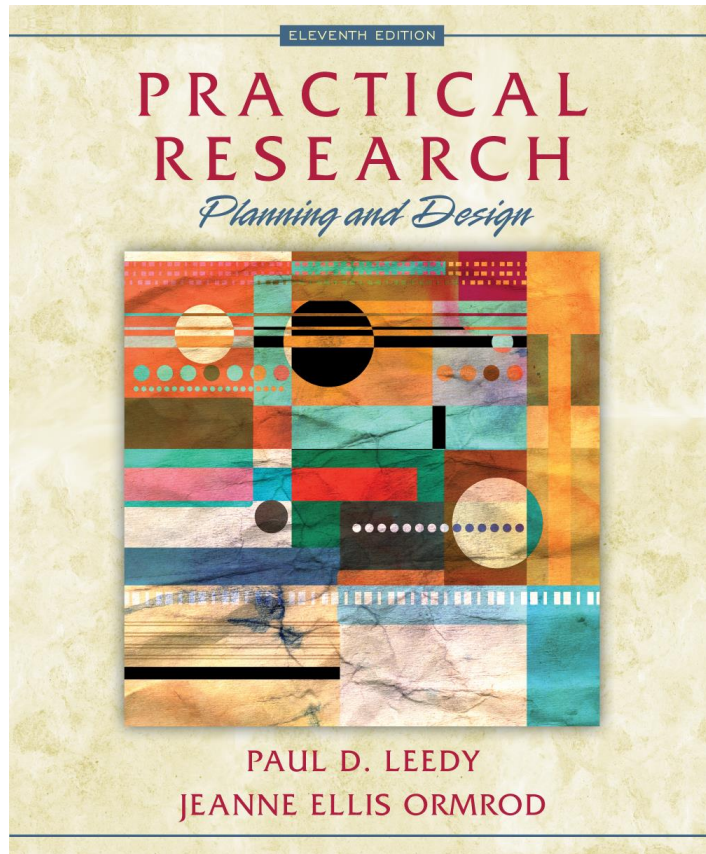


Practical Research

11th edition

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Chapter 2

The problem:
The heart of the
research process

Finding Research Projects

2

The Problem: The Heart of the Research Process

The problem or question is the axis around which the whole research effort revolves. The statement of the problem must first be expressed with the utmost precision; it should then be divided into more manageable subproblems. Such an approach clarifies the goals and directions of the entire research effort.

The heart of every research project—the axis around which the entire research endeavor revolves—is the problem. The first step in the research process is to identify the problem with unwavering clarity and to state it in precise and unmistakable terms.

Finding Research Projects

- Research projects can be one of two types:
 - Basic research
 - Applied research

Basic Research

- Enhances basic knowledge of
 - Physical world
 - Biological world
 - Psychological world
 - Social world
- Sheds light on historical, cultural, or aesthetic phenomena

Applied Research

- Addresses issues that have immediate relevance to current practices, procedures, and policies
 - Human decision making about practical problems
 - Questions in one's immediate work environment (action research)

Identifying a Suitable Research Problem

- Address an important question
- The answer should make a difference
- Advance the frontiers of knowledge by
 - leading to new ways of thinking
 - suggesting possible applications
 - paving the way for further research in the field

When Considering A Research Problem

- Select a research problem
 - for more than self-enlightenment
 - to do more than compare two sets of data
 - for something more than calculating correlation coefficient of two data sets
 - to contribute something new (**novelty**)
 - to identify and interpret a relationship
 - that has more than a yes/no answer

Finding a Legitimate Research Problem

- Look around you *(Details from book)*
- Read the literature
- Seek the advice of experts
- Attend professional conferences
- Choose a topic that intrigues and motivates you
- Choose a topic that others will find interesting and worthy of attention
- Be realistic

Stating the Research Problem

- State the problem clearly and completely
(**a novice should be able to make sense**) (*Details from book*)
- Think through the feasibility of the project that the problem implies (*realistic scope*)
- Say precisely what you mean
- Absolute honesty and integrity are the rule
- Reflect an open mind about the solution
- Edit your work

Stating the Research Problem

You can avoid the difficulties

~~^ We have been discussing several common difficulties~~
~~relating to the statement of the problem. These can be~~
~~improved or remedied through a careful editing of your~~
~~words. Editing is a process whereby the writer attempts~~
~~to bring what is said straight to the point. Editing also~~
~~and eliminating useless verbiage.~~
~~eliminates many meaningless expressions. We should~~
~~therefore, choose our words carefully. By editing the words~~
~~words, concrete nouns, and active, expressive verbs.~~
~~we have written our expression will take on new life.~~

by carefully

sharpening a thought

a gemlike

your precisely, ideally selecting simple

we have written our expression will take on new life.

Stating the Research Problem

Evaluating the Research Problem

_____ 1. Write a clear statement of a problem for research.

_____ 2. Review your written statement and ask yourself the following questions:

- Is the problem stated in a complete, grammatical sentence?
- Is it clear how the area of study will be limited or focused?
- Is it clear that you have an open mind about results that the research effort might yield?

_____ 3. On the basis of your answers to the questions in Item 2, edit your written statement.

_____ 4. Look at your edited statement and reflect on the following questions:

- Does the answer to this problem have the potential for providing important and useful answers and information?
- Will the result be more than a simple exercise in gathering information, answering a yes/no question, or making a simple comparison?
- Is the problem focused enough to be accomplished with a reasonable expenditure of time, money, and effort?

_____ 5. Looking at the statement once more, consider this: Is the problem really what you want to investigate?

_____ 6. Show other research students your work. Ask them to consider the questions listed in Items 2 and 4 and then to give you their comments. With your compiled feedback, edit and rewrite your problem statement once again:

Dividing the Research Problem Into Sub-problems

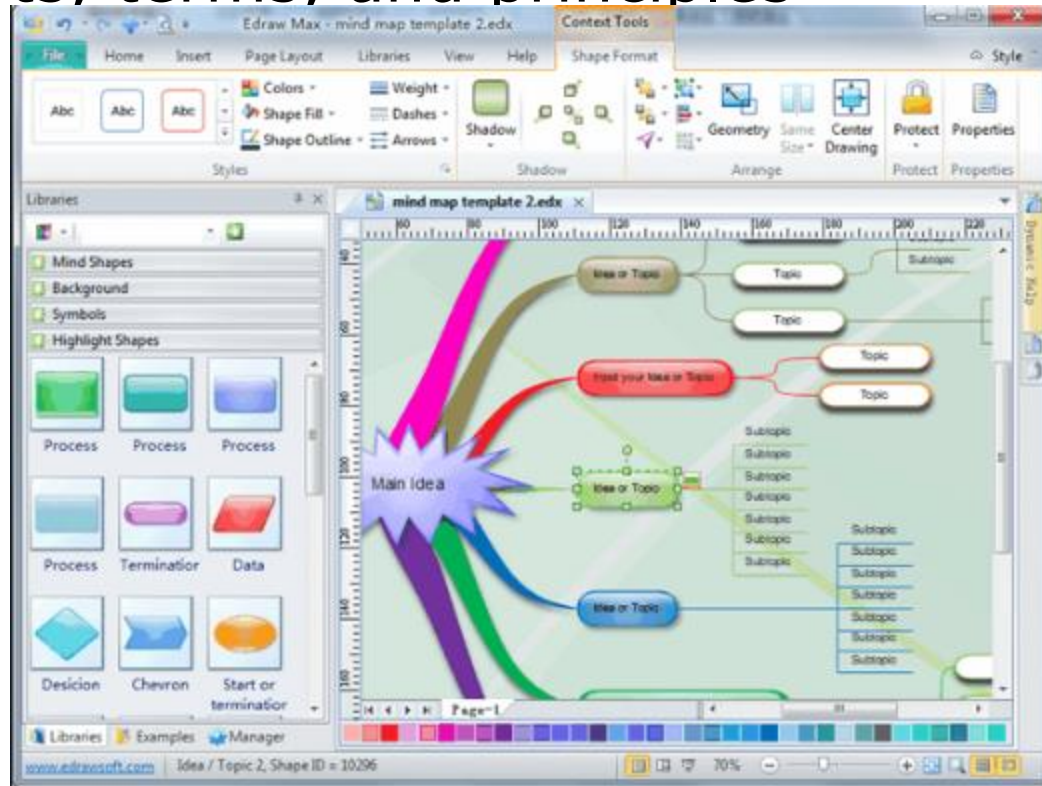
- Most problems are too big to tackle
- Identify sub-problems
 - A small number of completely researchable units
 - Sub-problems add up to the totality of the problem
 - Sub-problems clearly tie to the interpretation of the data

Identifying Sub-problems

- Take a paper-and-pencil approach
 - Write down the problem
 - Highlight key words/ideas to explore
 - Reorganize the ideas to identify the overall research design (examples from tribology papers the simulation of Muhammad Waqar and Experimentation of Jawad)
- Use brainstorming/mind-mapping software
 - Construct graphic networks of interrelated concepts, terms, and principles

Identifying Sub-problems

- Use brainstorming/mind-mapping software
 - Construct graphic networks of interrelated concepts, terms, and principles



Resolving Pseudo-subproblems

- Pseudo-sub-problems are procedural issues
 - decisions must be made before resolving the research problem and its sub-problems (**book highlights**)

Characteristics of sub-problems

- *Each sub-problem should be a completely researchable unit*
- *Each sub-problem must be clearly tied to the interpretation of the data (not merely collection of data)*
- *The sub-problems must add up to the totality of the problem (should not be a tangent)*
- *Sub-problems should be small in number*

Delineating the Problem

- Basically removing any ambiguities for the reviewer
- Every problem has a setting to establish
 - State *a priori* hypotheses
 - Identify specific variables
 - Define the terms
 - State the assumptions
 - Identify delimitations and limitations

Stating *a priori* hypotheses

- Specify the research hypothesis
 - Educated guesses that researchers hope their data might support
 - Really does not have to be true
- Recognize the null hypothesis
 - “There will be no patterns in the data”
 - Scientists support a research hypothesis by showing, statistically, that its opposite—the null hypothesis— is probably not true (**book**)

Identifying Variables

- Explicit identification of variables at the beginning of a study is most common in quantitative research, especially in experimental studies
- Identification of variables helps the researcher choose
 - an appropriate research design
 - an appropriate statistical analysis
(quantitative/qualitative variables)

Identifying Variables

- Variable: any quality or characteristic in a research investigation that has two or more possible values
 - Independent variable
 - researcher studies this variable as a possible cause of something else (may manipulate)
 - Dependent variable
 - potentially influenced by the independent variable, that is, may *depend* on the independent variable

Identifying Variables

Example:

- The consistency of ice cream (dependent variable - DV) depends on the temperature at which it's stored (independent variable - IV)
- High temperatures cause ice cream to melt, whereas low temperatures cause ice cream to be solid

Mediating Variables

- Mediating variables help explain why an independent variable has a particular effect on a dependent variable
 - Independent variable influences mediating variable, which in turn influences the dependent variable
 - Temperature, Pressure, Volume

Mediating Variables

- For example
 - confidence level → effort → performance
 - confidence level (IV) influences effort (mediator)
 - effort (mediator) influences performance quality (DV)
 - high confidence → more effort → great performance
 - low confidence → less effort → okay performance

Moderating Variables

- Moderating variables influence the nature & strength of relationship between IV and DV

Moderating Variables

- For example:
 - family income during childhood → problems later in life
 - low income + high maternal warmth → fewer problems
 - low income + low maternal warmth → more problems
 - high income + low maternal warmth → more problems
 - income (IV) does NOT influence maternal warmth (moderator)

Defining Terms

- Each term should be defined as it will be used by the particular researcher
 - Operational definition: the definition of a characteristic or variable in terms of how it will be measured in the research study not **as in the dictionary**

Defining Terms

- Examples
 - self-confidence = score on a self-report questionnaire that has items such as “I can usually achieve what I set out to do” and “I think of myself as a smart person”
 - popularity = number of peers who specifically identify an individual as being a desirable social partner

Stating assumptions

- All assumptions that have a material bearing on the problem should be openly and unreservedly set forth
- A statement of the assumptions is necessary for others to evaluate the conclusions of the study
- A statement of the assumptions reveals what the researcher may be taking for granted with respect to the problem

Identifying delimitations

- Delimitations are statements about what the researcher is not going to do.
- The researcher must distinguish between what is and what is not relevant to the problem
- For example, “I am interested in characteristics of X. I am not going to worry about influences on X.”

Identifying limitations

- The researcher must acknowledge weaknesses (limitations) that might cast doubt on results and conclusions
- For example:
 - “My sample is small and possibly not representative”
 - “I have certain personal biases, such as X and Y, that may affect my observations and interpretation”

Beginning a Research Proposal

- In the first section of a proposal, you should outline:
 - The problem and its setting
 - Sub-problems
 - *A priori* hypotheses
 - Variables
 - Assumptions, delimitations, and limitations
 - The importance of the study

Evaluating Your Proposed Research Project

- Have you conducted a thorough literature search to justify the time and effort expended on your research project?
- Have you looked at your research problem from all angles to minimize unwanted surprises?
- What research procedures will you follow?

Evaluating Your Proposed Research Project

- What research tools are available for you to use?
- Can others read and understand your proposal?

Fine-Tuning Your Research Problem

- Conduct a thorough literature review
- Try to see the problem from all sides
- Think through the process
- Discuss your research problem with others
- Remember that your project will take time
- Remember that the first draft of your proposal will almost certainly not be your last