clearly chalked out sampling design ensures pre determined steps, and also encompasses planning for contingencies.
- Sampling must be done in an unbiased, objective and systematic manner.
- The objective of the research must be kept in mind while sampling.
- Arbitrary alterations must be avoided during sampling.
- Sample size must be chosen in accordance with the nature of study, i.e. qualitative or quantitative, and taking into consideration the size of the universe.
- The cost and time factor is an important influencing factor in research. It is advisable to not see these factors as an impediment to research, but to utilise them in the most efficient way possible.
- Ease of contacting the respondents is another important factor that is to be taken into consideration while sampling. Even with the advent of technology, care must be taken by the researcher that the selected respondents are source of objective, unbiased answers. It should also be ensured to maximum possible extent that the potential respondents are not being forced for participation in the research.
- Sampling errors must be avoided as much as possible.

VIII. Conclusion

In this Module we have learnt the need of doing sampling in research, the methods and techniques of doing it and important principles to be kept in mind for it. Sampling is employed in socio-legal and sociological researches for ease of studying

large populations, their behaviour and their reactions to social dynamics. A number of methods to do sampling have been described, which are classifiable into three categories of 'Probability Sampling', 'Non-probability Sampling' and 'Mixed Sampling'. Each technique has its own merits and demerits, and any one sampling technique cannot be said to be better all the rest. Sampling technique has to be chosen according to the requirements of the study and keeping in tune with the objectives of the research.

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1. Introduction:

In every research work, it is essential to collect factual material or data unknown or untapped so far. It can be obtained from many sources, direct or indirect. It is necessary to adopt a systematic procedure to collect essential data so that the appropriate data relevant in research to be collected in quantity and quality and it should also be reliable and valid....For each and every type of research we need certain instruments to gather *new facts or to explore new fields. The instruments thus employed as means for collecting data are called tools.*[1]

Techniques and Tools are the ways and means to conduct research and it could only be justified through the use of appropriate methods and techniques meant for it, and Thereby collected evidence is called data and the tools used for this are called data collecting devices or tools, which is a common phenomenon in the behavioral researches. These tools help to realize, analyze and interpretation of data related to research. A researcher needs many data gathering tools and devices which may vary in their complexity, design, administration and interpretation.[2]

The selection of suitable instruments or tools is of vital importance for successful research. Different tools are suitable for collecting various kinds of information for various purposes. The researcher may use one or more tools in combination for his purpose. Researchers should therefore familiarize themselves with the verities of tools with their nature, merits and limitations. They should also know how to construct and use them effectively. The systematic way and procedure by which a complex or scientific task is accomplished is known as the technique. Techniques are the practical method, skill or art applied to a particulate task. So, as a researcher, one should aware of both the tools and techniques of research

2. Learning outcome – Intended learning outcome of this module is to make the students -

- Understanding of basic techniques and tools used for data collation in legal research.
- Developing skills of selecting appropriate techniques and their tools with best judgment in the light of objective and purpose of research.
- To develop skills of constructing and designing tools.
- To aware the students regarding benefits and limitations of various tools and techniques.

3. Data Collection in Legal Research –

Data collection is the middle compartment between formulation of research problem and results of research. Supplying data for research purpose works to fuel for stimulating research process and in majority cases reward or frustration in research credited for quality of data, method, tools and techniques used for data collection. Researcher should be equally skilled in all process of research applied at varies stages.

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Data collection methods, tools and techniques should be highly standardized so that the data relevant to undertaken research can be easily visualize, relies and analyze. Such expectations cannot be simply materialize in applied and normative sciences. Law is a normative science, its sources of study are found in law books as texts of legal principles and elements have been searched in complex social variables. Therefore, research in the field of law maintain its own methodology, which includes basic patterns applied in other social science research with distinct features and approach inevitable in legal research. Legal Research process is performed between two common methods i.e., doctrinal and empirical methods. Following any one method out of two require distinct sources of data, nature of data and their collection methods vary from one two another. Over all approach of research (procedural and technical) changes with individual method likewise changing in techniques of data collection is also inevitable.

Tools and Techniques of Data Collection in Doctrinal Research –

Traditional approach for legal research was centric to doctrinal method; even today doctrinal method is first choice of the researchers in law schools. The domain of doctrinal research mostly contain following technique in data collection as –

Library Research - Legal theories, principles and position of law may be easily referred by sitting in the library. Contents of the documents are self sufficient to be shown as good evidence of what law is on any issue of law and society, explanations, and object of law can be referred by bare reading of texts. That is why library research is most convenient way of data collection. Sources of data available within library are - Books, Journals, Reporters, Magazines, News Papers, Juristic work, Reports of (Seminar, conferences, symposiums, legislative, judicial and administrative proceedings), literature containing factual &

Participation –

Participation technique is another common pattern of data collection in doctrinal as well as in empirical researches. Doctrinal studies can be performed by using either Library, participation or both techniques. The objective of Doctrinal-participative approach is to obtain knowledge by participating in any activity where relevant information may be obtain from verbal statements and presentations made by the persons credible for such information as expert, experienced or authoritative, not from the printing or web materials. It may be obtain by participations in Lectures, Seminars, Conferences, and Proceedings of (Academic, Administrative, Judicial and Legislative) are some common sources of data collection. Here the objective of participation for doctrinal research is only to receive information given by credible person relevant to study not to observe and analyze the source of information, like observation of source under empirical method.

Participation for data collection may be face to face or by modern means of technology i.e., video conferencing, Television, means of mass media and other means of communications.

Tools and Techniques for Data Collection in Empirical Research-

Techniques used in empirical legal researches are the same as used in other social science

streams. Various techniques of data collection exist in social science researches with their specific tools. A systematic procedure or formula by which a complex or scientific task is accomplished. Techniques are the ways of gathering data, whereas tool refers to the instrument to be used in observing the method. The choice of the one or the other technique depends upon several factors like nature of the study; unit of inquiry; nature of the sample to be drawn; the standard of the representativeness

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3.2.1. Observation Technique:

Observation method of data collection deals with the recording of behavior of the respondents or sampling units. In this technique researcher has to observe the required phenomenon by himself. By involving himself, researcher will be able to keep his eye on the entire activity for the accurate data and certain direct inferences. Observation provides an opportunity for empirical study that is first hands collection of facts and there is scientific precision in this method as facts and related information is collected in a natural situation. From observation, researcher can very well relate cause and effect relationship.[5]

Observation technique can be further classified as participating and non participating observation. Observation technique is rarely used in legal researches.[6] C.A. Moser opines that "…In the strict sense observation implies the use of the eyes rather then of ear and the voice."[7]

Prof. Giri cites Oxford Concise Dictionary where Observation has been explained as "An accurate watching, noting of phenomenon as they *occur in nature with regard to* cause or effect or mutual relations."[8]

Jahoda and Cook in his treatise has explained observation in very simple words by saying "Observation is not only one of the most pervasive activities of daily life, it is a *primary tool* of scientific enquiry,"[9]

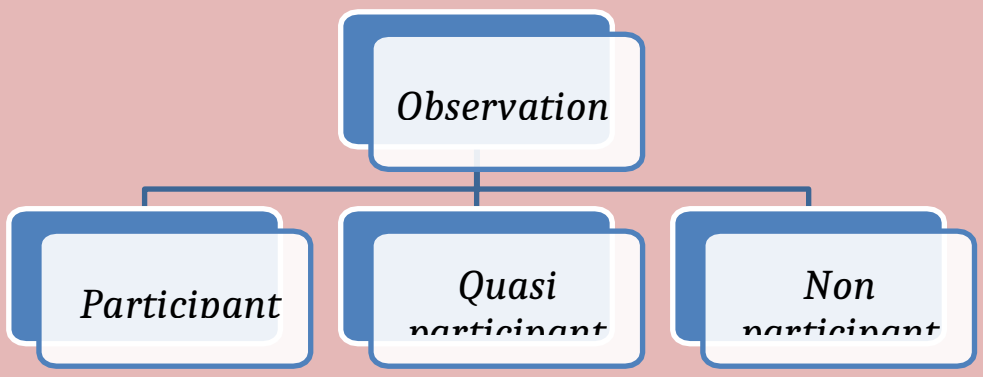
P.V. Young in her book Scientific Social Survey and Research defines observation as – "Observation, a deliberate study through the eyes may be used as one of the *methods for scrutinizing collective behavior and complex social institutions as well as* the separate units composing a totality."[10]

The purpose of observation technique is to study the existing phenomenon of human behavior. Though, to control human behavior is not easy, yet it is studied simply by control and uncontrolled observation. In uncontrolled observation, researcher, studies phenomenon without any interference in natural occurrence of phenomenon. Jahoda calls this observation as unstructured observation and P.V. Young call it simple observation. These observations are unguided, informal and independent observation. Uncontrolled observation is considered beneficial to research for following reasons –

1. In uncontrolled observation natural and real phenomenon as to human behavior is helpful in study.
2. It consist objectivity.
3. The dynamic social behavior can be well understood by uncontrolled observation.

Observation technique is considered very important from hypothesis point of view. P.V. Young is of the view that the observed incidents have greater importance on research rather information received from other techniques. The object of observation is to study the complex social phenomenon, human nature, culture, pattern of human conduct.

Observation technique can be classified on the basis of role of researcher's *participation in the phenomenon of observation as.*



i. **Participant Observation -** Here researcher himself being actively remains associated with other members of the group and observes behavior and activities of the group of study. G.A. Lundberg says that "researcher actively keeps close relation with the observed group." Prof. M.S. Gopal says that "in participant observation researcher in close relations of observe group studies the phenomenon more closely, correctly and comprehensively."

ii. **Quasi participant Observation –** In this kind of observation researcher does not remains all present to study group activities. He has to believe on his fellow researchers of the phenomenon when he is not present. In quasi participant observations the researcher takes parts in festivals, sports, in group fooding etc.

iii. **Non participant Observation** – In this observation though the researcher remains present with observe persons but he studies their activities and behavior as a neutral person. He does not take part himself in the group. He remains limited to the causes of observation, environment, population or social life of the observed group.

Interview: Interview is commonly accepted technique of data collection where researcher enters into face to face interaction with any person or group for the purpose of seeking certain information as to the facts, idea or observation relevant to his research. Components of the interview are the researcher, the interviewer, interviewee and the interview environment. Where Researcher or any other person in his behalf enter in the role of interviewer and other person whose opinion, behavior and responses are observed logically for research objectives is called interview. Expected research data is synthesized from internal views of other person.

The purpose of the interview is to probe the ideas of the interviewees about the phenomenon of interest. Even terms abstractly related to the search are helpful, in that they may pull up documents that would otherwise not be found.[11]

Interview is the process to know the opinion, information or observations of other person through verbal and non-verbal conversation initiated for specific purpose and focused on certain planned content areas. This method is preferred if such information cannot be adequately observed by other methods without entering into conversation only. Information cannot be easily obtained by this method, because the process depends on the interest and attentiveness and personal qualities of the interviewee. Though, apparently, it seems verbal communication but it is not mere verbal communication between interviewer and interviewee.

But, more then that, involving even the study of body language. Mead opines that, gestures, glances, facial expressions, pauses, even a flick of an eye or mere silence can speak more than verbal exchanges. Behaviour can be judged and attitude can be estimated based upon blush in the face, or laugh, visible happiness or anger. The term itself denotes it is inter viewing, an interpersonal interaction.

Interview can be classified on the basis of objectives, purpose and methods of research as -

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On the basis of objectives of research indicators to lead the conversation and observation is prepared. Method of interviewing either grouped or individual is decided according to nature of information and convenience of researcher. Applied methodology of focused, directive, non-directive, repeated, casual or formal all decide according to objectives and purposes of interview. Above terms are self explanatory of their nature and objectives.

Selecting tools for interview and their construction is an important step of this method. Interview schedule, instruction guide or arrangement of substance and devices for recording of responses in physical and electronic mode is required.

Schedules occupy a central place and play a vital role in interview. Schedule is a formal document containing a set of questions formulated and asked to the interviewees with the specific purpose. Schedule may contain direct or indirect, objective or open ended questions.

Questionnaire -

Questionnaire is a most popular method of data collection for empirical legal research. It is a physical or electronic document consists of predetermined set of questions printed, typed or digitalized distributed sent to various persons for their response on such questions. Questionnaire is useful where observation and interview is not possible and in the opinion of researcher it would be just to collect information for objective and purposive satisfaction of research. He may design certain questions in the light of objectives, hypothesis and indicators of research. On each indicator there must be Question/s is/are designed and their language should be free from ambiguity, easy to understand and grammatically correct because responses are not made in presence of researcher so that any guidance and assistance can be provided if any difficulty arises in understanding them this is the limitation. Even it is not useful if respondents are illiterate or week in language used in questionnaire. Therefore, before designing questionnaire researcher must select expected target group on whom it would be administer and design accordingly.

Questionnaires may be supplied to respondents personally, by mail or internet. It works as mean and method both. Information from distant places can be easily accessed by the researcher economically.

Case Study - Case study is an in depth study of any unit from the beginning to end. Any person, family, institution, group, cast, community or nation may be the unit for the purpose of study.

By this study those qualities of unit are focused and analyzed which makes it distinct from other and special subject matter of study in which researcher is interested to know. It is a qualitative research method where all facts and information relating to such unit from the origin to last are collected by the researcher and all such conditions of life and their relations, and impact on unit is focused which makes it special.

P.V. Young defines as- "Case study is a method of exploring and an*alyzing the life of a social unit, be that unit a person, a family, institution or culture group even entire* community."

Sources used for data collection may be internal or external. Internal data gather from such unit or within the unit is internal and any information taken from outer sources are external one. Researcher may use all possible ways and means for gathering information. If

information taken from different sources are inconsistent, in such situation researcher has to adjudge prudently as to the admissibility between opposite information. Nature of information, interest of the information provider in professing such information and other relative information may be the decisive factors in deciding such issue.

More specifically it may be understand as a comprehensive study of facts of life, incidents or episode of life of any person, group, institution or entity for certain objectives.

In legal research study on legal history of India, Constitutional history of India, Judicial contribution of any Judge, academic contribution of any renounce educationist, and life of artist may be the examples of case study method.

3.3.4. Survey - Survey method is commonly used in social science and socio-legal researches. Before planning any policy or implementing schemes surveys may be conducted to know the experience, observation and opinion of peoples relating to subject. The term 'Survey' constitutes with two terms as 'Sur' or 'Sor' which means 'Over' and 'veeir' or 'vor' which means to see. It means 'to see over' or 'to look over,'
H.N. Morse defines social survey as "The social survey is a method of analysis in *scientific and orderly form and for defined purposes of a given social situation or* problem or population"

Survey is a process of collecting quantity of facts in systematic and organized manner to report any social problem or status of facts in certain area of society. Where the object of study is to search the information through real public experience, their opinion or feelings as to any of social importance.

After deciding to survey, the next requirement is to decide about the means of information. Mostly the information is obtained through schedule, questionnaire and personal interview. Before launching survey its units must be determined. It must be definite, appropriate in size so that generalized statement made on the basis of information must be coherent. The matter on which survey is conducted for the first time is called primary survey and thereby obtained is called 'primary data', subs*equent* survey on the same matter on same area or group is called 'secondary survey' and such data is 'secondary data'. Data obtained from survey can be used for limited purpose only *to lay down the reality which is useful for making any policy matter. Data is only of persuasive nature not conclusive one.*

3.3.5. Scaling- Scaling means to measure something by using any unit of measurement. Social attributes, personality treats and human behavior are non- measurable facts. Measurements are acceptable only in quantitative researches where the measurable facts are variables. Variables are those facts who's characteristics may *vary & such variations are measurable. Facts studied in qualitative research are called* "Non variables". Characteristics of non-*variables is non measurable. Qualities cannot be measured i.e., honesty, dishonesty, integrity, love and enmity etc.*

Scaling as a technique introduced by the social science researchers by which they have tried to measure social behavior and attributes of man by converting 'qualitative facts' into 'quantitative facts'.

It is a method of converting series of qualitative facts into quantitative facts and attributes are turned into variables. Working knowledge of statistics is necessary for analyzing responses obtained by scaling method.

Questionnaires and schedules are used as a source of applying this method. Questions are designed in objective form and their multiple answers are scaled numerically. For particular response certain scores are awarded and complete response of respondent is analyzed statistically and interpretation of data is made on probability basis

4. **Summery –** Data collection is pivotal of whole research process. Proper balanced focus is necessary for data collection. Various tools and techniques are available for the data

collection. But researcher should be skilled and experienced in administering tools for data collection. Data collection in doctrinal research can be performed by Library & participation technique. In doctrinal research common sources of data is either document (printed or digital) or, written or verbal communication from credible source of information. In empirical research various methods are available according to object and purpose of research, and nature of data and subject to other conditions of research. No method or technique is conclusive according to changing nature of social problems their studying techniques are also changing gradually.

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Glossary-

Starting Character	Term	Definition	Related Term
D	Data	A series of observations, measurements, or facts; information usually in the form of facts or statistics that can be analysed.	
I	Interview	A conversation between two or more people where questions are asked by the interviewer to elicit facts or statements from the interviewee.	
Q	Questionnaire	A research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents.	
S	Scale	Concept, device or procedure used in arranging, measuring, or quantifying events, objects or phenomenon in any sequence.	
	Schedule	A basic tool, consists of a list of actions are intended to take place, or of a sequence in the chronological order in which such things are intended to take place. The process of creating a schedule - deciding how to order these tasks and how to commit resources between the varieties of possible tasks is called Scheduling	
	Survey	To view or consider in a comprehensive or general way to survey the situation..	
T	Tools	Anything used as a means of accomplishing a task or purpose	
	Techniques	The body of specialized procedures and methods used in any specific field of knowledge.	

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1. LONG QUESTIONS

I. DISCUSS THE STEPS OF RESEARCH.
II. WRITE A NOTE ON REVIEW RELATED LITERATURE.
III. HOW WE IDENTIFY A PROBLEM?
IV. DISCUSS THE TYPES OF RESEARCH.
V. DISCUSS PROBABILITY SAMPLING.
VI. WRITE A NOTE ON NON PROBABILITY SAMPLING.
VII. CRITICALLY ANALYSE TOOLS AND TECHNIQUES OF DATA COLLECTION.

2. SHORT QUESTION

I. WHAT IS THE SECOND STEP OF RESEARCH?
II. WHAT IS REVIEW RELATED LITERATURE?
III. WHAT IS HYPOTHESIS?
IV. HOW MANY TYPES OF HYPOTHESIS ARE THERE?
V. WHAT IS POPULATION ?
VI. WHAT IS SAMPLE?
VII. EHAT IS SAMPLLING?
VIII. WHAT IS PROBABILITY SAMPLING?
IX. WHAT IS NON PROBILITY SAMPLING?
X. GIVE TWO EXAMPLE OF PROBABILITY SAMPLING.
XI. GIVE TWO EXAMPLE OF NON PROBABILITY SAMPLING.
XII. WHAT IS QUESTIONNAIR?
XIII. WHAT IS INTERVIEW?
XIV. WHAT IS OBSERVATION?
XV. WHAT IS TOOLS?

YOUTUBE LINK

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RESEARCH

1. https://www.youtube.com/watch?v=0zITfpH89_E
2. https://www.youtube.com/watch?v=XsLu3E3kwp0
3. https://www.youtube.com/watch?v=InH2hrOW9rA
4. https://www.youtube.com/watch?v=MIPBbr_i3Yk
5. https://www.youtube.com/watch?v=72AJeV-faCE
6. https://www.youtube.com/watch?v=Nn89gfUC1bI
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