Chapter 2 : Tools of Research

General Tools of Research
- Library and its resources
- Computer and its software
- Techniques of measurement
- Statistics
- Human mind
- Language

Library and its resources as a tools of research
- How to access info quickly and efficiently
  - Library catalogs
  - Reference Librarian
  - Browsing the library shelves
    - Dewey decimal classification system and Library of Congress system

Computer and Its Software as a Tool of Research
- Computer as research assistant
  - Planning the Study : Brainstorming, Outline, Project Management, Budget
  - Literature Review : Background Literature Identification (CD-ROM, Online DB), Telecommunication (E-mail, WWW), Writing
  - Study Implementation and Data Gathering : Experimental Control Assistance, Survey Distribution (DB to specify target), Material Production, Data Collection
  - Analysis and Interpretation : Organizational, Conceptual (Findings), Stat, Graphical
  - Reporting : Communication, Writing & Editing, Publishing, Distribution
Computer and Its Software as a Tool of Research

• Taking Advantage of the Internet
  - WWW, E-mail, News

Measuring Insubstantial Phenomena: an Example

Measurement as a Tool of Research

• What is measurement? Most of us think of measurement in terms of such objects as rulers, scales, gauges, and thermometers.

• In research:

  Measurement is limiting the data of any phenomenon—substantial or insubstantial—so that those data may be interpreted and, ultimately, compared to an acceptable qualitative or quantitative standard.
Four Scales of Measurement

- Nominal
- Ordinal
- Interval
- Ratio
Validity and Reliability of Measurement

• Validity of a measurement instrument is the extent to which the instrument measures what is supposed to measure. Ex. Thermometer measures temp.
• For insubstantial phenomena, may be somewhat suspect.
• Reliability is the consistency with which a measuring instrument yields a certain result when the entity being measured hasn’t changed.

Statistics as a Tool of Research

• All tools are more suitable for some purposes than for others.
• Statistics are typically more useful in some academic disciplines than in others.
• When we use, statistical values are never the end of a research.
• Final question in research is, “What do the data indicate?”
• Statistics give us information about data, but a conscientious researcher is not satisfied until the meaning of the information is revealed.

Primary Functions of Statistics

• 2 principal functions: to help researcher (1) describe data (2) draw inference from data.
• Descriptive statistics summarize the general nature of the data obtained.
• Inferential statistics help researcher make decisions about the data.

Human Mind as a Tool of Research

• Deductive logic: begins with one or more premises (statements or assumptions that are self-evident and widely accepted “truth”). Reasoning then proceeds logically from these premises toward conclusions that must also be true.
• Inductive reasoning: use specific instances or occurrences to draw conclusions about entire classes of object or events
Scientific Method: is a means whereby insight into the unknown is sought by
- Identify a problem that defines the goal of one’s quest
- Positing a hypothesis that, if confirmed, resolves the problem
- Gathering data relevant to the hypothesis
- Analyzing and interpreting the data to see whether they support the hypothesis and resolve the question that initiated the research

Critical Thinking
- Before beginning a research project, effective researchers typically look at research studies and theoretical perspectives related to their topic of interest.
- But they don’t just accept research findings and theories at face; instead, they scrutinize them for:-
  - Faulty assumptions
  - Questionable logic
  - Weaknesses in methodology
  - Inappropriate statistical analyses
  - Unwarranted conclusions

Critical thinking: involves evaluating information or arguments in terms of their accuracy and worth. May involve:-
- Verbal reasoning: understand and evaluating the persuasive techniques found in oral and written language.
- Argument analysis: discriminating b/w reasons that do and do not support a particular conclusion
- Decision making: identifying and judging several alternatives and selective the best alternative

Critical analysis of prior research: evaluating the value of data and research results in terms of the methods used to obtain them and their potential relevance to particular conclusions. Ex:
- Was an appropriate method used to measure a particular outcome?
- Are the data and results derived from relatively large # people, objects, or events?
- Have other possible explanations or conclusions been eliminated?
- Can the results obtained in one situation be reasonably generalized to other situation?