

## CHAPTER 1: Research Methods

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### CONCEPT MAP

#### I. Introduction

#### II. Making Observations

##### A. *Defining the Question*

- i. Testable Hypotheses—create an hypothesis that is testable
- ii. Operational Definition—present definitions that are observable and testable
- iii. Construct Validity—create valid and true measurements

##### B. *Parts of an Experiment*

- i. Independent Variables—what is manipulated by the experimenter
- ii. Dependent Variables—what is measured by the experimenter

##### C. *Systematically Collecting Data*

- i. Confirmation Bias—biases common to experiments may alter results
- ii. Anecdotal Information—anecdotal information and common sense are not scientific but may provide clues to important questions

##### D. *Defining the Sample*

- i. Population—all possible representatives of a group
- ii. Sample—a subset of the population
- iii. Random Sample—several methods including maximum variation sampling used to ensure randomness to a sample and maximum variant sampling
- iv. Case Studies—single subject or limited case studies may also be used

##### E. *Issues That May Compromise Experiments*

- i. External Validity—ensure that your study measures what it was supposed to measure
- ii. Demand Characteristics—be alert to characteristics of the experimenter or subject that hinder experiments
- iii. Double-blind Design—reduce or eliminate experimenter and subject bias

### **III. Working with the Data**

#### *A. Descriptive Statistics*

- i. Frequency Distributions—tallying and tabling the data
- ii. Measure of Central Tendency—ways to summarize and present the data
- iii. Finding the “Average”—means, median, modes
- iv. Measures of Variability—characterizing variability of the data set and summarizing variability using standard deviations

#### *B. Correlations, Reliability, and Validity*

- i. Scatter Plots—graphing the data
- ii. Correlation Coefficients—studying relationships between variables
- iii. Reliability—measures of reliability such as test–retest reliability and interobserver reliability

#### *C. Inferential Statistics and Testing Differences*

- i. Testing Differences—determining whether experimental manipulation produced an effect
- ii. Statistical Significance—defining p-values and determining effect size

### **IV. Observational Studies: Alternatives to Experiments**

#### *A. Quasi-experiments*

- i. Observational Studies—studies that do not explicitly manipulate variables
- ii. Quasi-experimental Design—study of nonrandomly assigned variables such as gender or age
- iii. Third Variable Problem—may be a third, unaccounted for, variable that is the causal agent for your results

#### *B. Establishing Cause and Effect*

- i. Experimental Groups—the group that receives the manipulation
- ii. Control Group—the group that gets no manipulation
- iii. Random Assignment—assures that the experimental and control group are similar
- iv. Within-Subject Comparisons—comparing a subject to itself before and after a manipulation.
- v. Power of Experiments—experimental design increases the power of an experiment

*C. Internal Validity*

- i. Internal Validity—did you measure what you thought you measured?

**V. Beyond the Single Experiment**

*A. Peer Review*—ensuring quality in research

*B. Replication*—when and how to replicate research

*C. Literature Reviews*—an alternative to research

*D. Disconfirming vs. Proving*

- i. Research does not prove.
- ii. Research only disconfirms previous research studies.

**VI. Research Ethics**

*A. APA Ethical Guidelines*

- i. Informed Consent of Subjects—subjects must be informed about the parameters of the experiment
- ii. Debriefing—participants must be given sufficient information regarding the experiment and its results following the experiment
- iii. Other Ethical Guidelines

*B. Institutional Review Boards*

*C. The Power of Science*