

# Research Topics in Digital Forensics

Lecture 09

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# What do you do in research?

Pick up a problem

Choose an advisor

Prepare a research proposal

Defend your proposal

Work on your proposal

Communicate your findings

- Write research papers

- Write a thesis

Defend your research work



# Research Defined and Described


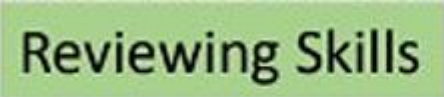
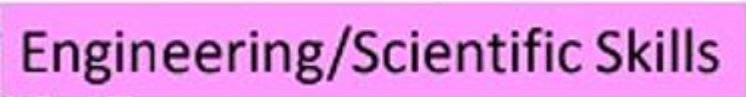



*“Research is the systematic approach to obtaining and confirming new and reliable knowledge”*

- Systematic and orderly (following a series of steps)
- Purpose is new knowledge, which must be reliable

This is a general definition which applies to all disciplines

# 'Researching Skills'

## In this 'Age of Information'

- How to find the **'right'** information  Searching Skills
- How to evaluate it  Reviewing Skills
- How to develop/improve it  Engineering/Scientific Skills
- How to report it clearly and accurately  Writing Skills
- How to improve it  Analytical Skills
- How to make money out of it  Business Skills

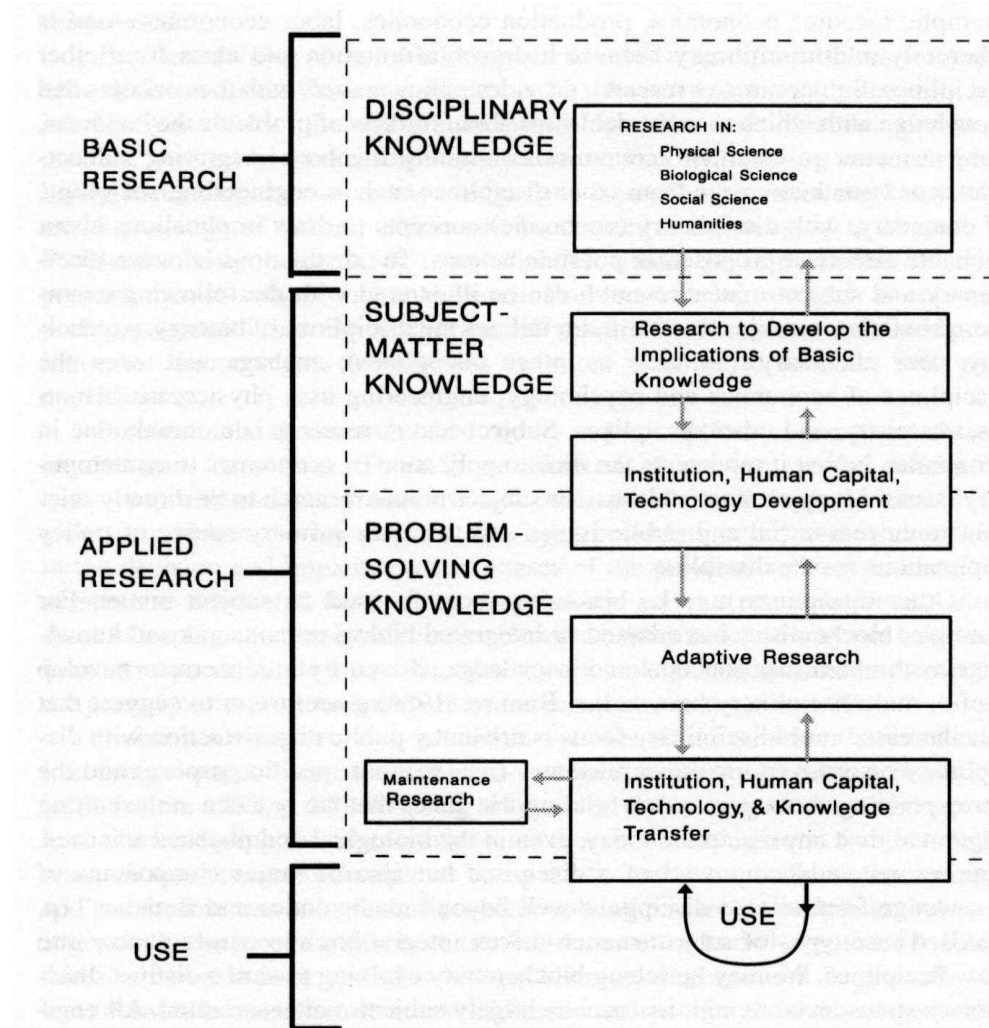
# One Fundamental Aspect of Research is **“Asking Questions”**

- As many as one can...
- Framing Questions
- Identifying Sensible/ Meaningful/ Useful/ Relevant/ Important questions
- Investigate those questions
- Report those questions

# Basic vs Applied Research

- Basic – to determine or establish fundamental facts and relationships within a discipline or field of study. Develop theories ... (examples in economics?)
- Applied – undertaken specifically for the purpose of obtaining information to help resolve a particular problem
- The distinction between them is in the application
  - Basic has little application to real world policy and management but could be done to guide applied research

# Disciplinary, Subject-matter, and Problem-solving Research (Johnson, 1986)



**Figure 2.1.** Relationship among research, knowledge, and use (Bonnen, 1986).

# 1. Disciplinary

- Designed to improve a discipline
- Dwells on theories, fundamental relationships and analytical procedures and techniques
- In economics, the intended users are other economists
- Provides the conceptual and analytical base for other economic research
- It is synergistic and complementary with subject matter and problem-solving research



# 1.Disciplinary... cont.

- Provides the foundations for applied research
- Circular as applied research reveals the shortcomings of disciplinary research
- Examples of some economic theories?  
(supply & demand, price elasticity, consumer utility ...)

## 2. Subject-matter research

- *“research on a subject of interest to a set of decision makers “*
- Tends to follow subject-matter boundaries within a discipline ( eg. resource economics, production economics, labor economics)
- Inherently multidisciplinary, drawing information from many disciplines
  - eg. consumer economic draws from psychology, natural resource economics from biology, economic policy from political science

## 2. Subject-matter research ... cont.

- Provides policy makers with general knowledge to make decisions about various problems.
- A primary source of policy applications for economics
- Subject-matter research is a cornerstone in economics – it involves direct application of economics to contemporary issues.

### 3. Problem-solving research

- Designed to solve a specific problem for a specific decision maker
- Often results in recommendations on decisions or actions
- Problem-solving research is holistic – uses all information relevant to the specific problem  
(while disciplinary research tends to be reductionist)
- Disciplinary research is generally the most “durable” (long lasting); problem-solving research the least durable

# Analytic vs Descriptive Research

- Descriptive Research – the attempt to determine, describe, or identify something
  - The intent is often synthesis, which pulls knowledge or information together
- Analytic – the attempt to establish why something occurs or how it came to be
- All disciplines generally engage in both

# Methodology Defined & Described

Methodology and Method are often (incorrectly) used interchangeable

- Methodology – the study of the general approach to inquiry in a given field
- Method – the specific techniques, tools or procedures applied to achieve a given objective
  - Research methods in economics include regression analysis, mathematical analysis, operations research, surveys, data gathering, etc.

# The Process of Research

- The process is initiated with a question or problem (**step 1**)
- Next, goals and objectives are formulated to deal with the question or problem (**step 2**)
- Then the research design is developed to achieve the objectives (**step 3**)
- Results are generated by conducting the research (**step 4**)
- Interpretation and analysis of results follow (**step 5**)

# Creativity in the Research Process

- Research is a creative process
- *“...research includes far more than mere logic ... It includes insight, genius, groping, pondering – ‘sense’ ... The logic we can teach; the art we cannot” (p 30)*
- Research requires (or at least works best) with imagination, initiative, intuition, and curiosity.



# Fostering Creativity (Ladd 1987)

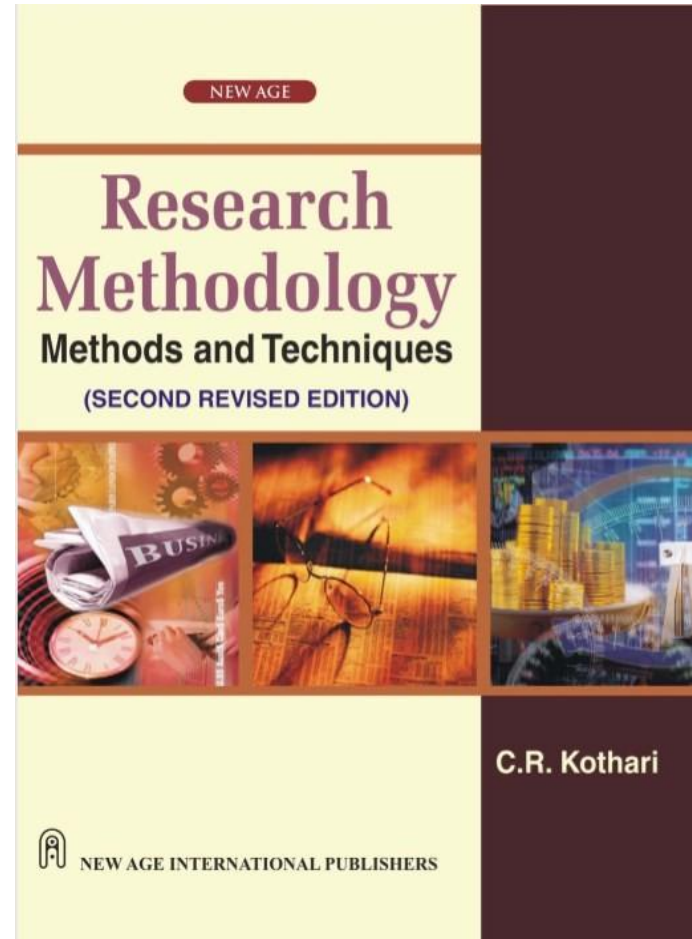
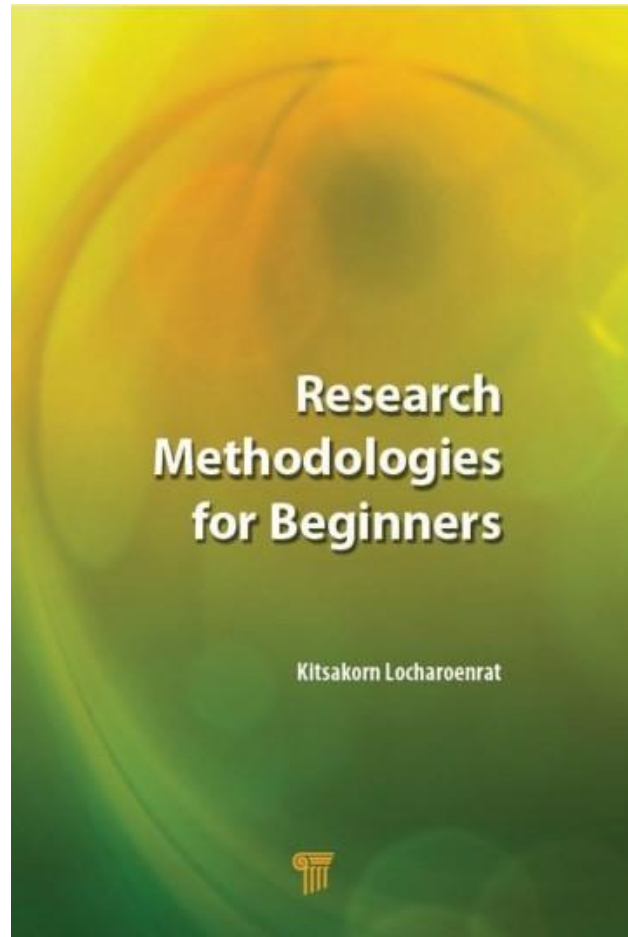
- A. Gather and use previously developed *knowledge*
- B. Exchange ideas
- C. Apply deductive logic
- D. Look at things alternate ways
- E. Question or challenge assumptions
- F. Search for patterns or relationships
- G. Take risks
- H. Cultivate tolerance for uncertainty

# Fostering Creativity ... cont.

- I. Allow curiosity to grow
- J. Set problems aside ... and come back to them
- K. Write down your thoughts
  - “... frequently I don't know what I think until I write it”
- L. Freedom from distraction ... some time to think.

*Creativity may provide the difference between satisfactory and outstanding research.*

# Reference Books/notes



## INTRODUCTION, DEFINITION & VALUE OF RESEARCH

Whether we are aware of it or not, we are surrounded by research. Educators, administrators, government officials, business leaders, human service providers, health care professionals, regularly use social research findings in their jobs. Social research can be used to raise children, reduce crime, improve public health, sell products, improve workers' efficiency, or just understand one's life.

Assume for the moment that you are the Manager of a restaurant. You are experiencing a significant turn over in your waiter/waitress pool, and long-time customers have been commenting that the friendly atmosphere that has historically drawn them to your door is changing. What will you do? Where will you try to solve this problem? The problem of high turn over and decline in the friendly atmosphere at the restaurant has to be researched.

The study of research methods provides you with the knowledge and skills you need to solve the problem and meet the challenges of a fast-paced decision-making environment. A systematic inquiry whose objective is to provide information to the problems (be they managerial as in our example) is one way to explain research.

### What is Research?

General image of the research is that it has something to do with the laboratory where scientists are supposedly doing some experiments. Somebody who is interviewing consumers to find out their opinion about the new packaging of milk is also doing research. Research is simply the process of finding solutions to a problem after thorough study and analysis of the situational factors. It is gathering information needed to answer a question, and thereby help in solving a problem. We do not do study in any haphazard manner. Instead we try to follow a system or a procedure in an organized manner. It is all the more necessary in case we want to repeat the study, or somebody else wants to verify our findings. In the latter case the other person has to follow the same procedure that we followed. Hence not only we have to do the study in a systematic manner but also that system should be known to others.

### What is the value of Research?

The nature of research problems could vary. Problems may refer to some undesirable situation or these may refer to simply a curiosity of the researcher that may be agitating his or her mind. For example, in a recent B.A.B.S examination of the Punjab University 67 percent of the students failed. That is a colossal wastage of the resources, hence an undesirable situation that needs research to find a solution. The researcher may come up with a variety of reasons that may relate with the students, the teachers, the curricula, the availability of books, the examination system, the family environment of the student, and many more. So a study may be carried out diagnose the situation, and the recommendations to be applied to overcome the undesirable situation of mass failure of students.

In the same examination result one finds that girls have captured a good number of top positions; and that is happening for the last couple of years. One gets curious and tries to do research for finding out the reasons. This is an academic problem but certainly a research problem. Conducting such research offers the pleasure of solving a puzzle. Why the girls are catching most of the top positions in different examination? This might be a puzzle that the research may like to explain. Such findings make a good contribution to the body of knowledge i.e. making some good discoveries as part of the basic research. Finding answer to any enigma is self satisfying. The researchers try to make use of their findings for generating theories and models that could be used for understanding human behavior and the functioning of different structures both at the micro (organizational) and macro (societal) level.