

Introduction to Research Methods

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Key concepts, steps, and tools for conducting systematic inquiry

1. What Is Research?

Aspect	Description
Definition	A systematic, organized process for investigating a question or problem and generating new knowledge.
Purpose	• Explain phenomena • Test theories • Solve practical problems • Inform policy and practice • Empirical (based on observable evidence)
Characteristics	• Replicable • Logical and transparent • Ethical

2. Types of Research

Category	Sub?type	Typical Goals	Example
Basic (Fundamental)	Pure, theoretical	Expand knowledge without immediate practical use	Studying the neural mechanisms of memory
Applied	Action, evaluative	Solve specific, real?world problems	Testing a new teaching method in classrooms
Quantitative	Experimental, correlational, survey	Measure variables, test hypotheses, infer causality	Randomized controlled trial of a drug
Qualitative	Ethnography, case study, grounded theory	Explore meanings, experiences, contexts	Interviewing patients about coping strategies
Mixed?Methods	Sequential, concurrent, transformative	Combine numeric and narrative data for richer insight	Survey + focus groups on community health needs

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3. The Research Process (Step-by-Step)

1. Identify the Problem / Research Question

- Start with a broad topic ? narrow to a clear, answerable question.
- Use the **PICO** format for health research (Population, Intervention, Comparison, Outcome) or **FINER** criteria (Feasible, Interesting, Novel, Ethical, Relevant).

2. Review the Literature

- Conduct a systematic search (databases, gray literature).
- Summarize existing findings, locate gaps, and justify your study.
- Tools: PRISMA flow diagram, reference managers (Zotero, EndNote).

3. Formulate Hypotheses / Objectives

- **Hypothesis:** A testable statement predicting a relationship.
- **Objectives:** May be exploratory (no hypothesis) or descriptive.

4. Choose a Research Design

- **Experimental** (e.g., RCT) ? manipulate independent variable.
- **Observational** (cohort, case-control, cross-sectional).
- **Qualitative** (interview, participant observation).
- Align design with question, resources, and ethical constraints.

5. Select Participants / Sampling Strategy

- **Probability sampling** (simple random, stratified) ? generalizable.
- **Non-probability sampling** (convenience, purposive) ? depth/qualitative focus.
- Determine sample size using power analysis (quantitative) or saturation (qualitative).

6. Develop Data Collection Instruments

- **Quantitative:** Surveys, scales, physiological measures. Ensure reliability (Cronbach's ?) and validity (content, construct).
- **Qualitative:** Interview guides, observation protocols. Pilot test for clarity.

7. Collect Data

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- Follow a standardized procedure.
- Keep detailed field notes, timestamps, and version control.
- Monitor for adverse events or ethical breaches.

8. Data Management & Cleaning

- Store data securely (encrypted files, de?identified).
- Check for missing values, outliers, coding errors.
- Use software: SPSS, R, Stata (quant