

Research Methodology

Overview of Research and its
Methodology

Overview

- What Is Research?
- Different Kind of Research
- What Is Research Methodology?

What Is Research?

- What?
- Why?
- Who?
- When?
- Where?

What Is Research?

- Hunting for facts or truth about a subject
- Organized scientific investigation to solve problems, test hypotheses, develop or invent new products

What Is Research?

- You will know it when you have understood the concept of the term 'research'.
- The researcher went through a sequence of steps which were in order and thus systematic.

What Is Research?

- The researcher did not just jump at the conclusions, but used a scientific method of inquiry in reaching at conclusions.
- The two important characteristics of research are: it is systematic and secondly it follows a scientific method of enquiry.

What Is Research?

- Research is systematic, because it follows certain steps that are logical in order. These steps are:
 - Understanding the nature of problem to be studied and identifying the related area of knowledge.
 - Reviewing literature to understand how others have approached or dealt with the problem.

What Is Research?

- Collecting data in an organized and controlled manner so as to arrive at valid decisions.
- Analyzing data appropriate to the problem.
- Drawing conclusions and making generalizations.

What Is Research?

- It is based on the work of others.
- It can be replicated (duplicated).
- It is generalizable to other settings.
- It is based on some logical rationale and tied to theory.
- It is doable!
- It is incremental.

What Is Research?

- It generates new questions or is cyclical in nature.
- It is apolitical activity that should be undertaken for the betterment of society.

What Is Research?

- Research follows a scientific method.
- This means that it makes an integrated use of **inductive** and **deductive** reasoning.
- This makes it very useful for explaining and/or predicting phenomena.
- The basic assumption of the scientific method is that every effect has a cause.

Don'ts In Research

- Plagiarizing other people's work.
- Falsifying data to prove a point.
- Misrepresenting information and misleading participants.

What Is Research?

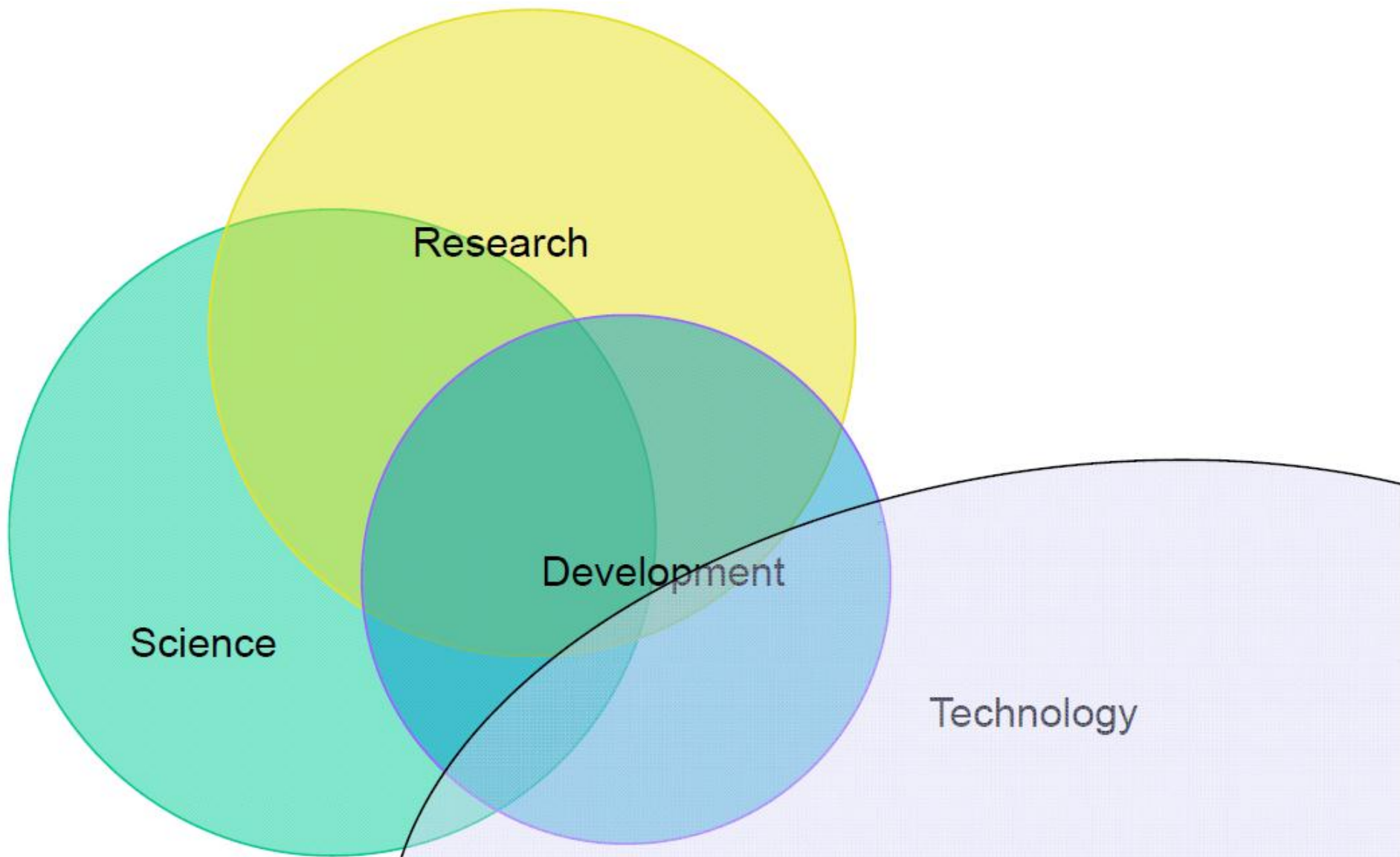
- It starts with the construction of hypotheses from casual observations and background knowledge (inductive reasoning) to reasoning out consequences or implications of hypotheses (deductive reasoning) followed by testing of the implications and confirmation or rejection of the hypotheses.

What Is Research?

- Integrated use of inductive and deductive reasoning is, therefore, the essence of scientific method.

Who and Why?

- To get PhDs, Masters and Bachelors??
- To provide solutions to complex problems
- To investigate laws of nature
- To make new discoveries
- To develop new products
- To save costs
- To improve our life
- Human desires



Research

Science

Development

Technology

Technology

- New development of collaborations between different research disciplines is enabled by the progress of technology.

Different Kind of Research

- There are two ways of classifying research.
 - One way is to classify research on the basis of its purpose.
 - The other is to classify research on the basis of the method employed in research.

Different Kind of Research

- Based on purpose
 - Basic or pure
 - No immediate application
 - Applied
 - immediate application
 - Development
 - Strategic

Different Kind of Research

- Based on Method
 - Historical (past)
 - Descriptive (current)
 - Correlational (relationship/ prediction/ future)
 - Experimental
 - Explanatory
 - Evaluation

Different Kind of Research

- Based on position
 - Academic
 - Industrial
 - Market
- Based on data
 - Quantitative
 - Qualitative
 - Quantitative/ Qualitative

What Is research Methodology?

- Find a problem ...
- Is the research earned or given?
- Who is a researcher?
- Genius is 1% inspiration and 99% perspiration
- Scientific research method by Francis Bacon, Centurions, Galileo

What Is research Methodology?

- Scientific research method requires
 - Science
 - Methodology
- Scientific research method
 - Conductivity
 - Doable
 - Repeatable

What Is research Methodology?

- Goals
 - Proper explanation
 - Discovering the reasons
 - Inference
 - Conduction

Scientific Research Methodology

- **Engineers make the things work**
 - **Solving problems**
 - Understand the problem
 - Analyze the problem
 - **Find solutions**
 - Constructing the solution from parts that address the problem's
 - Various aspects - do a synthesis

Scientific Research Methodology

– To achieve the goal engineers

- Apply theories, methods and tools from different disciplines
- Search for solutions even when there is not theory or methods

Scientific Research Methodology

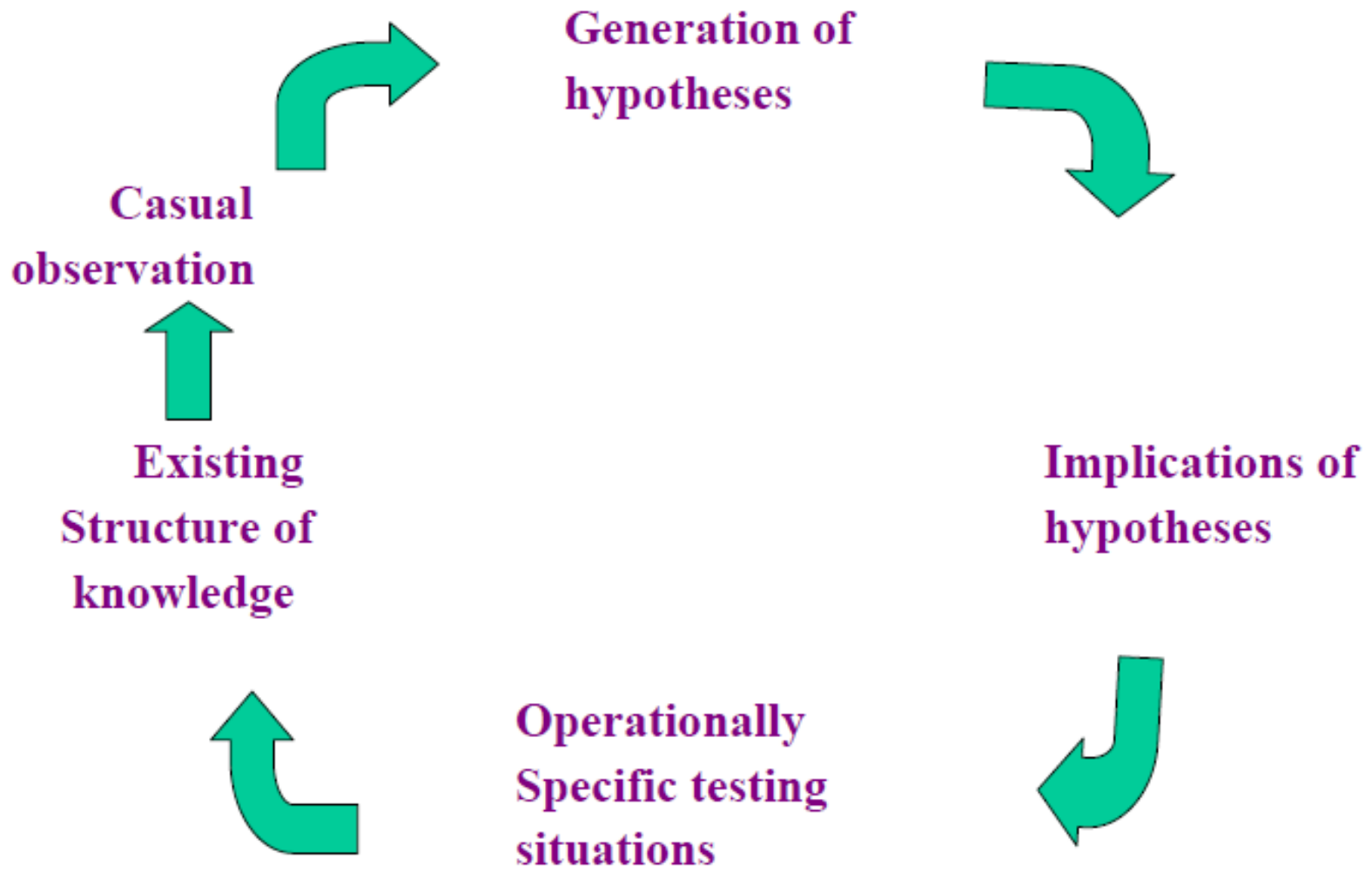
Observation

Hypothesis

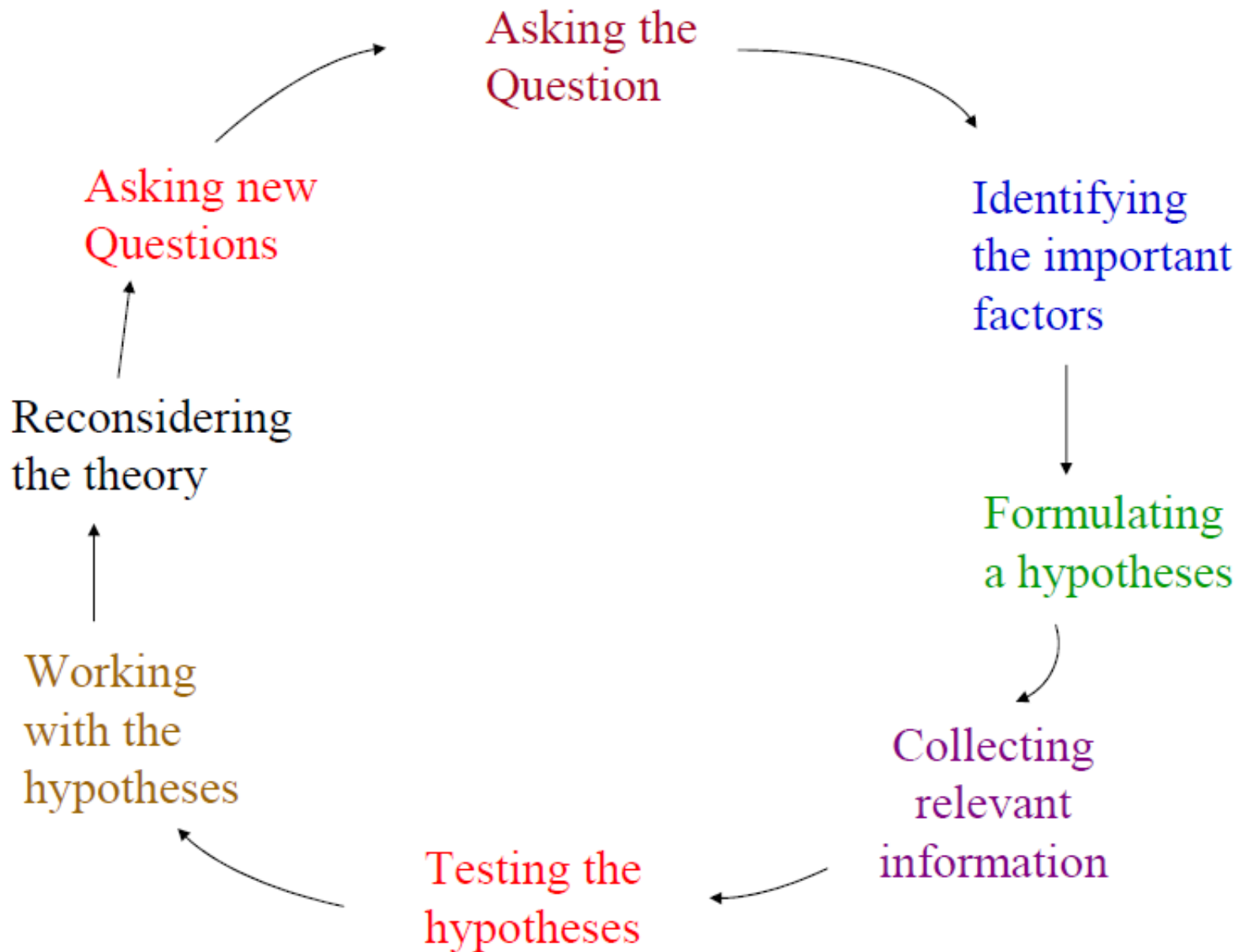
Experimentation

Induction





Scientific Method of Acquiring Knowledge of Problem Solving
(By courtesy of Yadav & Menon)



Scientific Research Methodology

- Observation
 - Science
 - Skill
 - Critical mind
 - Management
- Goals
 - Problem definition
 - Data collection

Scientific Research Methodology

- Problem definition
 - Good observation raise good problem definition
 - Conception
 - Problem formulization
- Data collection
 - Good references
 - Creative mind
 - Distinction

Scientific Research Methodology

- Hypothesis
 - Actually defined in observation step
 - Relation between observation and problem solving
 - It is not always a fact
 - Data collection/ hypothesis definition
 - Induction, deduction, novation

Scientific Research Methodology

- Hypothesis
 - Scientific meaning
 - Scientific compatibility
 - Interpretable with observation
 - Actually testable

Scientific Research Methodology

- Experimentation (engineering)
 - Good accuracy
 - laboratory
 - Simulation
 - Field experiment/study

Scientific Research Methodology

- Induction
 - Acceptance or rejection of hypothesis
 - Defining new hypothesis
 - Mathematical modeling
 - Statistical analysis
 - Discussion and conclusion

Question

Strategy/Result

Validation

Feasibility

Qualitative
methods

Persuasion

Characterization

Technique

Implementation

Methods/Mean

System

Evaluation

Generalization

Empirical
methods

Analysis

Selection

Analytical
methods

Experiment

Any Question?

THANKS FOR YOUR ATTENTION