

MODULE-I

**RESERCH
PROBLEM
FORMULATION**

Research Problem

Meaning

Research is an endeavour to discover answers to intellectual and practical problems through the application of scientific method.

“Research is a systematized effort to gain new knowledge”.

-Redman and Mory.

Research is the systematic process of collecting and analyzing information (data) in order to increase our understanding of the phenomenon about which we are concerned or interested.

It refers to some difficulty which a researcher experiences in the context of either theoretical or practical situation and wants to obtain a solution for the same.

A research problem can be simply defined as a statement that identifies the problem or situation to be studied.

Components of research problem

- ✓ An individual or a group with some difficulty or problem
- ✓ Objectives of research that are to be attained
- ✓ The environment in which the problem exists
- ✓ Two or more course of action or Alternative means for obtaining the objective
- ✓ Two or more possible Outcomes
- ✓ Objective of the study

Characteristics of a good topic?

- ✓ Interest – The topic must be able to keep the researcher interested in it throughout the research process
- ✓ Data Availability– It must be ensured that the topic can be investigated through the collection and analysis of data
- ✓ Significant – The topic must contribute towards improvement and understanding of an educational theory or practice
- ✓ Adequate – The topic must be according to the skills of the researcher, available resources and time restrictions
- ✓ Ethical – The topic must not embarrass or harm the society

Selecting a Problem

Guidelines for selecting a research problem:-

- Subject which is overdone should not be chosen
- An average researcher must not choose Controversial topics
- Too narrow or too vague problems should be avoided
- The chosen subject should be familiar and feasible
- Significance and Importance of subject must be given attention
- Cost and time factor must be kept in mind
- Experience, Qualification and Training of the researcher must be according to the problem in hand

Formulating a Research Problem

The steps involved in formulating a research problem are as follows:-

- Develop a Suitable Title
- Build a conceptual model of the problem
- Define the objectives of the study
- Set up investigative questions
- Formulate hypothesis
- State the operational definition of concepts
- Determine the scope of the study

Necessity of defining a problem

The problem to be investigated must be clearly defined in order to –

- Discriminate relevant data from the irrelevant one
- To keep a track and make a strategy
- Formulate objectives
- Choose an appropriate Research Design
- Lay down boundaries or limits

Technique involved in defining a research problem

A researcher may define a research problem by:-

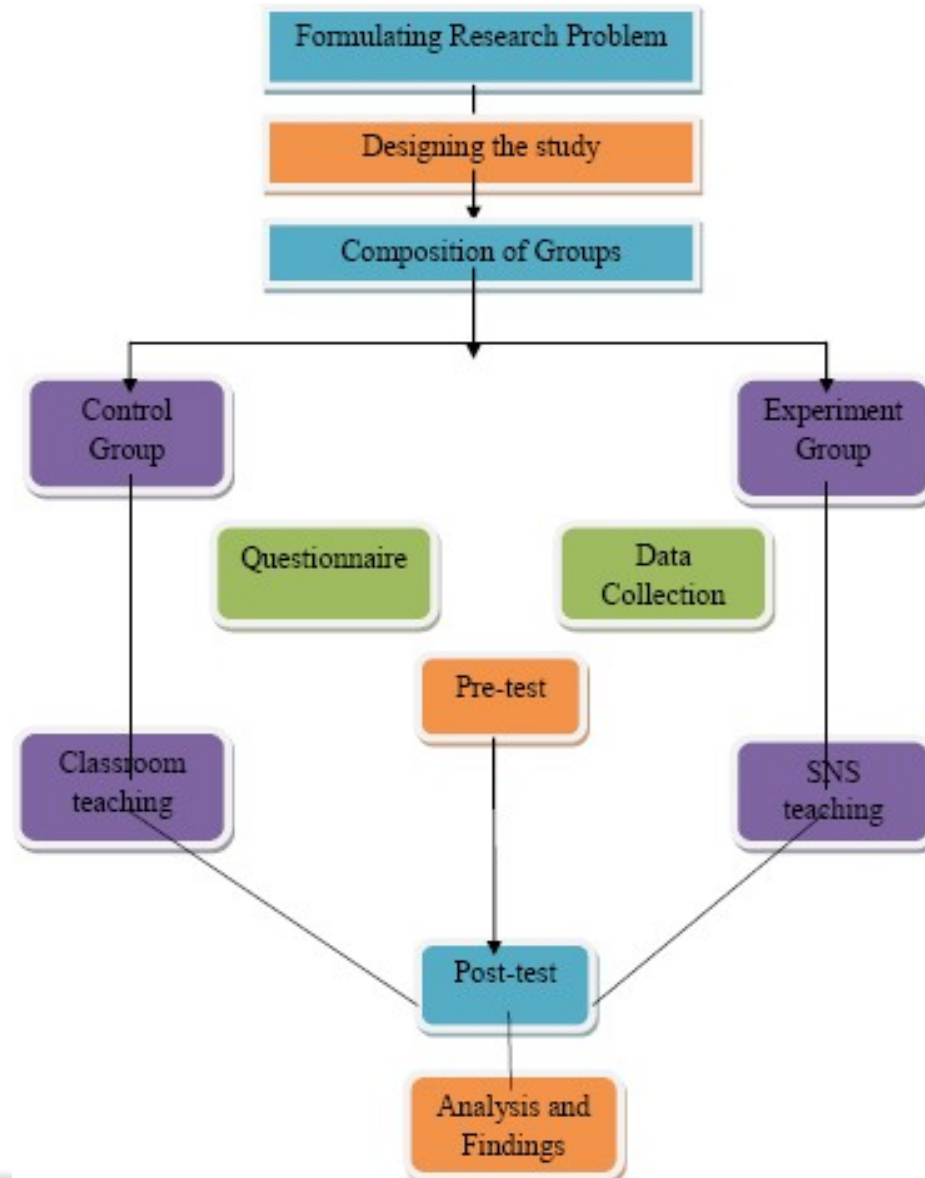
1. Defining the statement of the problem in a general way.
2. Understanding the nature of the problem.
3. Surveying the available literature.
4. Developing ideas through discussions and brain storming
5. Rephrasing the research problems

Defining a research problem

There are few rules that must be kept in mind while defining a research problem. They are-

- ✓ Technical terms should be clearly defined.
- ✓ Basic assumptions should be stated.
- ✓ The criteria for the selection should be provided.
- ✓ Suitability of the time period and sources of data available must be considered.
- ✓ The scope of the investigation or the limits must be mentioned.

Methodological Steps for the Research Study



Sources of research problem

- **Research Problem from Expert**
- **Research Problem from Folklore**
- **Research Problem from Insight**
- **Research Problem from Informal Discussion**
- **Research Problem from Knowledge of Techniques and Apparatus**
- **Research Problem from Reading the Literature**
 1. Sources of Research Literature
 2. How to Find Additional Sources
 3. How to Read Research Articles
- **Research Problem from a Paradoxical Incident or Conflicting Results**
- **Research Problem Deduced from Paradigms or Theories**

Criteria Characteristics of a good research problem

Personal Inclination

Resources Availability

Relative Importance

Researcher Knowledge

Practicality

Time-lines of the Problem

Data Availability

Urgency

Feasibility

Area Culture

Selection of research topic

1. Research topic must be very clear and easy to understand. It should not distract people.
2. If a topic is well define is the only way to successful research. The topic should not create doubt and double impression.
3. Easy language is a key to success. Use technical words if necessary otherwise focus of simplicity.
4. Research title should be according to the rules of titling. There are different rules of titling, a researcher must aware before writing a research title.
5. While selecting a research topic current importance of a researcher should also be considered. Topic should not be obsolete and it should have great importance in the current day

Errors in selecting a research problem

- 1. Population Specification**
- 2. Sampling and Sample Frame Errors**
- 3. Selection**
- 4. Non-responsive**

Scope and objectives of research problem

➤ Scoping is figuring out what, exactly, to explore for a study. It's a Goldilocks problem:

you don't want the scope too broad, or you will not see patterns appear in the data, but you don't want it too narrow, or the participants will tell you everything they have to say about it in five minutes.

You want to get the scope just right—somewhere in between these two extremes.

➤ The scope, in case you haven't read [Practical Empathy](#), is how you begin a listening session.

➤ It's how you introduce the subject you'd like the participant to cover, and it's the only question you think of in advance.

Research Problem and Objectives

Research Problem 5 factors to consider to determine that a problem is researchable or not.

1. The problem existing in the locality or country but no known solution to problem.
2. The solution can be answer by using statistical methods and techniques.
3. There are probable solutions but they are not yet tested.
4. The occurrence of phenomena requires scientific investigation to arrive at precise solution.
5. Serious needs/problems of the people where it demands research.

Research Objectives

Characteristic of Objective the objectives of a project should be **SMART**. They should be,

Specific. The problem be specifically tested.

Measurable. It is easy to measure by using research instruments, apparatus or equipment.

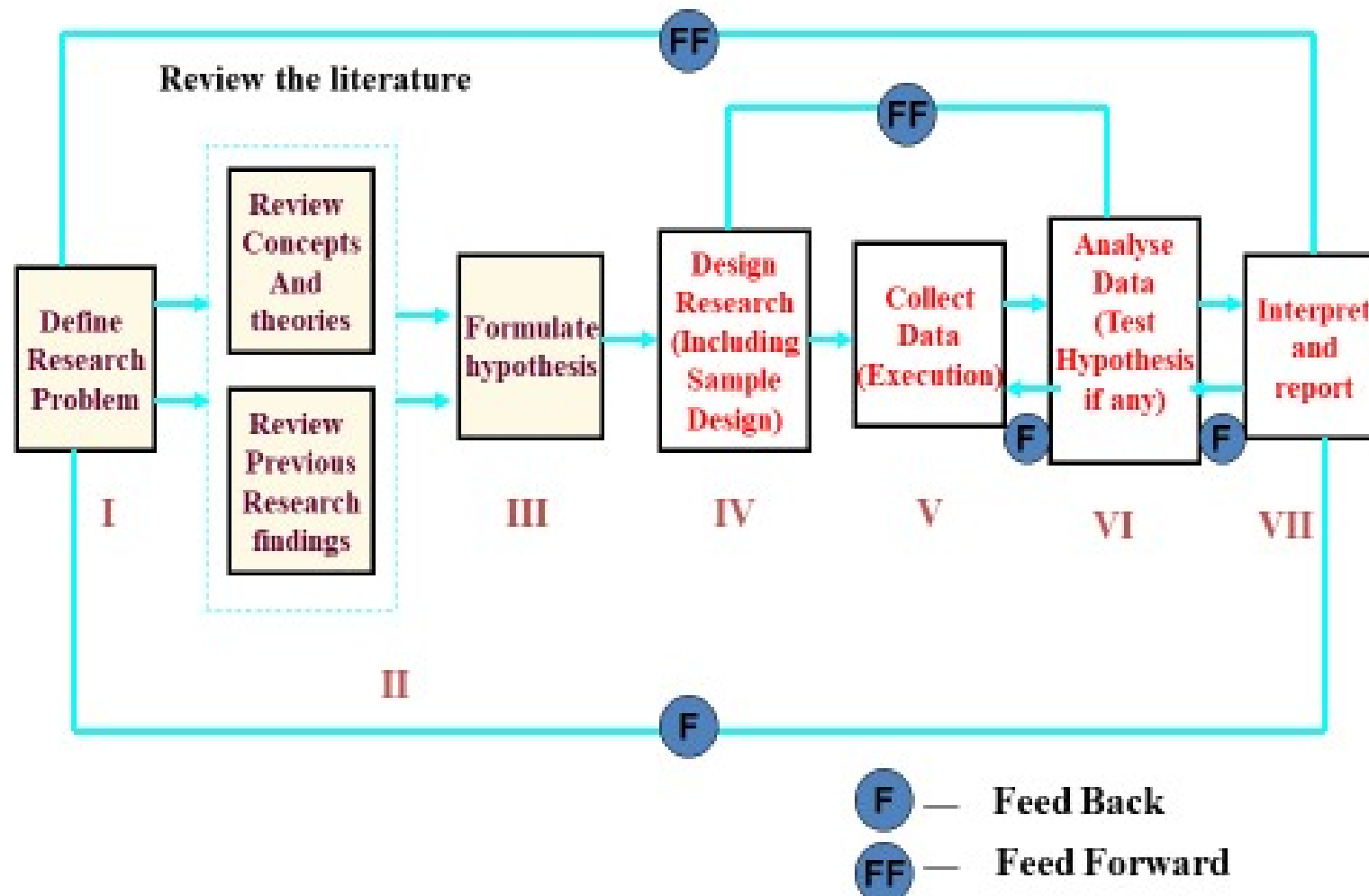
Achievable. The data are achievable using correct statistical tools to arrive at precise results.

Realistic. Real results are attained because they are gathered scientifically and not manipulated or manoeuvred.

Time-bound time frame is required in every activity because the shorter completion of the activity, the better.

Research Objectives

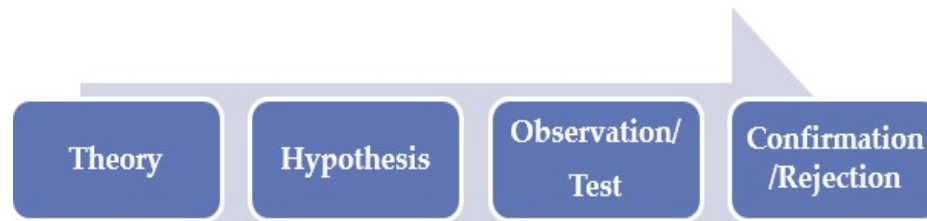
RESEARCH PROCESS



Approaches of investigation of solutions for research problem

	<u>Deduction</u>	<u>Induction</u>	<u>Abduction</u>
Logic	In a deductive inference, when the premises are true, the conclusion must also be true	In an inductive inference, known premises are used to generate untested conclusions	In an abductive inference, known premises are used to generate testable conclusions
Generalizability	Generalising from the general to the specific	Generalising from the specific to the general	Generalising from the interactions between the specific and the general
Use of data	Data collection is used to evaluate propositions or hypotheses related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
Theory	Theory falsification or verification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory

Approaches of investigation of solutions for research problem



Deductive process in research approach



Inductive process in research approach

CONCEPT OF DATA COLLECTION

TYPES OF DATA

Qualitative Data

Quantitative Data

Mixed Methods

PRIMARY DATA

•Sources of Primary Data:

•Experiments:

•Survey:

•Questionnaire:

•Interview:

•Observations:

SECONDARY DATA

Importance of Secondary Data

PROCESS ANALYSIS

- **Process Bottleneck**
- **Starvation and Blocking**
- **Process Improvement**

- Flowchart
- Failure Mode Effects Analysis (FMEA)
- Mistake-proofing
- Spaghetti Diagram
- Process Flow Diagram



Process Performance Measures

- Process capacity
- Capacity utilization
- Flow time
- Cycle time
- Process time
- Idle time
- Work In process
- Set-up time
- Direct labor content

LINK ANALYSIS

- Find matches for known patterns of interests between linked objects.
- Find anomalies by detecting violated known patterns.
- Find new patterns of interest (for example, in social networking and marketing and business intelligence).

Instrument, Validity, Reliability

Instrument

Researcher-completed Instruments	Subject-completed Instruments
Rating scales	Questionnaires
Interview schedules/guides	Self-checklists
Tally sheets	Attitude scales
Flowcharts	Personality inventories
Performance checklists	Achievement/aptitude tests
Time-and-motion logs	Projective devices
Observation forms	Sociometric devices

Validity is the extent to which an instrument measures what it is supposed to measure and performs as it is designed to perform. It is rare, if nearly impossible, that an instrument be 100% valid, so validity is generally measured in degrees.

Instrument, Validity, Reliability

Reliability can be thought of as consistency. Does the instrument consistently measure what it is intended to measure? It is not possible to calculate reliability; however, there are four general estimators that you may encounter in reading research:

Inter-Rater/Observer Reliability: The degree to which different raters/observers give consistent answers or estimates.

Test-Retest Reliability: The consistency of a measure evaluated over time.

Parallel-Forms Reliability: The reliability of two tests constructed the same way, from the same content.

Internal Consistency Reliability: The consistency of results across items, often measured with Cronbach's Alpha.

Relating Reliability and Validity

- First, a test can be considered reliable, but not valid.
- Second, validity is more important than reliability.
- Finally, the most useful instrument is both valid and reliable.