

Introduction to Research Methods in IT

Introduction to Research Methods in Information Technology (IT)

(A concise, structured guide for students and practitioners)

1. What Is Research in IT?

Aspect	Description
Definition	Systematic inquiry that generates new knowledge or validates existing knowledge about information technology, its development, use, and impact.
Purpose	- Solve practical problems - Evaluate technologies and processes - Contribute to theory and best-practice guidelines
Scope	Hardware, software, networks, data management, human-computer interaction, security, AI, cloud services, emerging tech, etc.

2. Types of Research Approaches

Approach	Key Characteristics	Typical IT Applications
Quantitative	- Numerical data - Structured instruments (surveys, logs, benchmarks) - Statistical analysis	Performance testing, usability metrics, network traffic analysis
Qualitative	- Non-numerical data (interviews, observations, documents) - Thematic or content analysis	User experience studies, case studies of IT adoption, ethnography of dev teams
Mixed-Methods	- Combines quantitative & qualitative - Sequential or concurrent designs	Evaluating a new software tool: usage logs + user interviews
Design Science	- Creation and evaluation of artifacts (algorithms, prototypes) - Emphasis on relevance & rigor	Developing a new encryption protocol, building a decision-support system

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Approach	Key Characteristics	Typical IT Applications
Action Research	• Collaborative problem solving with stakeholders • Iterative cycles of planning, acting, observing, reflecting	Improving agile processes within a development team

3. Research Process – Step by Step

1. Identify the Problem / Research Question

- Example: “How does latency affect real-time video conferencing quality in 5G networks?”
- Ensure the question is **clear, focused, and feasible**.

2. Literature Review

- Search academic databases (IEEE Xplore, ACM Digital Library, Scopus).
- Map existing theories, methods, and gaps.
- Produce a **conceptual framework** that guides the study.

3. Select a Research Design

- Choose between experimental, survey, case study, etc.
- Decide on **sampling strategy** (random, purposive, convenience) and **data collection methods**.

4. Develop Instruments & Protocols

- Design questionnaires, interview guides, test scripts, or simulation models.
- Pilot test to refine reliability and validity.

5. Data Collection

- Follow ethical standards (informed consent, data protection).
- Record data systematically (logs, recordings, spreadsheets).

6. Data Analysis

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- **Quantitative:** Descriptive stats, inferential tests (t-test, ANOVA, regression), machine learning models.
- **Qualitative:** Coding, thematic analysis, discourse analysis, grounded theory.
- Use tools: SPSS, R, Python (pandas, scikit-learn), NVivo, Atlas.ti.

7. Interpretation & Discussion

- Relate findings back to the research question and literature.
- Discuss implications for theory, practice, and future research.

8. Reporting

- Follow a recognized structure (e.g., IMRaD: Introduction, Methods, Results, Discussion).
- Include tables, figures, and code repositories where appropriate.

9. Dissemination

- Publish in conferences/j