Topic: Introduction to Research Methodology

- Subject : Research Methodology

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Research Methodology

- Understanding the Systematic Approach to Research

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**

Objectives of Research:

- Discover new facts
- Verify existing knowledge
- Solve problems

Innovative Idea



Solar Tree

13-YO's Patented Washing Machine Recycles Soap Water, Saves Hundreds Of Liters Of Water



Ayushman Nayak, a Class VII student from KIIT International School, conceived the idea of a washing machine that could reduce water waste by recycling and re-purposing water using a 5-layer filtration system

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

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**

Types of Research

- Basic (Pure) Research
- Applied Research
- Quantitative Research
- Qualitative Research
- Descriptive, Analytical, Experimental, Exploratory

Research Process Overview

- Define the Problem
- Review of Literature
- Formulate Hypothesis
- Research Design
- Data Collection
- Data Analysis
- Interpretation & Conclusion
- Report Writing

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

Defining the Research Problem

- Identifying a gap in knowledge
- Understanding context and background
- Formulating research questions

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

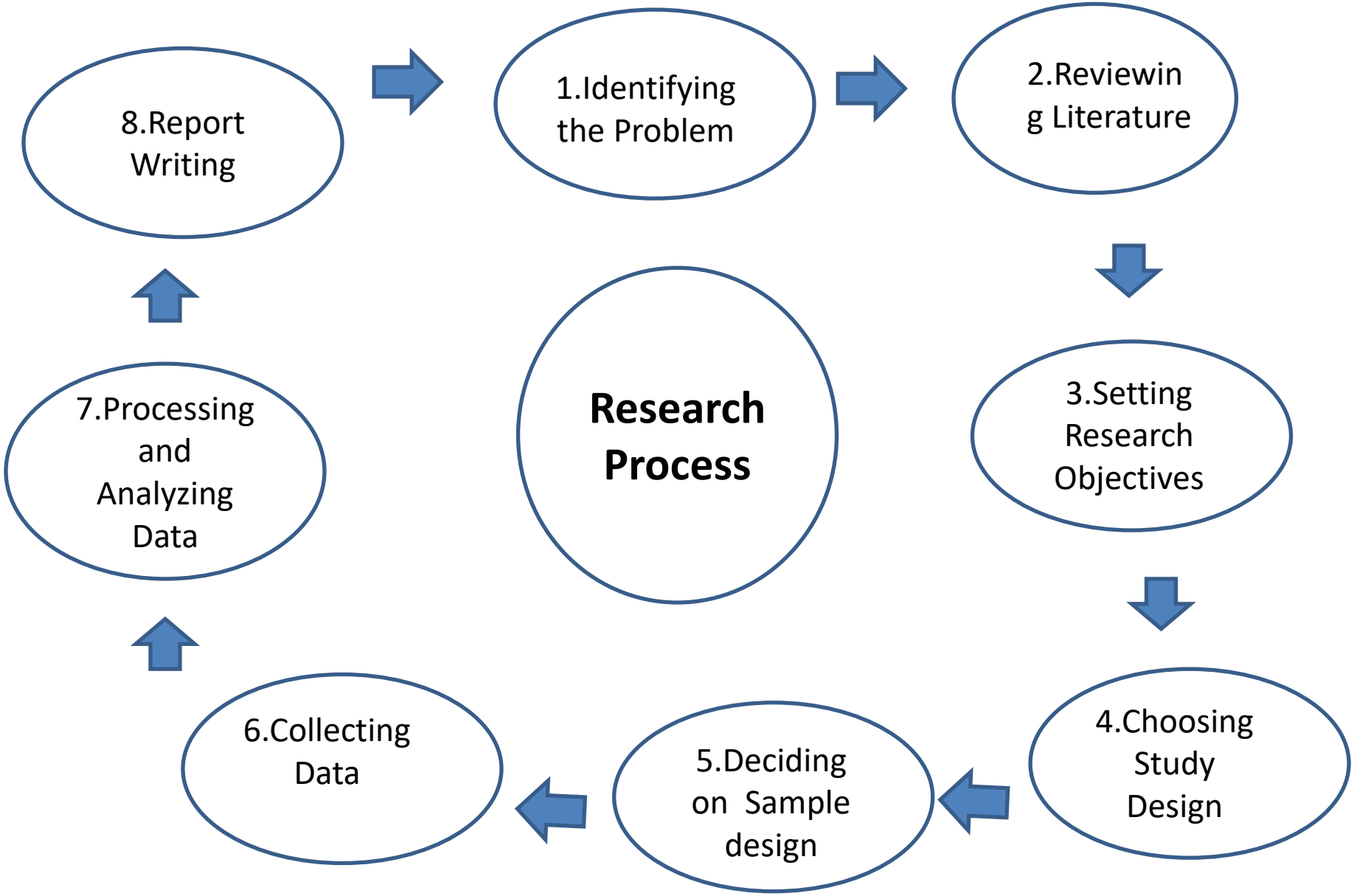
Steps involved in a research

- 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

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

The Process of Research



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

- 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