RESEARCH METHOD CHAPTER 3

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THE PROBLEM: THE HEART OF THE RESEARCH PROCESS

- The problem is the axial centre around which the whole research effort turns.

- The statement of the problem must be expressed with the utmost verbal precision.

- The problem is then fractioned into more manageable subproblems.

- So stated, we can then see clearly the goal and the direction of the entire research effort.

Finding Research Projects

- Everywhere
- Whatever arouses interest, tweaks curiosity, raises questions but no answer or answers exist but dispute arises on validity
- Extremely important to distinguish between PERSONAL and RESEARCHABLE problem
- Personal problems are real but not researchable
- Researchable problems fit the requirement of the scientific method

Where Does your Interest Lie?

- Inspect any volume of *Dissertation Abstracts International* under the general heading of your interest

- All you need to see is your own area of interest in sharp, clear focus and then enunciate the problem indigenous to it in precise lucid terms

- Research only begin with an unmistakably clear statement of the problem

DAI

Problems for Research

- Two theoretical levels: problems whose aim is to increase our knowledge and problems whose aim is to make our life better

- The wise choice of a researchable problem can lead the researcher into a truly unexpected and fascinating domain

Keeping the Research Process in Focus

- Scientific method is a new concept to many students
- Difficult to formulate an acceptable research problem
- Lies in their inability to appreciate the struggle between thinking and doing
- First must learn to distinguish between what it is to think and what it is to do with respect to data

The Wording of the Problem

- Must indicate that thinking on the part of the researcher is required – analytical thinking that squeezes meaning out of the mere accumulation of facts, called the interpretation of the data
- The world Almanac is a treasury of fact, full of meanings but remain sterile and frozen upon the pages
- So no research without any interpretation, no matter how many facts you have

What is NOT a Research Problem?

- Certain problems are not suitable for research – because they lack
  - the "interpretation of data" requirement
  - the "mental struggle on the part of the researcher to force the facts to reveal their meaning"
- Avoid four situations when considering a problem for research

1. Not Self-Enlightenment

- Don't use a problem as a ruse for achieving self-enlightenment –
  - Students may find gathering facts and dissipating their own informational deficiency, gratifying
  - But do not confuse with the research process
  - Example, " the problem of this research is to learn more about the way the SMP system is developed"
  - The summit of the fact-finding effort will provide only the satisfaction having gain more information about SMP not solution of THE PROBLEM

2. Not Comparing Data

- Example "This research project will compare the increase in the number of women students over 10 years from 1990 to 2000 with the men students over the same time span."
- We can do that without any effort, in two lines

	1990	2000
Women	1234	2567
Men	1567	1600

3. Not Finding Coefficient of Correlation

- Finding correlation between two sets of data to show relationship is not an acceptable problem
- Basic research is ignored – nobody struggling with facts
- It is a proposal to perform a statistical operation that a computer can do faster and more accurately
- In research, correlation coefficient acts as a signpost to look deeper into the cause of the relationship that exists between two sets of data

3. Not Finding Coefficient of Correlation

- We feel most pompous that two variables are closely related and trumpeting the world that "Research has shown that the correlation between … and … is such-and-such."

- We are blindly mistaken. Research hasn't shown that. A tool of research has given us this tantalizing fact. It has suggested a problem for research. To find the answer to those questions and to isolate the causal basis for the relationship is research – need thinking from researcher

4. Problems that Result in a Yes or No Answer

- Example, " Is homework beneficial to children?"

- No problem for research - give the students homework and see what happens.

- The researchable issue is wherein the benefit of homework, if any, lies?

  - What factual components of homework are beneficial in the process?

  - Which ones are self-defeating?

4. Problems that Result in a Yes or No Answer

- Answers to these questions would enlarge our wisdom – could structure the homework assignments with more purpose and greater intelligence and thereby promote the learning of children - more effectively than we do now

- But demand full power of the scientific method and ancillary help of statistics, computerization, discriminative and analytical thinking, and creative research methodology

Guidelines For Finding A Legitimate Problem

- Appropriate research projects don't fall out of trees and hit you on the head.

- Must be sufficiently knowledgeable about your topic of interest to know what projects might make important contributions to the field.

- SIX guidelines to formulate an important and useful research project are listed below.

1. Look Around You

- In many disciplines, questions that need answers – phenomena that need explanation - are everywhere.
- Example: In 17th. century, Galileo was trying to make sense of why large bodies of water (but not small ones) rise and fall in the form of tides twice a day?
- BUT not to suggest that novice researchers should take on such monumental questions.
- Concentrate on smaller problems – continually ask questions about what you hear and see.
- Why does such–and–such happen? What makes such–and–such tick? (The reasons for somebody's behavior)

2. Read the Literature

- What things are already known – don't reinvent the wheel – also tells what is NOT known in the area – in other words, what still needs to be done.

- Research project might

a) Address the suggestions for future research that another researcher has offered

b) Replicate a research project in a different setting or with a different population

c) Consider how various subpopulations might behave differently in the same situation

d) Apply an existing perspective or explanation to a new situation

2. Read the Literature

e)   Explore unexpected or contradictory findings in previous studies

f)   Challenge research findings that seem to contradict what you know or believe to be true.

Other advantages :

- Provides theoretical base on which to build a rationale for your study

- Provides potential research methodologies and methods of measurement

- Help you interpret your results and relate them to what is already known in the field

3. Attend Professional Conferences

- Many researchers have great success finding new research projects at national and regional conferences.

- Learn "what is hot and what is not" in their field

- Novice researchers can make contacts with experts in their field, ask questions, share ideas, exchange e-mail addresses with more experienced and knowledgeable individuals

- Many students are reluctant to approach well-known scholars at conferences, for fear that these scholars don't have the time or patience to talk with novices – Quite the opposite is true – They may feel flattered that you are familiar with their work and that you would like to extend or apply it in some way.

4. Seek the Advice of Experts

- Another simple yet highly effective strategy for identifying a research problem is simply to ask an expert:

a) What needs to be done?

b) What burning questions are still out there?

c) What previous research findings seemingly don't make sense?

5. Choose a Topic that Intrigues and Motivates You

- Reading literature, attend conferences, talk with experts, will uncover a number of potential research problems

- Pick just one, based on what you want to learn more about

- Must believe that it is worth your time and effort.

- Saying "You're going to be married to it, so you might as well enjoy it."

6. Choose a Topic That Others Will Find Interesting and Worthy of Attention

- Want to share findings with a larger audience, not only end with thesis.

- Describe what you have done at a regional or national conference, publish an article in a professional journal, or both.

- Future employers, too, are also interested in your thesis topic if in your research, you are pursuing an issue of broad scientific or social concern or, more generally, a hot topic in your field.

Stating the Research Problem

- The heart of any research project is the problem.
- At every step in the process, successful researchers ask themselves: What am I doing? For what purpose am I doing it?
- Such questions can help focus your efforts toward achieving your ultimate purpose for gathering data: to resolve the problem.
- Researchers get off to a strong start when they begin with an unmistakably clear statement of the problem.

Stating the Research Problem

- After identifying a research problem, therefore, you must articulate it in such a way that *it is carefully phrased and represents the single goal of the total research effort*.

- Following are some general guidelines to help you do just that:

1. State the Problem Clearly and Completely

- Always state the problem in one or more grammatically complete sentences

- Anyone, anywhere in the world could read it, understand it, and react to it without the benefit of your presence.

- If the problem is not stated with such clarity, then you are merely deceiving yourself that you know what the problem is.

- Such self-deception will cause you difficulty later on.

The Problem Statement

- Bad habits – try to state a research problem by jotting down meaningless groups of words, verbal fragments - no help in seeing the problem clearly

- Examples of half-statements, mere verbal blobs that only hint at the problem but do not state it
  - A) Software metrics and the quality of software
  - B) Subsidise ICT industry
  - C) ICT promotes English in school
  - D) QoS in computer network

The Problem Statement

- The fragments demonstrate that the researcher either cannot or will not think in terms of specific, researchable goals

- Must limit the area of study to a manageable size

- Example, metric and quality, must limit what metrics? which quality attribute? and more importantly what domain of the software you want to investigate? By specifying the domain you are narrowing down the metric and the quality attribute

Example: Metric and Quality

- What effect does module size has on the understandability of program for a Science subject educational software?
- The metric: module size
- The quality attribute: understandability
- The domain: program, Science subject, educational software

2. Think through the Feasibility of the Project that the Problem Implies

- Don't rush into problem without thinking through its implications.

- "This study proposes to study the effect of information and communication technology (ICT) in teaching mathematics and science in Iranian standard schools".

- How many primary schools all over Iran? How to contact? Personal visit? What is the financial outlay? Mail survey? Printing and postage cost?

3. Say Precisely What You Mean

- Correct the problem statement right up front, no place for evasion (trying to avoid something), equivocation (having a doubtful or double meaning), or mental reservation in research

- Must mean what you say, cannot assume others will know what is in your mind, they will take your words at their face value: You mean what you say. That's it.

- Your failure to be careful with your words can have grave (serious) results for your status as a scholar and a researcher

Generalized and Foggy

- Occasionally, announce intention to make statement, from that point the discussion becomes foggier

- This researcher talks about the problem but never actually states what the problem is.

- Under the excuse that the problem needs an introduction or needs to be seen against a background, the researcher launches into a generalized discussion, continually obscuring (not easily seen or understood) the problem, never clearly articulating (able to express his/her opinions clearly in words) it

Foggy Problem Statement

The upsurge of interest in reading and learning disabilities found among both children and adults has focused the attention of educators, psychologists, and linguists on the language syndrome. In order to understand how language is learned, it is necessary to understand what a language is. Language acquisition is a normal developmental aspect of every individual, but it has not been studied in sufficient depth. To provide us with the necessary background information to understand the anomaly of language deficiency implies a knowledge of the developmental process of language as these relate to the individual from infancy to maturity. Grammar, also an aspect of language learning, is acquired through pragmatic language usage. Phonology, syntax, and semantics are all intimately involved in the study of any language disability.

Where is the Problem Statement?

- None, that is articulated with sufficient clarity
- No orientation essay
- The problem is stated in the very first words of an abstract in DAI, e.g "The purpose of this study is to …"
- No mistaking it
- No background buildup necessary
- Straightforward plunge into the business at hand

4. Edit your Work

- Difficulties can be avoided by carefully editing your words. Editing is sharpening a thought to a gemlike point, and eliminating useless verbiage (wordiness). By choosing words precisely will clarify your writing

- Editing improves your thinking and your prose (ordinary written or spoken language). Many students think that any words that approximately express a thought are adequate to be conveyed to others

- Approximation is never precision

- Need to be rigorous (careful and detailed) with the words

4. Edit your Work

- Punctuation will help
- Cliches (idea or expression that is used so often that it no longer has any meaning), colloquialisms (word or phrase suitable for normal conversation: not formal or literary), slang (words, phrases, etc. used in very informal conversation, not suitable for formal situations), jargon (special or technical words used by a particular group of people), and the gibberish (meaningless talk; nonsense) of any group obscure (not easily seen or understood) thought
- Jargon shows lazy mind
- They feel impressive or add importance
- Thought is clearest when clothed in simple words, concrete nouns, and active, expressive verbs

Basic Guidelines for Clear Writing

1. Express thought fully with least words possible
2. Use a thesaurus: help find the exact word
3. Economize on syllable
4. Keep the sentence short
5. Look critically at each thought. Do the words say exactly what you want them to say? Read carefully phrase by phrase. Throw out superfluous (more than is needed and wanted) and unnecessary words
6. Misplaced phrases and clauses can create havoc

Subproblems Versus Pseudo-Subproblems

- *Subproblems* are the subparts of the main problem
- The researcher must distinguish subproblems that are an integral part of the main problem from things that look like problems but are nothing more than procedural issues
- The latter, which are called *pseudo-subproblems*, involve decisions the researcher must make before he or she can resolve the research problem and its subproblems
- Pseudo-subproblems are not researchable problems
- Procedural indecisions – decision that researcher must resolve
- Problems for researcher BUT not part of the research problem

Subproblems Versus Pseudo-Subproblems

Consider the following as examples:

- What is the best way to choose a sample?

- How large should a representative sample of a population be?

- What instruments or methods should be used to gather the data?

- What statistical procedures should be used to analyze the data?

- How do I find the subproblems within the main problem?

Subproblems Versus Pseudo-Subproblems

- Deal with pseudo-subproblems forthrightly by making a firm decision about them and then get on with the solution of the research problem.

- To deal with pseudo-subproblems, you must decide whether (a) a little common sense and some creative thinking might help in solving your "problem" or (b) you simply lack the knowledge to address the difficulty.

Characteristics of Subproblems

There are four key characteristics of subproblems:

1)   Each subproblem should be a completely researchable unit

- A subproblem should constitute a logical subarea of the larger research undertaking.
- Each subproblem might be researched as a separate subproject within the larger research goal
- The solutions to the subproblems, taken together, combine to resolve the main problem
- It is essential that each subproblem be stated clearly and succinctly (expressed briefly and clearly)
- Often, a subproblem is stated in the form of a question because it tends to focus the researcher's attention more directly on the research target of the subproblem than does a declarative statement
- After all, an interrogative attitude is what marks a true researcher

Characteristics of Subproblems

2)   Each subproblem must be clearly tied to the interpretation of the data

- At some point in the statement of the subproblem – as within the main problem – the fact that data will be interpreted must be clearly evident

- This fact may be expressed as a part of each subproblem statement, or it may occupy an entirely separate subproblem

Characteristics of Subproblems

3) The subproblems must add up to the totality of the problem

- After the subproblems have been stated, check them against the statement of the main problem to see that

a) nothing in excess of the coverage of the main problem is included and that

b) all significant areas of the main problem are covered by the subproblems

Characteristics of Subproblems

4)   Subproblems should be small in number

- If the main problem is carefully stated and properly limited to a feasible research effort, the researcher will find that it usually contains two to six subproblems

- Sometimes, the inexperienced researcher will come up with as many as 10, 15, or 20 subproblems

- If this happens, it may fall into one of the following:
  - Some are actually procedural issues (pseudo-subproblems);
  - Some might reasonably be combined into larger subproblems; or
  - The main problem is more complex than you originally believed.
    If the last of these is true, you may want to reconsider whether the solution to the overall research problem is actually achievable given the time and resources you have

Every Problem Needs Further Delineation

- To comprehend fully the meaning of the problem, the researcher should eliminate any possibility of misunderstanding by
  - *Stating the hypotheses and/or research questions:* Describing the specific hypotheses being tested or questions being asked.
  - *Delimiting the research:* Fully disclosing what the researcher intends to do and, conversely, does not intend to do.
  - *Defining the terms:* Giving the meanings of all terms in the statements of the problem and sub-problems that have any possibility of being misunderstood.
  - *Stating the assumptions:* Presenting a clear statement of all assumptions on which the research will rest.
- These matters facilitate understanding of the research – called *the setting of the problem*

Stating the Hypotheses and/or Research Questions

- Hypotheses are tentative, intelligent guesses posited for the purpose of directing one's thinking toward the solution of the problem

- Necessary in searching for relevant data and in establishing a tentative goal

- Hypotheses are neither proved nor disproved. They are nothing more than tentative propositions set forth to assist in guiding the investigation of a problem or to provide possible explanations for the observations made

Accept/Reject Hypotheses

- Hypotheses have nothing to do with proof
- Their acceptance or rejection is dependent on what the data – and the data alone – ultimately reveal
- Hypotheses may originate in the subproblem, could be 1 to 1
- Hypothesis provides a position from which a researcher begins to initiate an exploration of problem and subproblems and checkpoints to test the findings that the data reveal

Accept/Reject Hypotheses

- If the data do not support the research hypothesis, don't be disturbed – it merely means that the educated guess about the outcome of the investigation was incorrect

- Frequently, rejected hypotheses are a source of genuine and gratifying surprise – truly made unexpected discovery

- Another type of hypothesis is the null hypothesis

Delimiting the Research

- Know PRECISELY what the researcher intends to DO and does NOT intend to do
- What the researcher intends to do is stated in the problem statement
- What the researcher is not going to do is in the *delimitations*
- The researcher can easily be beguiled (deceived, cheated) by discovering interesting information that lies beyond the precincts of the problem under investigation
- Only a researcher who thinks carefully about the problem and its focal centre can distinguish between what is relevant and what is not relevant to the problem
- All irrelevancies to the problem must be firmly ruled out in the statement of delimitations

Defining The Terms

- Without knowing explicitly what a term means, we cannot evaluate the research or determine whether the researcher has carried out what was proposed in the problem statement

- Need not necessarily agree with such a definition, but as long as we know what the researcher means when using the term, we are able to understand and appraise it appropriately

- A formal definition contains three parts: (a) the *term* to be defined; (b) the *genera*, or the general class to which the concept being defined belongs; and (c) the differentia, the specific characteristics or traits that distinguish the concept being defined from all other members of the general classification

Defining The Terms

- To make the software more USER-FRIENDLY?
- What is the relationship between the user interface metric and user acceptance?
- The researcher must be careful to avoid circular definitions, in which the terms to be defined are used in the definitions themselves
- A classic example is Gertrude Stein's "A rose, is a rose, is a rose" and "Islam is Islam".

Stating the Assumptions

- Assumptions are so basic that, without them, the research problem itself could not exist
- Example, to determine by pretest-posttest whether one method of instruction has produced the results hypothesised
- The assumptions are:
  - The test measures what it is presumed to measure
  - The teacher(s) in the study can teach effectively
  - The students are capable of learning the subject matter
- Without these assumptions, we have no problem, no research

Stating the Assumptions

- Assumptions are what researchers take for granted with respect to the problem
- But taking everything for granted may cause misunderstanding
- If others know the assumptions a researcher makes, they are better prepared to evaluate the conclusions that result from such assumptions
- Many students thought that assumption is stating the obvious
- In research, try to leave nothing to chance in the hope of preventing any misunderstanding

Stating the Assumptions

- All assumptions that have a material bearing on the problem should be openly and unreservedly set forth.

- Asking question "What am **I** taking for granted with respect to the problem?" will bring assumptions into clear view

Importance of the Study

- In dissertations or research reports, researchers frequently set forth their reasons for undertaking the study
- In a research proposal, such a discussion may be especially important
- Some studies seem to go far beyond any relationship to the practical world
- Of such research efforts, one might asks "Of what *use* is it? What *practical value* does the study have?"
- For example, the time, money, effort spent on early space exploration flights