

Session- 18
Orientation Workshop for the Fresh Faculty Members

The Research Process: Asking the Right Question-II



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Criteria for developing a good research question

- Feasible
- Interesting
- Novel
- Ethical
- Relevant

FINER

— Cummings et al.
2001

Developing Your Question

Don't let methodology drive the question !

Develop Research Question

- Research area is selected
- Now it's time to develop the research question
- You need to ask the right question

Developing Your Question

- Start with a clear purpose
- Know your literature
- Be iterative in your approach
- Try to specify the who, what, where and when of your purpose
- Ask yourself "What would the answer to this question add to the literature or knowledge world?" and...

Define Your objectives

Why you need a clear cut well defined objectives?

- To Focus the study. What do you want to achieve from your research ?
- To Avoid the collection of data which are not strictly necessary for understanding and solving the problem we have identified
- For research grants
- For writing your thesis or research articles

To Organize the study in clearly defined parts or phases

Properly formulated, specific objectives will facilitate the development of our research methodology and will help to orient the collection, analysis, interpretation and utilization of data.

Define Your objectives

- Try to keep these simple
- The more variables the more difficult
- Get help at this stage
 - Senior colleagues
 - Experienced researchers

Take care of the objectives of your study

- Cover the different aspects of the problem and its contributing factors in a **coherent** way and in a **logical sequence**
- Are **clearly phrased** in **operational terms**, specifying exactly what you are going to do, where, and for what purpose
- Are **realistic** considering local conditions and
- Use **action verbs** that are specific enough to be evaluated

Examples of action verbs are: to determine, to compare, to verify, to calculate, to describe, and to establish. Avoid the use of vague non-action verbs such as: to appreciate, to understand, or to study.

Example

It was split up in the following specific objectives:

1. To develop a refined methodology for the detection of typhoid and/or paratyphoid fever by utilization of the RT-PCR facility so far used for COVID-19 detection in different medical colleges and diagnostic centers in Bangladesh
2. To optimize primers and PCR conditions for simultaneous detection of Typhoid and Paratyphoid strains
3. To evaluate antibiotic resistance pattern of *S. typhi* using disk diffusion culture sensitivity (CS) test and *AcrB* gene amplification by PCR
4. To detect the specific mutations in regulatory genes for antibiotic resistance that could be responsible for increasing azithromycin resistance in *Salmonella typhi* and *paratyphi* by gene sequencing
5. To analyze and minimize the diagnostic cost for PCR based detection of typhoid and paratyphoid fever for practical utilization in hospitals and diagnostic centers in Bangladesh context

Types of objectives

1. **General objective:** states what researchers expect to achieve by the study in general terms.
 2. **Specific objectives:** smaller, logically connected parts of general objective. They are the specific aspects of the topic that we want to study within the framework of our study
- Specific objectives should systematically address the various aspects of the problem. They should specify **what** we will do in our study, **where** and for **what purpose**.

Example

Project Title: Development and validation of multiplex PCR based diagnostic method for enteric fever using COVID-19 RT-PCR facility and identification of mutation in *Salmonella* that contributes antibiotic resistance in Bangladesh

General objective: Developing molecular detection method for typhoid and paratyphoid and identification of cause of antibiotic resistance in Bangladesh

Starting and carrying out the research

- Write down systematically what experiments you will be doing
- What answers it might give
- Always keep in mind some alternative experiments
- Be systematic
- You can make a flowchart of your work
- Give yourself a deadline/timeline, because time flies
- Spend Enough time to go through different protocols
- Choose wisely
- You also can write to the authors of those articles
- Avoid un-necessary experiments only because your laboratory has that experimental facility
- Keep record properly
- Make a logbook of your everyday's work

Qualities of Good Research

- Good Research is systematic.
- Good Research is logical.
- Good Research is empirical.
- Good Research is replicable.

Whether you want to do a groundbreaking research the world or your country or your society will remember forever or you want to do a so-so research

It is you who need to decide.

Enjoy research !!!

Give yourself some break !!!

Have fun !!!

The steady state of research is that you will be stuck.
Once you unstuck yourself and experiments starts working go ahead with full speed until you stuck again

Good Research

- Good research is systematic: It means that research is structured with specified steps to be taken in a specified sequence in accordance with the well defined set of rules. Systematic characteristic of the research does not rule out creative thinking but it certainly does reject the use of guessing and intuition in arriving at conclusions.
- Good research is logical: This implies that research is guided by the rules of logical reasoning and the logical process of induction and deduction are of great value in carrying out research. In fact, logical reasoning makes research more meaningful in the context of decision making.
- Good Research Experiments must have control
 - Positive control
 - Negative control
- Good Research must have statistical analysis wherever applicable

You can get some help

Some helpful link for writing research proposal and formulation of research idea
Examples, Formats, Video lectures

Penn State University, USA

<http://writing.engr.psu.edu/workbooks/proposals.html>

<http://www.writing.engr.psu.edu/index.html>

End of Session 2