

Research Methodology

Part-I

**Scientific Attitude,
Methodology and Writing**

S.Y.B.Sc.

Semester: IV; Course: VIII

(Paper-II)

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Process of science

- Science means 'to know'.
- To gain knowledge through the mode of thinking and experimenting with reasoning.
- Ideas are tested and hypotheses are set and finally the concept is accepted or rejected.
- Person involved in these activities is known as 'scientist'.

The scientific method

- Experimentation, observation, logical arguments based on known facts, justification to figure out facts and truth.
- To study hypothesis and prove it.
- Aim and objective is fixed in scientific method.
- **Deductive reasoning: PRIORI**: reasoning or drawing conclusion from some fundamental assumption (hypothesis or theory etc.).

Theory → Hypothesis → Observatio/test → Confirmation/rejection

- **General to specific**.....or....top to down
- Complex multifactor study like ecology and evolution
- Darwin's theory and Lamarkism

Inductive reasoning

- '**POSTERIORI**' it involves **specific to general** process. Or down to top.
- It starts with observation with a specification and ends with the hypothesis or theory.

Observation / Test \Rightarrow Pattern \Rightarrow Tentative hypothesis \Rightarrow Theory

- This process involves long process of several experimentations and observations and then coming to the conclusion or formation of the hypothesis.
- Composition of air was studied from years to come to a conclusion that what is the exact composition of air?

Critical Thinking



Critical thinking leads to----

Barry Keyer (1995) critical thinking means making clear, reasoned judgement.

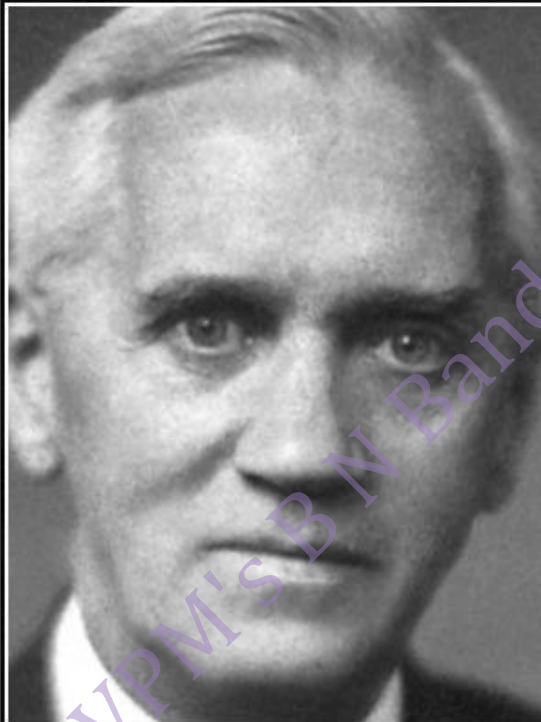
Lesley Brown (1993) defined as the process of activity and skillfully conceptualization, applying, analyzing, synthesizing and evaluating information to reach an answer or conclusion.

Critical Thinking involves

- To recognize problem
- To set priorities and order of experiments
- To identify hidden ideas
- To understand and use language
- To infer data
- To draw necessary conclusion
- To test the conclusion
- To reform one's belief
- To provide accurate conclusion

Role of chance of scientific discovery

- **Serendipity** is the unexpected findings by chance due to creation of the appropriate conditions by the researcher.

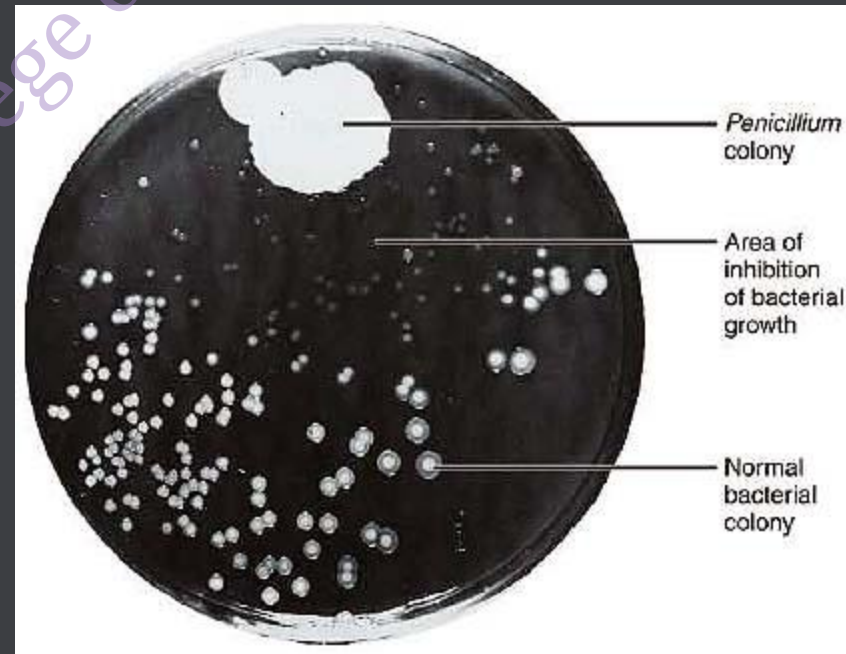


(The discovery of penicillin) was a triumph of accident, a fortunate occurrence which happened while I was working on a purely academic bacteriological problem.

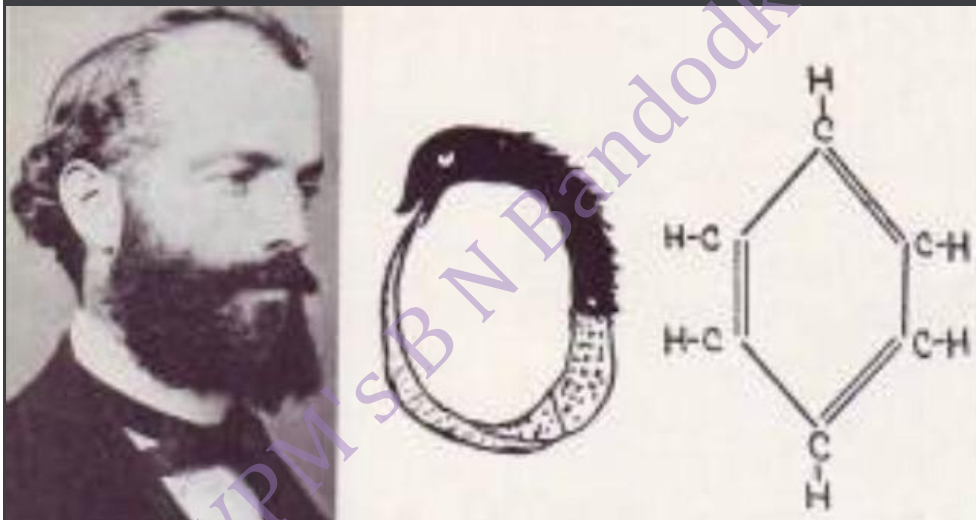
— Alexander Fleming —

Discovery of Penicillin by Alexander Fleming (1928)

- In one of the staphylococcus culture fungus was grown which showed a clear area around prohibiting bacteria to grow.....Fleming observed it seriously instead of throwing it away. And discovered the penicillin.



Newton
discovered
gravity in a
similar manner.



August Kekulé
Discovery of
benzene ring in a
dream when snake
ate its own tail

Scientific research

- Research meaning a new search.
- Two things are important in research
- 1. **Research method** : Experiment, test survey, experiments etc are done to reach a conclusion
- 2. **Research methodology**: it is multidimensional and has wide scope of research. It involves high technology, advance and more logical process.

Characteristics of scientific research

- Scientific research leads to a truth and helps in solving the problem through a process of methodology.
- The scientific research is characterized by
 - 1. purposefulness
 - 2. Objectivity
 - 3. Reproducibility
 - 4. Reliability
 - 5. Rigor
 - 6. Testability
 - 7. Possibility to generalize

Types of research

- **Descriptive:** fact finding investigations. No control over variables. Only what happened or what will happen in future is defined.
- **Analytical:** Available facts are analyzed and critically evaluated.
- **Applied:** Useful to society and industries.
- **Fundamental:** pure research...basic research...natural phenomena or mathematics.
- **Quantitative:**
- **Qualitative:**
- **Conceptual:** to develop new concept or abstract of new ideas or re-interpreting the existing one.
- **Empirical:** experimental research

Steps in Scientific Method

1. Identifying research problems:
2. Formulating the research hypothesis
3. Testing a hypothesis
4. Preparing research design
 - **Appropriate control**
 - **Sampling design**
 - **Avoiding bias: Pre-trial bias; bias during trial and post-trial bias**
 - **Reliability**

5. **Documentation:** Meticulous record keeping and documentation in clear and understandable manner.
 - Documentation is carefully done for data analysis, publication, peer review to avoid the allegations etc.
6. **Analysis of data:** authentic methods and statistical analysis.
7. **Interpretation:** reading the findings in more meaningful manner. To prove or support the efficacy of the results/ findings.
8. **Results and conclusion**

Dissemination of data

- **Publication** in peer reviewed journal, proceedings, bulletins.
- **Dissertation**: a systematic discussion of the topic
- **Thesis**: comprehensive report of the research
- **Report**: reports may lead to new questions
- **Oral presentation**: Seminars/conferences the presentation is given to present the research.
 - Title
 - Abstract
 - Introduction
 - Result and discussion
 - Conclusion
 - Future plans
 - Acknowledgement
- **Poster presentation**:

Application of the knowledge gained by research

- Basic research
- Applied research
- Transitional research: combination of basic science and clinical research

Scientific writing

- Its an matter of 7C's rule described by Mary Jaspers (2007).
- Clear (**simple language**)
- Correct
- Complete
- Concise
- Conformable
- consistent
- Common sense

Components of Research Paper

- **Title**: should be of 10-12 words long including terms and phrases revealing the core content.
- **Authors and their affiliation**: First author and co-authors; names and addresses are included sometimes emails are also included.
- **Abstract**: Summary; descriptive, informative and structured abstracts
- Descriptive abstract used in social sciences and humanity
- Informative: Science research
- Structured : Medical or clinical research.

- **Key words:** core words explaining or helpful for searching it online be included.
- Introduction:
- Materials and Methods
- Results
- Discussion
- Conclusion
- Acknowledgement
- Bibliography
- Table and figures
- Legends

Writing a review paper

- Its not a original research publication
- It is summary of many research publications in same or similar fields.
- It combines results of several primary research papers to produce a logical discussion.
- This paper includes
 - Introduction and/or backgroud
 - Body of the paper
 - Conclusion
 - Bibliography

Report writing

- This is not complete work but some concept developed during research are needed to be passed on to others who are intersted in similar fields to enhance the research.
- **Preliminary material:** title, table, abstract/synopsis
- **Body of report:** literature review, result and conclusion
- **Supplementary material:** Bibliography, appendices

Report includes

- Introduction with the recommendation and interest of the further research be involved in reports.
- Supporting literature and other researcher doing such research should be mentioned in the supplementary material.

Types of reports

- **Technical reports:** For record keeping or public dissemination. Detailed information of the findings with its limitations and supporting data or literature.
- **Popular reports:** the result obtained is used in policy making regarding an issue. It has attractive design, large print, many subheadings, cartoon are involved in this type.
- **Monograph:** Specialist; writing on a single subject by a single author.

Sample Qualitative Research Proposal
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Dissertation Proposal
Robert R. Maldonado
Akamai University

Title: A Phenomenological Pilot Study of Energy Healers Expertise and Recommendations for
Energetic Disaster and Trauma Relief Training

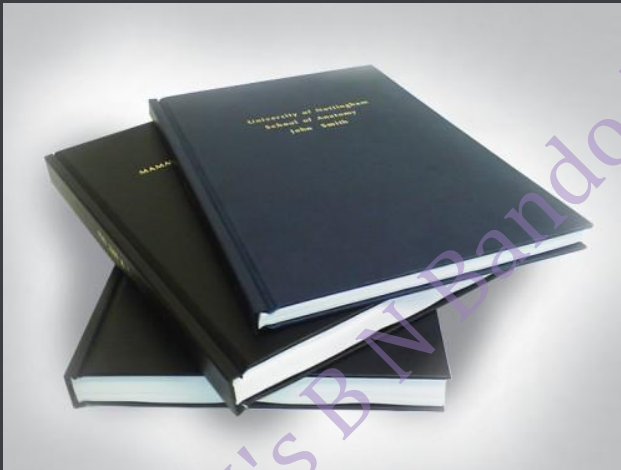
Introduction

In order to effectively and consistently provide energetic disaster relief treatments for humanitarian disasters, there needs to be a training program to train volunteers and local social service providers. Few studies have focused on how to adequately and effectively integrate and train people in the knowledge of different energy systems in disaster relief. Some trauma relief organizations such as The Trauma Relief Committee of the Association of Thought Field Therapy, Green Cross Association of Traumatic Stress Specialists, Common Bond Institute--Catastrophic Trauma Recovery Project (CTR) and others, have had much success providing training and coordinating teams of practitioners to deploy to assist victims and workers in need during incidents of trauma and disaster. The Association of Comprehensive Energy Psychology (ACEP) has provided initial relief work and training on a volunteer basis to local service providers during disasters (Feinstein, 2008). Despite the effective use of energy psychology in Singapore, Sri Lanka, and Indonesia by ACEP members, no comprehensive training program or organizational structure exists to train a core of dedicated trainers for this type of work. The ACEP Humanitarian Committee has been tasked with developing a training model of best practices and how to move forward (Bulbrook, 2009).

A study that addresses/defines energetic disaster and trauma relief training is important for several reasons. First, it brings the strengths of many energy systems to the field in the aftermath of trauma and disasters. Second, it compiles a diverse wealth of potentially meaningful information/data from numerous experts in their respective fields that can be used to create a training program for relief workers in energetic disaster relief. Finally, it brings this information to a wider audience of practitioners and organizations to assist them in the development of their own training programs in disaster relief.

Purpose of the Study—the purpose of this phenomenological study is to explore and understand through the obtaining of information from key participants in their respective energy systems, what they can contribute to energetic disaster and trauma relief training. The overall aim of this study is to draw on the clinical expertise, field experience and the vision of key “experts” to help define the field of disaster relief training, identify needs and gaps, and make recommendations

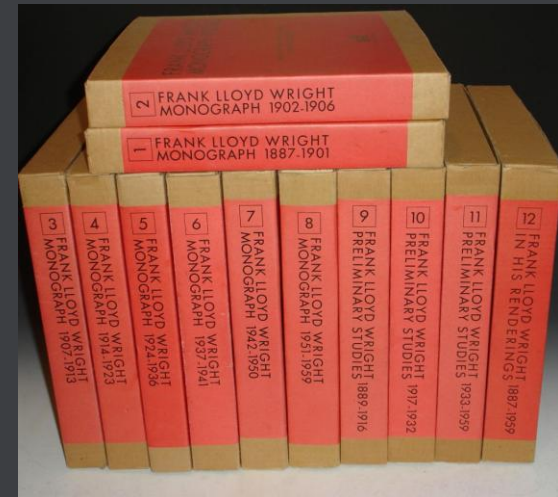
■ Research paper



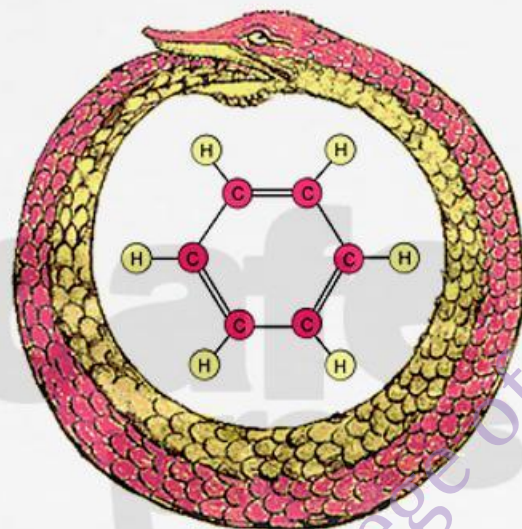
Dissertation and thesis



Journals



Monograph



LET US LEARN TO DREAM
THEN WE MAY PERHAPS
FIND THE TRUTH

KEKULE

THANK YOU