

INTRODUCTION TO RESEARCH METHODOLOGY

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Research?

- A careful investigation for new facts in any branch of knowledge
- **Redman and Mory:** Research is a systematic effort to gain new knowledge

Research?

- **Clifford Woody:** Research-
- defining and redefining problems, formulating hypothesis/objectives;
- collecting, organizing and evaluating data;
- making deductions and reaching conclusions;
- testing the conclusions to determine whether they fit the formulating hypothesis/objectives

Why do research?

- Desire to get a research degree along with its consequential benefits
- Desire to face the challenge in solving the unsolved problems
- Desire to get intellectual joy of doing some creative work
- Desire to be of service to society
- Desire to get respectability
- Directives of government, employment conditions etc.

Why do research?...

- ◉ **Validate intuition**
- ◉ **Improve methods**
- ◉ **Demands of the Job**
- ◉ **For publication/patent**

Choose a subject

- ◉ Based on an idea
- ◉ Based on your experience
- ◉ Based on your reading
- ◉ Originality

The important features of a research design

- **A plan**

Specify the sources & types of information relevant to the research problem

- **A strategy**

Which approach will be used for gathering and analyzing the data

- **The time and budgets**

Most studies are done under these two constraints

CHARACTERISTICS OF RESEARCH

- **Systematic**- All steps must be inter related- one to another
- **Logical**- Agreeing with the principles of logic
- **Empirical**-Conclusions should be based on evidences/observations

CHARACTERISTICS OF RESEARCH...

- **Objectivity-** It must answer the research questions
- **Replicable-** reproducible
- **Transmittable**
- **Quality control-** Accurate measurements
- **All well designed and conducted research has potential application**

Define Your objectives

- Try to keep these simple
- The more variables the more difficult
- Use the opportunity
- Get help at this stage
 - Senior colleagues
 - Experienced researchers

Literature search

- Check to see if your idea is original
- Get articles
- Read articles and their references
- Most of these will be vital when writing up reports
- Find gap areas
- Find obsolete measurements and results
- Define objectives of the study

Steps involved in a research

- ◉ Choose a subject
- ◉ Literature survey
- ◉ Defining and formulation of specific objectives
- ◉ Prepare Synopsis
- ◉ Procuring of suitable apparatus/materials
- ◉ Design of experimental set up
- ◉ Preliminary experiments
- ◉ Execution of the project
- ◉ Accurate measurements/data collection

Steps involved in a research...

- Data analysis and error compounding
- Hypothesis testing and verification
- Results and discussion
- Generalization, interpretation and drawing conclusions
- Preparation of the project report or writing thesis

The Process of Research

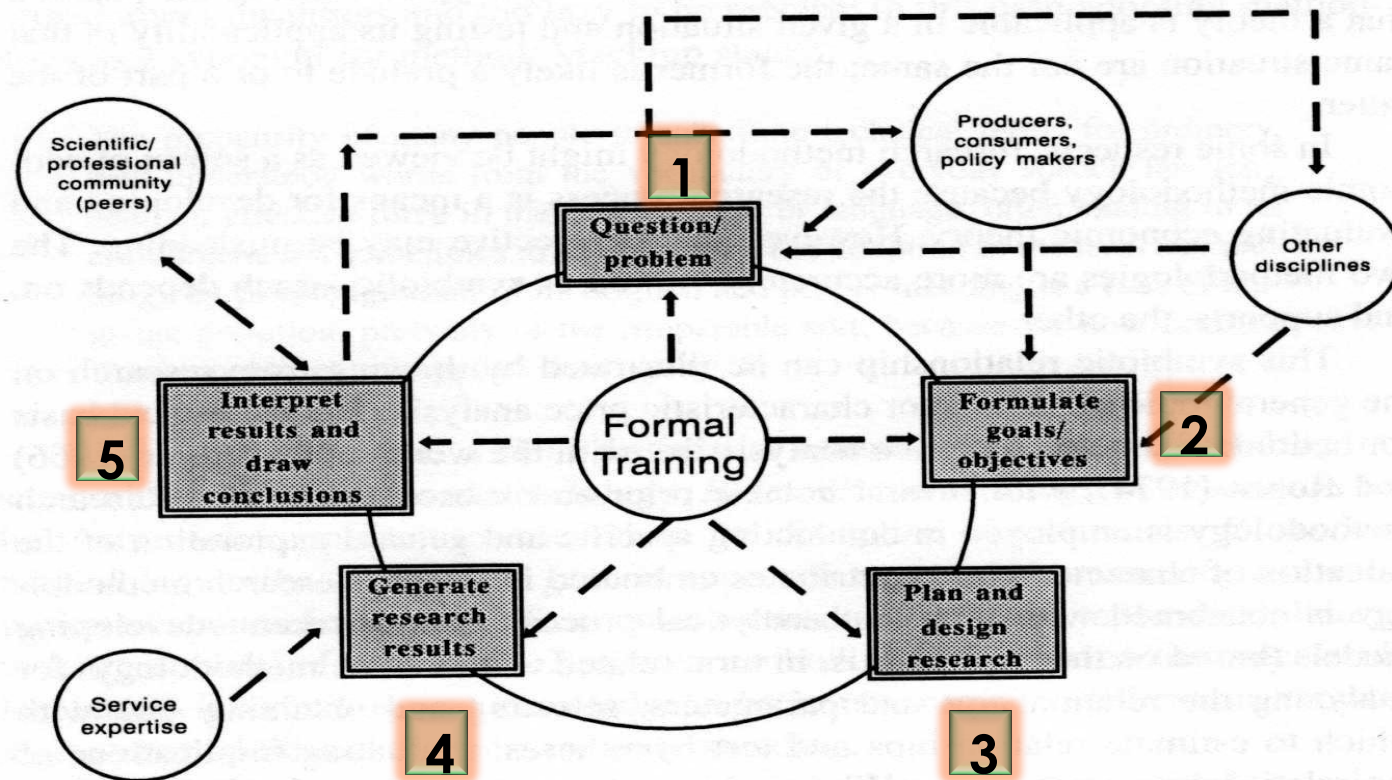


Figure 2.2. Schematic of research process.

Research article writing

- Find suitable/specified journals
- Get copy of Instructions to authors
- Prepare article as per instructions
- Select suitable titles
- Authors and affiliations
- Abstract
- Highlights
- Novelty statements
- Introduction
- Materials and methods
- Results and discussion
- Conclusions
- Acknowledgements
- References

Authorship/ethics

- All authors should directly involved in entire study
- Article is free from plagiarism
- Should follow ethics

A Research Report

A Research Report generally include:

- Introduction and Statement of problem
- Review of relevant literature
- Statement of hypothesis or research objectives
- Theoretical resume
- Description of research design
- Description Experimental design
- Description of measurement and data analysis
- Error compounding
- Presentation of Results
- Discussion
- Conclusion, limitations, and implications
- Suggestions for future work
- Acknowledgements
- References cited
- Appendices

Types of research

1. **Application-** Pure and Applied Research

Applied- Finding solutions for immediate problems facing a society/industry

Pure- Concerned with generalization and formulation of a theory

2. **Inquiry Mode-** Quantitative and qualitative

Quantitative- Measurements of quantity or amount

Qualitative- Concerned with qualitative phenomena (reasons for human behavior)

Research Studies

- Based on research objectives:
 - ❖ *Exploratory or formulative research*- To gain familiarity with a phenomenon or to achieve new insights into it
 - ❖ *descriptive research*- To study accurately the characteristics of a particular individual, situation or a group-includes survey

Research Studies

- ❖ **Diagnostic research-** To determine the frequency with which something occurs or with which it is associated with something else
- ❖ **hypothesis-testing research-** To test a hypothesis of a causal relationship between variables

More on Research

- ❖ <https://www.youtube.com/watch?v=EUaxA0ryjeA>

**“Science is not belief,
but the will to find out.”**

Thank you

