Types of Research

Topic: Types of Research

- Subject : Research Methodology

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Descriptive vs. Analytical Research

- Descriptive Research:
- Focuses on describing characteristics or functions.
- Answers 'what is'.
- Example: Survey on smartphone usage.

- Analytical Research:
- Involves analysis and evaluation of information.
- Answers 'why' and 'how'.
- Example: Study on causes of smartphone addiction.

Applied vs. Fundamental Research

- Applied Research:
- Seeks practical solutions to specific problems.
- Industry and society focused.
- Example: Research on new vaccine development.

- Fundamental Research:
- Aims to expand theoretical understanding.
- Driven by curiosity.
- Example: Research on atomic structures.

Quantitative vs. Qualitative Research

- Quantitative Research:
- Involves numerical data and statistics.
- Objective, structured approach.
- Example: Examining test scores of 500 students.

- Qualitative Research:
- Involves descriptive and subjective data.
- Explores experiences and opinions.
- Example: Interviewing students on learning preferences.

Conceptual vs. Empirical Research

- Conceptual Research:
- Related to abstract ideas and theories.
- No direct experimentation.
- Example: Philosophical study on ethics in AI.

- Empirical Research:
- Based on observed and measured phenomena.
- Uses experiments and data.
- Example: Lab tests on AI algorithm performance.

Overview of Research Methodology in Various Areas

A comparative look across disciplines

Research Methodology in Engineering and Technology

- Experimental and applied research
- Prototyping and simulations
- Case studies and field testing
- Quantitative data analysis
- Use of design-based methodology

Research Methodology in Medical and Health Sciences

- - Clinical trials and longitudinal studies
- - Randomized controlled trials (RCTs)
- - Observational studies
- - Systematic reviews and meta-analysis
- - Ethical approvals and patient consent crucial

Research Methodology in Social Sciences

- - Surveys and interviews
- - Case studies and ethnography
- - Content and discourse analysis
- - Mixed methods (qualitative + quantitative)
- - Grounded theory and participatory approaches

Research Methodology in Natural Sciences

- - Laboratory experiments
- - Hypothesis-driven research
- - Field studies and observational data
- - Statistical modeling and simulations
- - Peer review and reproducibility focus

Research Methodology in Humanities

- - Theoretical and interpretive research
- - Textual and historical analysis
- - Archival research
- - Case studies and comparative analysis
- - Hermeneutics and critical theory approaches

Research Methodology in Business and Management

- - Case studies and market research
- - Surveys and focus groups
- - Action research and feasibility studies
- - Quantitative modeling (e.g., operations research)
- - SWOT and PESTLE analysis

Introduction to Problem Solving & Basic Research Terminology

Introduction to Problem Solving

- - Problem solving is the process of identifying, analyzing, and resolving issues.
- - It involves understanding the problem, exploring solutions, and implementing the best one.
- - Essential in research, engineering, and daily decision-making.
- - Steps: Define problem → Analyze → Plan → Execute → Evaluate

Basic Research Terminology: Hypothesis & Theory

- Hypothesis:
- - A proposed explanation made on the basis of limited evidence.
- - Can be tested and falsified.
- - Example: 'Increased study time improves exam scores.'

- Theory:
- - A well-substantiated explanation of an aspect of the natural world.
- - Built from multiple tested hypotheses.

Basic Research Terminology: Lemma & Corollary

- Lemma:
- - A helping theorem used to prove a larger theorem.
- - Example: Lemma used to prove the Pythagorean Theorem.

- Corollary:
- - A statement that follows readily from a previous statement (like a theorem).
- - Automatically true if the theorem is true.

Basic Research Terminology: Proof & Axiom

- Proof:
- - A logical argument demonstrating the truth of a statement.
- - Based on axioms, definitions, and previously established results.

- Axiom:
- - A statement accepted as true without proof.
- - Forms the foundation of logical systems (e.g., Euclidean geometry).