Research and Program Evaluation

Comps Study Guide #7

Define research
and the two types of research.

Research is the collecting and analyzing of information about a articular subject. It may involve searching through written material, observation of a phenomenon or of people, or experiments.

Research an be divided into deductive and inductive types.

- **Deductive research** sets out to prove or disprove a theory by collecting data and testing hypotheses.

- **Inductive research** works from known information to develop a theory by establishing relationships or patterns in the data.

Describe non-experimental quantitative research
giving examples of each type.

Quantitative research is systematic and usually uses scientific methods. **Non experimental types** are survey, descriptive, comparative, correlational, and Ex Post Facto.

1. **Surveys** can be questionnaires or interviews and can be used to ascertain attitudes, beliefs, and opinions. Surveys sent out through the mail often have a poor response rate, which may invalidate generalizations make from them.

2. **Descriptive or statistical research** can be used to document such factors as frequencies, averages, etc., showing the who, what, when, where, and how of the data. An example is a ratings chart

3. **Comparative research** compares two or more groups without changing any of the experiences of the groups. A comparative survey would ask, "Which are more alike?"

4. **In correlational research** the degree of relationship between variables is determined by the use of the correlation coefficient.

5. **Ex Post Facto, or causal comparative, research** discovers the relationships between pre-existing variables. The t-test and variance statistics may be used.

Describe qualitative research.

Qualitative research is an in-depth investigation of the subject, which often is a group of people, but may be an individual. The group may be a family, a community, or even an ethnic or cultural minority. The motivation for the research usually involves learning the reasons why the subject practices certain behaviors. Research methods include observation, case studies, and participant observation.

- One type of qualitative research is **ethnographic research**, which is the foundation of anthropology.
- **Interactive qualitative research** includes case studies and ethnography.
- **Non interactive qualitative research** includes a study and analysis of the literature about a particular subject.

Describe experimental and quasi-experimental quantitative research and give an example.

The cause and effect relationship between variables can be discovered by **experimental quantitative research**. In such research there will be a control factor, a dependent variable, and an independent variable while random and confounding variables will be eliminated. The hypothesis is tested by the measurement of the changes in the independent variable as compared with the control. An example would be a foreign language class in which half the students (the control) receive only the classroom lessons, and the other half watch a film with subtitles in the language they are learning.

Quasi-experimental research is much like experimental but may not use a control. The results from quasi experimental research may not be unequivocal.

Explain external validity
and the factors that can threaten it.

External validity is the accuracy with which the results of a study can be generalized to a larger population. Loss of external validity can come from such factors as too small a sample or from differing circumstances. For example a study using only high school students cannot be generalized to all students. Nor can a study of factory workers be generalized to all employed people. Changing circumstances during the study can also affect external validity.

Generalization can also be affected by the Hawthorne effect, the Rosenthal effect, and demand characteristics.
- **The Hawthorne effect** is caused by the study subjects knowing they are involved in a study or by the attention paid to the subjects.
- The **Rosenthal effect**, also called experimenter bias and the **Pygmalion effect,** happens when the study subjects change their behavior because of the attitudes, expectations, or behavior of the researcher.
- **Demand characteristics** are caused by information received by the subjects, including rumors they heard before the start of the study.

Explain internal validity and the confounding variables that can occur.

Internal validity is the extent to which the results of an experiment can be attributed to the variable under study because extraneous or confounding variables have been controlled.

Confounding variables can include the selection of subjects, the testing instruments, the maturation and experiences of the subjects during the study, and the researchers themselves.

- Subject selection becomes a confounding variable unless the control and experimental groups are identical in age, gender, ethnicity, and socioeconomic background.
- Identical testing and recording instruments must be used with both groups and must remain reliable and consistent.
- If the study endures for more than a few weeks, then the maturation and/or experiences of the subjects become confounding variables.
- If group members drop out of the study or die during it, their loss will affect the outcome.
- The researcher becomes a confounding variable if he allows his biases to influence his reporting of the study and the results, or if such factors as health and fatigue affect it.

Sampling is selecting a part of a population in order to make a valid generalization about the total population. Describe the types of samples.

1. **Random sampling** is choosing the subjects for a study entirely by chance. Such sampling reduces the likelihood of bias.

2. **Stratified sampling** divides the population into subgroups according to some criteria - such as age, ethnicity, gender, or socioeconomic level, and then selects subjects from each subgroup. This increases the validity of generalizing the findings to the entire population.

3. **Proportional stratified sampling** is the selection of the number of subjects from each subgroup that corresponds to the percentage of the population that fits into that subgroup.

4. **Cluster sampling** divides the population into subdivisions or clusters, and then selects a random sample from the clusters.

5. **Purposeful sampling** is the selection of subjects for in-depth study. Generalizations are not derived from these studies.

Studies based on convenience or volunteer samples do not produce normal score distributions but may provide useful information.

Describe the four levels of measurement.

1. **Nominal measurements** are categorical variables such as gender, race, marital status, and religion. In a study nominal measurements are used to describe the demographics of the subjects.

2. **Ordinal measurements** are used to describe variables that can be ranged in some type of order or ranking. Opinion and attitude scales are examples.

3. **Interval level of measurement** is used to describe variables with similar or equal distances between the ranks. Generations and crime rates are examples.

4. **Ratio level of measurement** applies to variables that have equal intervals and a zero reference point. This type of measurement is little used in the social sciences since attitudes are usually not measured at the zero level.

Explain independent and dependent variables
and Type I and Type II errors.

The **independent variable** is the factor in an experiment or study that is changed by the researcher.

The **dependent variable** is what is being measured by the study and is changed in response to the changes in the independent variable.

In a **type I error (alpha error)** the null hypothesis is rejected as false or unproven when it is actually true.

A researcher makes a **type II error (beta error)** when he or she does not reject the null hypothesis when it is actually false. Type II errors are often the result of a sample size that is too small.

Define the terms:
meta-analysis,
sample size,
table of random
numbers,
Likert scale,
and scatterplot.

Meta-analysis - answering a research question through the comparison of results from multiple studies.

Sample size - the number of samples included in a study.

Table of random numbers - a list of random numbers (usually computer-generated) that can be assigned to potential study samples and used to randomly select those who will participate in the study.

Likert scale - a rating scale on which study participants agree or disagree with statements that measure attitudes or opinions.

Scatterplot - a graphic using horizontal and vertical lines to illustrate the relationship between two variables.

Explain *t-test.*

The *t-test* compares the mean of two independent data sets to determine if there is a significant statistical difference between them. The test makes reference to an established Table of *t* Values.
It can establish the existence or non-existence of relationships between data sets before a full standard deviation value is determined. This test can be especially useful for small sample groups.

Explain the various forms of hypothesis and how the significance level affects study results.

Hypothesis is a statement or prediction of what will be shown by a study. It may be a hunch, an educated guess, or derived from a theory.

1. **null hypothesis** assumes no difference or no association between variables.
2. **directional hypothesis** predicts how the independent variable will affect the dependent variable.
3. **non-directional hypothesis** predicts an effect, but does not state how the dependent variable will be affected.

Significance level indicates the probability of making a type 1 error in a hypothesis test. It is usually set as low as possible with a level of .05 or 5% being a commonly used level.

Describe the analysis of covariance and the three basic kinds of analysis of variance.

Analysis of covariance (ANCOVA) is used in studies where the dependent variables are controlled. Possible techniques of controlling the variables are to use non-random samples or to statistically adjust variables that affect the dependent variable.

1. **One-way analysis** of variance is a test for differences when the study involves three or more independent groups or levels.
2. **Factorial analysis of variance (ANOVA**) is used in the study of two or more variables. The 2X2 design, in which there are two independent variables each with two distinct values, is the most common, although multi-level designs can be used.
3. **Multivariate analysis of variance (MANOVA)** is used in studies involving several dependent variables and at least two independent variables.

Explain chi-square and bivariate tabular analysis

Chi-square is used to determine if there are significant differences in the distribution of two data sets. This test is used to determine whether the data fits a known type of distribution or whether different attributes or factors in a single data set are related or independent of each other. Another use for the test is to determine if two data sets or populations are homogeneous when compared to each other.

Bivariate tabular analysis (or **crossbreak**) is a method of graphically illustrating the relationship or non-relationship of two variables by the use of an X/Y graph. Traditionally the independent variable is shown by the vertical axis and the dependent variable by the horizontal axis.

Describe the following:
Solomon four-group design,
multiple regression,
factor analysis,
and biserial correlation.

Solomon four-group design is a study of whether or not a pretest affects the subjects of a study by sensitizing or influencing them before the start of the research. Such effects must be considered in the comparison of the results with the control group.

Multiple regression is a procedure in which the researcher uses a correlation coefficient to learn about the relationship between multiple independent variables and a dependent variable. The procedure can be used to determine the "best predictor" of a particular event or outcome. An example would be which personality trait best predicts social adjustment.

Factor analysis examines the relationships among a group of variables for the purpose of determining the simplest explanation for those relationships, which is usually the smallest number of factors involved.

The Biserial correlation coefficient is a measure of the relationship between one variable with multiple values and another that is dichotomous.

Describe *post hoc* and nonparametric tests.

***Past hoc* tests,** which are multiple comparison tests, can be done after the data sets in a study are determined to have similar F values. Popular tests, listed in order from most conservative to most liberal include: Scheffe's, Tukey's Honesty Significant Difference (HSD), Newman-Keuls, Duncan's New Multiple Range Test, and Fisher's LSD.

Nonparametric tests are validation tests used when a study yields values that are not distributed normally or the sample variance is close to that of the population. When two samples are independent of each other and have significantly differing means, the Mann-Whitney U Test is appropriate. The Wilcoxon Signed-Rank Test is useful in situation where each individual has two or more scores or two data sets have the same values. A nonparametric one-way analysis of variance is the Kruskal-Wallis Test used when there are multiple values for a single variable or factor.

Discuss accountability
in the field of counseling.

Accountability is primarily concerned with the effectiveness of the treatment and with justification of the cost.
- Both **formative evaluation**, which analyzes the effectiveness of a treatment, process, or technique, and
- **summative evaluation,** which measures how well a program meets its goals, are used to determine if a program is worthwhile.

Justification of the cost of a program is related to its effectiveness and must answer the question "Is the results worth the cost?" Whether it is an insurance company, an individual, a government agency, or a business providing a service to its employees, whoever is paying for the program wants an explanation for the cost as well as information about the effectiveness of the program. Specific measurable objectives must be established and the level of achievement measured and documented.

Define the following terms:
cross-sectional,
degrees of freedom,
double-blind technique,
heteroscendasticity,
homoscedasticity,
and semantic differential.

Cross-sectional - a study of the characteristics of multiple groups. The study of one group's characteristics over a period of time is a longitudinal study.

Degrees of freedom - how many observations the researcher may make after he or she has made the minimum number needed for the study.

Double-blind technique - neither the subjects nor the researchers know at least one variable. For example, in a drug test neither would know which subjects had received the actual drug or which had received the placebo.

Homoscedasticity - statistical variances are assumed to be equal

Heteroscedasticity - unequal variance of the data.

Semantic differential - a method for measuring a subject's reactions to words or concepts through the use of a bipolar scale using contrasting adjectives.

Explain the ethical issues faced in doing research

Primary ethical issues in research involve informed consent, confidentiality, credit. and truthfulness in reporting. Research subjects should always be aware that they are participating in a research project and should have given their consent to participate only after being fully informed about the research and any risks involved. The informed consent is especially important in any research where there may be arm to the subjects, such as in drug testing where the control group receives a placebo or the new drug may produce harmful side effects.

All personal information should be held in strict confidence and raw data should be accessible only to the research team.

In reporting the results of the research it is imperative that the report be accurate even when the results disprove the researcher's theory and that proper credit is given to all involve.

Explain writing issues faced in doing research.

In addition to the ethical issues of accurate reporting and giving credit where it is deserved, the researcher must write his/her report in an acceptable style. The Publication Manual of the American Psychological Association is the standard style manual for most counseling and psychological publications as well as for many college and university dissertations.

- Reports should be free of sexist, racist, and any other inappropriate language.
- Reports may be written for a sponsoring agency, for publication, or both.
- If the report is submitted for publication, it should only be submitted to one journal at a time.

Describe ERIC.

ERIC is the acronym for the Educational Resources Information Center, an electronic library of educational research and information.

Sponsored by the Institute of Education Sciences, a part of the U.S. Department of Education, ERIC provides access to bibliographic records of journals and other literature from 1966 to the present.

The database also has a growing number of full-text materials. Currently ERIC indexes more than 650 journals and offers free, full-text access to over 100,000 other materials.

Define the following in terms of counseling research:
parsimony,
parameter,
statistic,
probability,
correlation,
and SPSS.

Parsimony - the researcher interprets the results of a study in the simplest and least complex manner - sometimes called Occam's Razor.

Parameter -a value used to represent a characteristic of the population. Statistic is a value calculated from a data sample.

Probability - the quantitative description of the likelihood of a particular event occurring.

Correlation - the relationship between variables.
*   **Positive correlation** - both variables have the same directional change.
    Negative correlation - the variables change in opposite directions.
*   **Zero correlation** - the variables have no relationship.

SPSS (Statistical Package for the Social Sciences) - a software package for use statistical analysis.