

Course Title: Research Fundamentals

Unit- One: Introduction

RESEARCH

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1.1. What is Research?

- Research from the French word ‘*recherché*’ – meaning **to search**
Two syllables: ‘*re* and ‘*search*’
again a new/ to examine closely and carefully over again
- When both are combined, they form a noun that describes a **careful, systematic, patient study and investigation.**
- It is a movement from unknown to known
- It is a **voyage of discovery**
- A research is carried out to **find a truth or verify an existing truth.**
- Use of **scientific method** to solve problem and create new knowledge
- It is a systematic process of inquiry consisting of a **question, problem, hypothesis, data analysis/ interpretation.**
- According to (**Thyer, 2001**), "the word research is composed of two syllables, re and search. re is a prefix meaning again, a new or over again search is a verb meaning to examine closely and carefully, to test and try, or to probe. Together they form a noun describing a careful, systematic, patient study and investigation in some field of knowledge, undertaken to establish facts or principles."
- Means search again and again until you reach near to the facts.

10 points

- Research is the search of what is already searched.
- Research is the search of what is ever unsearched.
- Research is the study of what is not studied.
- Research should answer what is unanswered.
- Research should solve what is still unsolved.
- Research should discover what is not discovered yet.
- Research should know what is said to be unknown.
- Research should question what is believed not to be questioned.
- Research should falsify what is said the established truth.
- Research should prove something true what is said untrue.

Shubhechchu and Yonghang (2011)

- **Definition of research**
- Systematic and objective investigation on a particular subject or a problem to discover relevant information.
- It is a process that involves systematic design, collection, interpretation and reporting of information needed to solve specific problems
- "Research is an organized, systematic, data based, critical, scientific enquiry or investigation into specific problem, undertaken with the objective of finding answers or solutions to it." -*Sekaran (2000)*

- "Research is systematic investigation to establish the facts."
(Creswell, 2008)
- **Creswell** states that – —Research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue.
- **It consists of three steps:** Pose a question, collect data to answer the question, and present an answer.
- For **(Rocco, 2011)**, "Research is a careful investigation or inquiry especially through search for new facts in any branch of knowledge."
- **So, research is an original contribution to the existing stock of Knowledge, for making its advancement.**

1.2. Research Aims

- The primary aim of research: uncovering unknown realities and facts.
- For guiding the direction of the study and what it seeks to achieve.
- Adding knowledge in a specific area.
- Addressing existing gaps in knowledge.
- Creating and testing solutions to problems.
- Research aims should be specific, measurable, achievable, relevant, and time-bound (SMART).
- Research aims should aid with the research questions and objectives.
- should be communicated clearly and concisely to all stakeholders.
- should be reviewed and refined throughout the research process.
- should be used to evaluate the success of the research project.

1.2. Basic Research Objectives

- To explore a new idea.
- To gain insights into the incidence of a wonder.
- To understand the characteristics of an individual, situation, or event accurately.
- To identify the frequencies of occurrence of events.
- To establish a cause-and-effect relationship.
- To test the relationship between two variables.

- **Specific Research Objectives**
- Focus on answering the 3W, H questions: **What, Why, When, and How.**
- **What (What is the Problem)**
 - Identifying critical areas of focus for the research.
 - Clarity on aims, objectives, and problem overview.
- **Why (Why is the Problem Significant)**
 - Assessing the current scenario and reasons behind the problem.
 - Exploring potential gaps in information and decision-making processes.
 - Reviewing literature to understand the problem scenario and relevant variables.

- **When (Time Frame Constraints)**
 - Considering time frame limitations in research.
 - Evaluating the usefulness of the research inquiry within specific situation.
- **How (Research Design and Methodology)**
 - Establishing the research blueprint and design.
 - Determining data sources, research instruments, and statistical measures.
 - Planning evaluation and presentation techniques.

1.3. Features of Research

- i.** Objective
- ii.** Directed to solution of the problem
- iii.** Logical
- iv.** Empirical
- v.** Systematic
- vi.** Control
- vii.** Critical
- viii.** Free from personal biases
- ix.** Reproducible
- x.** Replicable
- xi.** Generalizability

- **Objective**- good research should have objective for formulating proper hypothesis.
- **Directed towards solution of problem**- research must identify the problem and in-depth study for its solution
- **Logical**- research is based on valid procedures and principles.
- **Empirical**- research is centered on direct experiment or observation by the researcher.
- **Systematic**-actions adopted to undertake an investigation follow a certain logical sequence.
- **Replicable** – research design and procedures are repeated to enable the researcher to arrive at valid and consistent results

- **Reproducible**- result must be reproduced
- **Free from personal bias**- investigation must be objective rather than subjective
- **Generalizability**- there must be same result everywhere in the same situation
- **Control**- designing studies to minimize outside influences on the relationship between two variables.
- **Critical**-The process implemented must be able to withstand critical analysis.

1.4. Types of research

Classification based on Application

- **Pure / Basic / Fundamental Research**
 - Exploration of a problem, focusing on theory and hypothesis development.
 - Expand/adds scientific knowledge base
 - Theoretical, universal nature, focused on creating new knowledge
 - Provides the foundation for applied research.
- **Applied / Decisional Research**
 - Utilizes findings from basic research to address practical questions and solve real-life problems.
 - Solve specific problems, develop technology, forecast future advancements.
 - Practical, descriptive, emphasizes problem-solving.
 - Drives technological advancements.

- **Basic Research Example**
- **Investigating the Impact of Cyber security Training on Employee Performance:**
- **Investigating the Influence of Cultural Diversity on Software Development Teams:**
- **Applied Research Examples**
- **Evaluation of E-Learning Platforms in Education**
- Reasons of road accidents in Mahendra highway.
- **Analysis of Cyber security Threats in Financial Institutions**

Classification based on Objectives:

Descriptive Research

- Systematic attempt to explain a situation or phenomenon by collecting quantifiable data
- Defines who, what, when, where, how linked with a research question
- Observational
- valuable in uncovering insights and informing decision-making processes
- Eg: Analyzing User Behavior in Online Platforms
- Explaining changes in budget allocation to department heads for clarity and understanding.

Correlational Research

- Measures two variables to understand statistical relationship without manipulation from extraneous variables.
- Establishes relationship between aspects of a situation.
- focuses on relationship between variables.
- utilize systematic methods for data collection and analysis.
- Eg: Internet Usage among employees and Productivity
- Understanding the relationship between the sound of an ice cream vendor's bell and the distance of the vendor.

Exploratory Research

- To find solutions for unexplored problems or to establish priorities.
- Develop operational definitions, identify issues for future research, determine research design.
- Flexible, subjective, often leads to grounded theory approach.
- lays the groundwork for further investigation.
- Eg: Artificial Intelligence in Healthcare
- Fast food outlet owner conducts research to explore increasing snack variety to boost sales.

Explanatory Research

- Aims to explain why events occur, extend or test theories.
- Showcase, explain, and present existing knowledge, build on theories.
- Focuses on theory testing, seeks to understand causal relationships.
- helps deepen understanding and validate theories.
- Eg: Software Development Methodologies
- Survey research on factors contributing to customer satisfaction and their relative weight.

Quantitative Research

- Based on measurement of quantity or amount.
- Suitable for phenomena expressible in terms of quantity.
- Numerical data, measurable quantities
- Statistical analysis, surveys, experiments...
- Eg: Robot-Assisted Learning in Computer Science Education
- Studying room booking enquiries through various modes and sources.

Qualitative Research

- Concerned with qualitative phenomena relating to quality or kind.
- explores attitudes, opinions, behaviors, changing preferences.
 - Non-numerical data, focuses on qualities and meanings.
 - Interviews, observations, content analysis.
 - examines into depth, context, and meanings behind behaviors and attitudes.
 - Eg: User Experience Feedback on New Mobile App Design
 - Studying stress levels and reasons for variable performances of staff in different shifts.