Research Methods and Design

Scientific Method:

Steps of the Scientific Method:

1. Involves specifying a specific problem(s),
2. Systematically observing events,
3. Forming a hypothesis regarding the relationship between the variables,
4. Collecting new observations in order to test the hypothesis,
5. Using the evidence to formulate & support theory,
6. Testing the theory.

Research Designs:

I. True Experimental Design

1. Data: Observations and/or numerical measurements.
2. Hypothesis: A tentative explanation of a set of observations.... (an educated guess).
3. Replication: To repeat a study with the exact same parameters and the goal of obtaining the same results which were previously found. Used to estimate the underlying experimental error; Used to obtain a more precise estimate of the mean effect of any factor or factor combination; Used to increase the range of the experiment if treatment effects are found to be consistent over all experimental units that they are applied to, hence they acquire much broader inferential conclusions.
4. Variable: Any aspect of a situation that can vary or change.
   A. Independent Variable: The variable that is manipulated in the research design.
   B. Dependent Variable: The variable that is used to measure the independent variable.
5. Theory: A statement of a set of underlying principles that are intended to explain a set of observations.
6. Prediction: Expectations about specific events that should occur under given circumstances if a theory or hypothesis is correct.
7. Randomization: The assignment of treatments to experimental units, i.e., control vs. experimental groups; multiple experimental groups. Used to control and reduce bias in variables; Supports critical assumptions made at the analysis stage of an experiment.

II. Quasi-experimental design:

Quasi-experimental designs lack some aspect of randomization. For example, it may lack randomization in the selection of subjects or in the placement of subjects in group assignment. This has a direct impact on how generalizable the results will be.

**** As a general rule of thumb in designing an experiment... “Wherever & whenever possible, randomize!!!”

III. Correlational design:

Designs that specifically assess whether relationships exist between two or more variables and assesses the strength of the relationship(s).

IV. Naturalistic Observation:

This is considered to be a "non-experimental" design.
This type of research consists of "unobtrusive" observations of subjects' naturally occurring behavior.

V. Ethnography:

The researcher becomes immersed in the behavioral &/or social system being studied and may be considered as a participant or non-participant observation study.

VI. Case Study:

This is when you observe and report in detail on a very specific single case.

VII. Archival Research:

This is when you use existing records such as police records, school records, medical records, etc. as your data source. Example – meta-analysis: allows researchers to combine data from multiple different studies on the same topic.

VIII. Content Analysis:

This is when you analyze spoken or written records for the occurrence of specific categories of events such as word or phrase. Both RECORDING and CONTEXT UNITS are evaluate. The most common statistical program used to analyze this kind of data is called, "N.U.D.I.S.T.".

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Reliability: The extent to which a test measures something consistently.
Validity: The extent to which a test measures what it is supposed measure.