

A content analysis

A historical study - 2

An etymology

A single subject experiment

A correlational

A group comparison

Each of the statements above are actually questions turned into statements that will identify your paradigm.

Chapter 2

Research Problems

- A research problem is the focus of a research investigation.

Research Questions

- Many research problems are stated as questions.
- The essential characteristic of a researchable question is that there is some sort of information that can be collected in an attempt to answer the question.

Characteristics of Good Research Questions

- Research questions should be feasible -- that is, capable of being investigated with available resources.
- Research questions should be clear -- that is, unambiguous.
- Research questions should be significant -- that is, worthy of investigation.
- Research questions often (although not always) suggest a relationship to be investigated. The term "relationship," as used in research, refers to a connection or association between two or more characteristics or qualities.

Defining Terms in Research

- Three commonly used ways to clarify ambiguous or unclear terms in a research question involve the use of constitutive (dictionary-type) definitions; definition by example, and operational definitions.
- A constitutive definition uses additional terms to clarify meaning.
- An operational definition describes how examples of a term are to be measured or identified

Activity #2

Research Questions and Related Designs

Experimental

Historical

Content analysis

Correlational

Causal Comparative

Case Study Survey

What do elementary teachers in the San Francisco USD think about full inclusion as practiced in their district? SURVEY

Is there a relationship between students' level of social skills and successful transition into mainstream classes? CORRELATIONAL

How do individuals with physical disabilities perceive themselves in comparison to the able bodied peers in terms of work related activities? SURVEY

Does a whole-language curriculum lead to higher student achievement than phonics curriculum does? EXPERIMENTAL

How are teachers implementing the whole language approach to reading in the curricula a Harding Elem School? CASE STUDY

What were the key events that led to the demise of affirmative action in state hiring and college admissions in CA? HISTORICAL

How do magazines targeted at teenager's present information on safe-sex practices? CONTENT ANALYSIS

Are the reasons NA Indian students give for dropping out of school different from those given by non NA Indian students? CAUSAL COMPARATIVE

Chapter 3 Main Points

The Importance of Studying Relationships

- Identifying relationships among variables enhances understanding.
- Understanding of relationships helps us to explain the nature of the world in

which we live.

Variables

- A variable is any characteristic or quality that varies among the members of a particular group.
- A constant is any characteristic or quality that is the same for all members of a particular group.
- Several kinds of variables are studied in educational research, the most common being independent and dependent variables.
- An independent variable is a variable presumed to affect or influence other variables.
- A dependent (or outcome) variable is a variable presumed to be affected by one or more independent variables.
- A quantitative variable is a variable that varies in amount or degree, but not in kind.
- A categorical variable is a variable that varies only in kind, not in degree or amount.
- An extraneous variable is an independent variable that may have unintended effects on a dependent variable in a particular study.

Hypotheses

- The term "hypothesis," as used in research, usually refers to a prediction of results made before a study commences.
- A significant hypothesis is one that is likely to lead, if it is supported, to a greater amount of important knowledge than a nonsignificant hypothesis.
- Stating a research question as a hypothesis has both advantages and disadvantages.
- A directional hypothesis is a prediction about the specific nature of a relationship -- for example, method A is more effective than method B.
- A nondirectional hypothesis is a prediction that a relationship exists without specifying its exact nature -- for example, there will be a difference between method A and method B (without saying which will be more effective).

Commentary:

Topic needs to be converted into a question and key to that question are the variables that make up your question. What is the relation between a & b? What is the relationship between two things? When you get those variables, you need to be clear that you have a great range of choices if those are quantitative choices. If you are doing an ethnographic study, you are likely to have categorical variables. You differ in kind, not amount. Your testing will be very limited. You will probably look for patterns. You won't use SPSS.

If you want to be in the positivist—you need a question that has variables that are quantitative. You need instruments to get that quantitative data. As you think about your question, you need to shift thinking of what is next. How do I convert this into variables, quantitative or categorical in design? When you figure out your design, you have a proposal. As you move away from the positivist, you become the tool for data collection. You have to reveal your own bias. Tell where you are coming from. Give your perspective straight off—tell the reader—especially when you do qualitative, ethnographic research. In qualitative, the control is having three different sources on the topic. What you get from interviews you also got from content analysis and archival data (records of achievement/performance). You have to provide some validation that the data or info actually supports your bias.

Chapter 5:

The Value of a Literature Review

- A literature review helps researchers learn what others have written about a topic. It also lets researchers see what have been the results of other, related studies.
- A detailed literature review is often required of master's and doctoral students when they design a thesis.

Type of Sources for a Literature Review

- Researchers need to be familiar with three basic types of sources (general references, primary sources, and secondary sources) in doing a literature review.
- General references are sources a researcher consults to locate other sources.
- Primary sources are publications in which researchers report the results of their investigations. Most primary source material is located in journal articles.
- Secondary sources refer to publications in which authors describe the work of others.
- RIE and CIJE are two of the most frequently used general references in educational research.
- Search terms, or "descriptors" are words researchers use to help locate relevant primary sources.

Steps Involved in a Literature Search

- The essential steps involved in a review of the literature include: (1) defining the research problem as precisely as possible; (2) pursuing the secondary sources; (3) selecting and pursuing an appropriate general reference; (4) formulating search terms; (5) searching the general references for relevant primary sources; (6) obtaining and reading the primary sources, and noting and summarizing key points in the sources.

Ways to Do a Literature Search

- Today, there are two ways to do a literature search -- manually, using the traditional paper approach, and electronically, by means of a computer. The most common and frequently used way, however, is to search online via computer.
- There are five essential points (problem, hypothesis, procedures, findings, conclusions) that researchers should record when taking notes on a study.

Doing a Computer Search

- Computer searches of the literature have a number of advantages -- they are fast, are fairly inexpensive, provide printouts, and enable researchers to search using more than one descriptor at a time.
- The steps in a manual search are similar to those in a computer search, though computer searches are visually the norm.
- Researching the World Wide Web (WWW) should be considered, in addition to ERIK and PsycINFO, in doing a literature search.
- Some of the Information on the Web is classified into *directories*, which group websites together under similar categories. Yahoo! is an example of a directory.
- To obtain more specific information, *search engines* should be used, because they search all of the contents of a website.

The Literature Review Report

- The literature review report consists of an introduction, the body of the review, a summary, the researcher's conclusions, and a bibliography.
- When a researcher does a meta-analysis, he or she averages the results of a group of selected studies to get an overall index of outcome or relationship.
- A literature review should include a search for relevant meta-analysis reports, as well as individual studies.

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Samples and Sampling

- The term "sampling," as used in research, refers to the process of selecting the individuals who will participate (e.g., be observed or questioned) in a research study.
- A sample is any part of a population of individuals on whom information is obtained. It may, for a variety of reasons, be different from the sample originally selected.

Samples and Populations

- The term "population," as used in research, refers to all the members of a particular group. It is the group of interest to the researcher, the group to whom the researcher would like to generalize the results of a study.
- A target population is the actual population to whom the researcher would like to generalize; the accessible population is the population to whom the researcher is entitled to generalize.
- A representative sample is a sample that is similar to the population on all characteristics.

Random Versus Nonrandom Sampling

- Sampling may be either random or nonrandom. Random sampling methods include simple random sampling, stratified random sampling, and cluster random sampling. Nonrandom sampling methods include systematic sampling, convenience sampling, and purposive sampling.

Random Sampling Methods

- A simple random sample is a sample selected from a population in such a manner that all members of the population have an equal chance of being selected.
- A stratified random sample is a sample selected so that certain characteristics are represented in the sample in the same proportion as they occur in the population.
- A cluster random sample is one obtained by using groups as the sampling unit rather than individuals.
- A two-stage random sample selects groups randomly and then chooses individuals randomly from these groups.
- A table of random numbers is a table of numbers, listed and arranged in no particular order that is used to select a random sample.

Nonrandom Sampling Methods

- A systematic sample is a sample obtained by selecting every n th name in a population.
- A convenience sample is any group of individuals that is conveniently available to be studied.
- A purposive sample is a sample selected because the individuals have special qualifications of some sort, or because of prior evidence of representativeness.

Sample Size

- Samples should be as large as a researcher can obtain with a reasonable

expenditure of time and energy. A recommended minimum number of subjects is 100 for a descriptive study, 50 for a correlational study, and 30 in each group for experimental and causal-comparative studies.

External Validity (Generalizability)

- The term "external validity," as used in research, refers to the extent that the results of a study can be generalized from a sample to a population.
- The term "population generalizability" refers to the extent to which the results of a study can be generalized to the intended population.
- The term "ecological generalizability" refers to the extent to which the results of a study can be generalized to conditions or settings other than those that prevailed in a particular study.

Replication

- When a study is replicated, it is repeated with a new sample and sometimes under new conditions.

In Chap 3. If I use a sample just from my district, I have to discuss the value and limitations of this "convenient" group. They don't represent all people in all districts. You don't know what it represents other than intelligent people wanting to participate in research. There is an inherent bias.

If you are doing qualitative research—he doesn't endorse random sampling—you need a **purposeful sample**. You interview/survey people who already know what you are trying to get at.

Sample number: text gives a formula that relates to the idea of to whom do you wish to generalize. If you want a descriptive study, you need 100 people because if you are going to do an analysis of the survey responses, you need to be able to break that down three or four ways. You need to be able to fill the cells—less people won't fill the cells.

For a correlational study-you need at least 50. If you are looking for a relationship, how strong does that relationship have to be before it's viewed as important? With 50 people, you can say "across this 50, this relationship holds."

Experimental-random group—some get a treatment.

Causal comparative-like experimental except you already have the result. What you have is causes that might have produced the result. You did not offer them a treatment. You don't know what caused the outcome. You are looking for is what is the treatment that caused this. You need at least 30 in each group—30 who got the treatment and 30 do not.

How valid are my results for the population, for something else? If you do this, you have to make a statement about who the population is.

Ecological generalization- limited generalization (Most of us will do this). "Future sixth graders MAY have this experience." (In chap 4).

Replication usually deals with experimental studies when you can control things. Qualitative is not really replicated because you use a new site or subjects. You could use the same instrument and duplicate without replicating. It's not that I want to find these findings all over again, it's because I believe that a different finding will be found under a new condition.

The visuals in the text are very good.

Interactive Activity:

A researcher surveying opinions about a university president first determines the population of the total faculty in each college in the university. She then randomly selects the same proportions for sample. STRATIFIED RANDOM SAMPLING

A researcher is interested in interviewing the members of the NYC police force who do not live in the city. He gets a roster of the names of all officers on the force, randomly selects five police stations and then conducts interviews of all officers in those stations. CLUSTER SAMPLING-this one is not as clear as it might be

Another researcher is also interested in interviewing alumni of SSC who graduated between the years of 1990 and 1996. She gets the name of these individuals from the alumni office, selects these individuals from the alum office and mails a questionnaire to everyone on his roster. NO SAMPLING—ENTIRE POPULATION IS BEING STUDIED

A researcher is interested in interviewing alum of SSC who graduated between 1990 and 1996. She gets the roster and selects 100 SIMPLE RANDOM SAMPLING

A researcher is interested in identifying the attitudes of the physicians who work for toward the republican plan for health care. She obtains a list of the staff and randomly selects ten of these centers. Then she obtains a list of the doctors at these centers TWO STAGE RANDOM SAMPLING

A graduate student enrolled in the Marriage and Family Counseling Program at Daytona U is interested in determining how other graduate students feel about the program. He interviews all of the students he has access to on a given Monday night when he takes one of his counseling courses. CONVENIENCE SAMPLING

A student enrolled in the Hotel and Rest—interviews the experts. PURPOSEFUL SAMPLING

Chapter 7

What Are Data?

- The term "data" refers to the kinds of information researchers obtain on the subjects of their research.

Instrumentation

- The term "instrumentation" refers to the entire process of collecting data in a research investigation.

Validity and Reliability

- An important consideration in the choice of an instrument to be used in a research investigation is validity: the extent to which results from it permit researchers to draw warranted conclusions about the characteristics of the individuals studied.
- A reliable instrument is one that gives consistent results.

Objectivity and Usability

- Whenever possible, researchers try to eliminate subjectivity from the judgments they make about the achievement, performance, or characteristics of subjects.
- An important consideration for any researcher in choosing or designing an instrument is how easy the instrument will actually be to use.

Ways to Classify Instruments

- Research instruments can be classified in many ways. Some of the more common are in terms of who provides the data, the method of data collection, who collects the data, and what kind of response they require from the subjects.
- Research data are data obtained by directly or indirectly assessing the subjects of a study.
- Self-report data are data provided by the subjects of a study themselves.
- Informant data are data provided by other people about the subjects of a study.

Types of Instruments

- Many types of researcher-completed instruments exist. Some of the more commonly used are rating scales, interview schedules, tally sheets, flowcharts, performance checklists, anecdotal records, and time-and-motion logs.

- There are also many types of instruments that are completed by the subjects of a study rather than the researcher. Some of the more commonly used of this type are questionnaires; self-checklists; attitude scales; personality inventories; achievement, aptitude, and performance tests; projective devices; and sociometric devices.
- The types of items or questions used in subject-completed instruments can take many forms, but they all can be classified as either selection or supply items. Examples of selection items include true-false items, multiple-choice items, matching items, and interpretive exercises. Examples of supply items include short-answer items and essay questions.
- An excellent source for locating already available tests is the *ERIC Clearinghouse on Assessment and Evaluation*.
- Unobtrusive measures require no intrusion into the normal course of affairs.

Types of Scores

- A raw score is the initial score obtained when using an instrument; a derived score is a raw score that has been translated into a more useful score on some type of standardized basis to aid in interpretation.
- Age/grade equivalents are scores that indicate the typical age or grade associated with an individual raw score.
- A percentile rank is the percentage of a specific group scoring at or below a given raw score.
- A standard score is a mathematically derived score having comparable meaning on different instruments.

Measurement Scales

- Four types of measurement scales -- nominal, ordinal, interval, and ratio -- are used in educational research.
- A nominal scale involves the use of numbers to indicate membership in one or more categories.
- An ordinal scale involves the use of numbers to rank or order scores from high to low.
- An interval scale involves the use of numbers to represent equal intervals in different segments on a continuum.
- A ratio scale involves the use of numbers to represent equal distances from a known zero point.

Preparing Data for Analysis

- Collected data must be scored accurately and consistently.
- Once scored, data must be tabulated and coded.

Commentary:

If you are doing qualitative, check your bias, don't claim to be objective. You are not a positivist.

Supply items are generally a bad idea. Most people don't want to take the time to figure out the answer and give it to you. You then have to figure out how to assess it. The way around is to have a focus group and based upon ideas they supply, you then create an item probably using a likert scale from agree to disagree. The item is based on an idea shared in the focus group and then you get the opinion of the rest as to if it is an important idea.

ERIC clearinghouse—go there to look at some instruments and use their format or general approach. If you are going to say that you are using the instrument from somewhere else, you MAY NOT change it. If you do, say you are using a modified instrument and you have thrown out the data out on the instrument. It no longer applies as tested and validated because it is NOT the instrument that you are using.

If you want to be able to say something about an attitude in sort of definitive terms you have to know how the instrument works. You go through a series of stat procedures to see how it works. You have to test a likert scale, but you wouldn't have to do the statistical test as you would on an attitude scale. If you say this instrument will reliably provide info, you would have to give it to some other group and run a test. If you get a low correlation, you need to rework and retest the instrument.

One measure that is a powerful measure is an unobtrusive measure. You collect but don't intervene in any way. How engaged are teachers? Go to parking lot and count cars at 3:30. That's an unobtrusive measure. You didn't construct it and use it—appropriate in an ethnographic study.

Measurement Scales—the core of this chapter. Four types: nominal, ordinal, interval and ratio. You need to be clear, because this determines what kind of analysis you can do.

Nominal—membership in one or more categories—people differ in kind but not in degree
Ordinal—rank—horse race—the order in which they came from high to low, first to last.
Limited

Interval—the difference between two different levels on a continuum are known. 32 degrees is a significant difference from 34. On likert 3 is different from 4, but you don't know if the difference between 2& 3 and 3& 4 are not clear. You don't know the interval—likert is not interval

Ratio—most powerful, it has all characteristics of other scales, you know the difference between each number and has a zero.

If you are doing a quantitative study, and you want to do statistical analysis, you will need data sets that permit you to do that. In chap 3, tell us what is the type of measurement scale you use and why it is appropriate for your question and what kind of analysis it permits you to do.

Activity:

A researcher wishes to observe and record the behavior of individual over time
ANECTDOTAL RECORD

A researcher wishes to survey a large group of individuals QUESTIONNAIRE

A researcher wants to find out how much someone knows about the French Revolution
ACHIEVEMENT TEST

A researcher wants to evaluate the quality of a new microwave oven RATING SCALE

A researcher wants to get in-depth information from a small group of people
INTERVIEW

A researcher wants to gain some idea of how students in a graduate program in teacher education feel about the student teaching experience ATTITUDE SCALE which needs to be somewhat standardized.

Which type of instrument is most appropriate?

A person's self concept QUESTIONNAIRE

Readiness for kindergarten APTITUDE

A person's experiences in high school INTERVIEW

Assessing paramedic skills PERFORMANCE CHECKLIST

Quality of college application RATING SCALE

Ability to work with others on a research project RATING SCALE

Educational experiences INTERVIEW

Potential of high schools seniors for college work APTITUDE

Type of questions asked by students in a chemistry class TALLY SHEET

Prevalence of different kinds of errors in baseball TALLY SHEET

Student evaluations of instructor competence RATING SCALE

How a particular student feels about poetry INTERVIEW

Public reactions to recently announced plan to raise property taxes QUESTIONNAIRE

PC

Ability to use a calculator PERFORMANCE CHECKLIST—we thought/TALLY SHEET—author JUST MEANS YES OR NO

Chapter 8

Validity

- It is important for researchers to use valid instruments for the conclusions they draw are based on the information they obtain using these instruments.
- The term "validity," as used in research, refers to the appropriateness, meaningfulness, correctness, and usefulness of any inferences a researcher draws based on data obtained through the use of an instrument.
- Content-related evidence of validity refers to judgments on the content and logical structure of an instrument as it is to be used in a particular study.
- Criterion-related evidence of validity refers to the degree to which information provided by an instrument agrees with information obtained on other, independent instruments.
- A criterion is a standard for judging; with reference to validity, it is a second

instrument against which scores on an instrument can be checked.

- Construct-related evidence of validity refers to the degree to which the totality of evidence obtained is consistent with theoretical expectations.
- A validity coefficient is a numerical index representing the degree of correspondence between scores on an instrument and a criterion measure.
- An expectancy table is a two-way chart used to evaluate criterion-related evidence of validity.

Reliability

- The term "reliability," as used in research, refers to the consistency of scores or answers provided by an instrument.
- Errors of measurement refer to variations in scores obtained by the same individuals on the same instrument.
- The test-retest method of estimating reliability involves administering the same instrument twice to the same group of individuals after a certain time interval has elapsed.
- The equivalent-forms method of estimating reliability involves administering two different, but equivalent, forms of an instrument to the same group of individuals at the same time.
- The internal-consistency method of estimating reliability involves comparing responses to different sets of items that are part of an instrument.
- Scoring agreement requires a demonstration that independent scorers can achieve satisfactory agreement in their scoring.

Commentary:

You need to talk about the validity and how you get some measure of its validity. You are going to probably use some panel of experts to talk about the structure and how it matches the concept. If you move more toward quantitative using interval scales, you have to establish the validity—how it relates to some other construct that you know—to the degree you can do that quantitatively—you need to match the scores of your instrument with those of another proven instrument. You need to spend time constructing the instrument before you use it. Check the clearinghouse to see if someone has already done that and can tell you about the reliability. It will do over and over again what it says it will do—using some statistical test.

If you do qualitative work you have to talk about how the instrument matches, but you are not going to have a quantitative test.

Positivists are very formal and systematic.

Read through Chap 8 and decide the relevance of your own study.

ACTIVITY:

A researcher develops two versions of a test meant to measure interests in students prior to their taking an examination. He gives one version of the test to a group of college sophomores on a Monday and the other version of the test to them on the next day.

- a. internal consistency
- b. test-retest reliability
- c. equivalent forms reliability
- d. none of the above

A teacher develops a new test for high school biology. She gives the test twice, once to the students in her morning class and once to the students in her afternoon class. She then compares the scores for the classes of students.

- a. internal consistency
- b. test-retest reliability
- c. equivalent forms reliability
- d. none of the above

Chapter 14

Single subject research—most will not be doing this. It is more a psychological study-intensely studying one subject. Not applicable

Chapter 13: Experimental research

The claim is that this research is the only design you can be fairly certain in determining the result or discuss cause and effect.

The Uniqueness of Experimental Research

- Experimental research is unique in that it is the only type of research that directly attempts to influence a particular variable, and it is the only type that, when used properly, can really test hypotheses about cause-and-effect relationships. Experimental designs are some of the strongest available for educational researchers to use in determining cause and effect.

Essential Characteristics of Experimental Research

- Experiments differ from other types of research in two basic ways — comparison of treatments *and* the direct manipulation of one or more independent variables by the researcher.

Randomization

- Random assignment is an important ingredient in the best kinds of experiments. It means that every individual who is participating in the experiment has an equal chance of being assigned to any of the experimental or control conditions that are being compared.

Why Scientific Research Methodology is of Value

- The scientific method provides an important way to obtain accurate and reliable information.—*Not only is it observable, but it is public.*

Ways of Knowing

- There are many ways to obtain information, including sensory experience, agreement with others, expert opinion, logic, and the scientific method.
- The scientific method is considered by researchers the most likely way to produce reliable and accurate knowledge.
- The scientific method involves answering questions through systematic and public data collection and analysis.

Types of Research (Frankel's list)

- Some of the most commonly used scientific research methodologies in education are experimental research, correlational research, causal-comparative research, survey research, content analysis research, qualitative research, and historical research.
- Experimental research involves manipulating conditions and studying effects.
- Correlational research involves studying relationships among variables within a single group, and frequently suggests the possibility of cause and effect. *Establishes relationships but not causes.*
- Causal-comparative research involves comparing known groups who have had different experiences to determine possible causes or consequences of group membership. *Look in multiple ways*
- Survey research involves describing the characteristics of a group by means of such instruments as interview schedules, questionnaires, and tests.
- Ethnographic research concentrates on documenting or portraying the everyday experience of people using observation and interviews.
- Ethnographic research is one form of qualitative research. Another common form of qualitative research involves case studies.
- A case study is a detailed analysis of one or a few individuals.
- Content analysis research involves the systematic analysis of communication.
- Historical research involves studying some aspect of the past.
- Action research is a type of research by practitioners designed to help improve their practice.
- Each of the research methodologies described constitutes a different way of inquiring into reality and is thus a different tool to use in understanding what goes on in education.
- *People are not simply observed—random assignment of people and some experiment*

General Research Types

- Individual research methodologies can be classified into general research types. Descriptive studies describe a given state of affairs. Associational studies investigate relationships. Intervention studies assess the effects of a treatment or method on outcomes.
- Quantitative and qualitative research methodologies are based on different assumptions; the purpose of research, the methods used by researchers, the kinds of studies undertaken, the researcher's role, and the degree to which generalization is possible.
- Meta-analysis attempts to synthesize the results of all the individual studies on a given topic by statistical means. *Phonics example*

Critical Analysis of Research

- Critical analysis of research raises basic questions about the assumptions and implications of educational research.

The Research Process

- Almost all research plans include a problem statement, an exploratory question or hypothesis, definitions, a literature review, a sample of subjects, instrumentation, a description of procedures to be followed, a time schedule, and a description of intended data analyses.

Types of Research

1. Diplomatic relationships between Japan and the US 1918-1941 A HISTORICAL STUDY
2. Images of women in U.S. history A CONTENT ANALYSIS
3. Relationship between student attendance and achievement in chemistry classes CORRELATIONAL
4. Number of single mothers on welfare in the city of Chicago SURVEY
5. Daily activities of an operating room nurse in a big city hospital ETHNOGRAPHY
6. a comparison of the inquiry method and the lecture methods in teaching high school bio GROUP COMPARISON
7. changing impulsive behavior through the use of praise SINGLE SUBJECT EXPERIMENT

Choices: A case study

A survey

Control of Extraneous Variables

- The researcher in an experimental study has an opportunity to exercise far more control than in most other forms of research.
- Some of the most common ways to control for the possibility of differential subject characteristics (in the various groups being compared) are randomization, holding certain variables constant, building the variable into the design, matching, using subjects as their own controls, and the statistical technique of ANCOVA.

Weak Experimental Designs

- Three weak designs that are occasionally used in experimental research are the one-shot case study design, the one-group pretest-posttest design, and the static-group design. They are considered weak because they do not have built in controls for threats to internal validity.
- In a one-shot case study, a single group is exposed to a treatment or event, and its effects assessed.
- In the one-group pretest-posttest design, a single group is measured or observed both before and after exposure to a treatment.
- In the static-group comparison design, two intact groups receive different treatments.

True Experimental Designs

- Several stronger designs that are more commonly used are true experimental designs, matching designs, counterbalanced designs, time-series designs, and factorial designs. These designs do have at least some controls built into the design to control for threats to internal validity.
- The randomized posttest-only control group design involves two groups formed by random assignment and receiving different treatments.
- The randomized pretest-posttest control group design differs from the randomized posttest-only control group only in the use of a pretest.
- The randomized Solomon four-group design involves random assignment of subjects to four groups, with two being pretested and two not.

Matching

- To increase the likelihood that groups of subjects will be equivalent, pairs of subjects may be matched on certain variables. The members of the matched groups are then assigned to the experimental and control groups.
- Matching may be either mechanical or statistical.
- Mechanical matching is a process of pairing two persons whose scores on a particular variable are similar.
- Two difficulties with mechanical matching are that it is very difficult to match on more than two or three variables, and that in order to match, some

- subjects must be eliminated from the study, since no matches can be found.
- Statistical matching does not necessitate a loss of subjects.

Quasi-Experimental Designs

- In a counterbalanced design, all groups are exposed to all treatments, but in a different order.
- A time-series design involves repeated measurements or observations over time, both before and after treatment.

Factorial Designs

- Factorial designs extend the number of relationships that may be examined in an experimental study.

Commentary: Random assignment is extremely important. If you don't, a possible problem may be that the treatment may have already been there. In random these subjects would be mixed by equal chance.

Extraneous variables deal with the history. Your measure of impact is increased because some of the people left the study.

A basic control is randomization and that the non-treatment group believes that they are getting something or something different. It's an extraneous variable contaminating the results you get.

It's difficult to claim that one group got treatment and others did not. You can talk about relationships and associations, but you can't say one thing causes something else.