RESEARCH METHODS I

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- Systematic investigative process employed to increase or revise current knowledge by discovering new facts.

- **Knowledge**
- Knowledge is a familiarity, awareness, or understanding of someone or something, such as facts, information, descriptions, or skills, objects, events, ideas, which is acquired through experience or education by perceiving, discovering, or learning.
- Sources of Knowledge
- **1- Intuition**
- **2- Authority**
- **3- Reasoning/Logic**
- **4-Empericism /The Senses**
- **5- Deductive-inductive Method**

- **Scientific empiricism**
- It requires a research hypothesis be formed and tested, that the study is published in an article to be scrutinized by other scientists.
- **Scientific Method:**
- **(POHDES R)**
-
- Problem Identification (Selection and definition of a problem)
- Observations / (Review of Literature) (Understand the problem)
- Hypothesis (an idea as to a probable solution to the problem)
- Data Collection/ Experimentation
- Summarization of data/results
- Reporting

- Research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue.

- Research may be defined as the systematic and objective analysis and recording of controlled observations that may lead to the development of generalization, principles, or theories resulting in prediction and control of events (Best and Kahn, 1998).

STEPS OF SCIENTIFIC METHOD

- **1- Problem Identification (Selection and definition of a problem)**
- A research problem is a question of interest that can be tested or answered through the collection and analysis of data.
- The main sources of research problems are theories, personal experiences, previous studies that can be replicated, and library searches.
- A good research problem has theoretical or practical significance; its solution contributes in some way to improving the educational process.

- **2- Observations / (Review of Literature) (Understand the problem)**
- The review of related literature involves systematically identifying, locating, and analysing documents concerning to the research problem.
- The major purpose of reviewing the literature is to identify information that already exists about research problem.
- The literature review can point out research strategies, procedures, and instruments that have and have not been found to be productive in investigating that topic.

- **3- Hypothesis (an idea as to a probable solution to the problem)**
- A hypothesis is a researcher's prediction of the research findings.
- Researchers do not set out to prove a hypothesis but rather collect data that either support or do not support it.
- An inductive hypothesis is a generalization made from a number of observations.
- A deductive hypothesis is derived from theory and is aimed at providing evidence that supports, expands, or contradicts aspects of a given theory.

- **4- Data Collection**
- The section generally includes a description of the research participants, measuring instruments, design, and procedure.
- A particular tests or tool is specified and used for data collection. The measure should be valid and reliable. Tests, interviews, questionnaires, observations are some forms of measurement instruments.
- Population of the research study is decided.
- The strategy for selecting the sample or samples is decided.
- The appropriate sampling techniques is chosen
- Data is collected by using instruments from samples to know and understand population characteristics.

- **5- Data Analysis**
- Data collected is summarised and analysed to have probable information about population.
- Statistical tests such as mean, median, ANOVA, t-tests etc. are used for analysis of quantitative data.
- Thematic analysis, grounded theory are qualitative analysis methods used for qualitative data.

- **6- Report**
- All processes to conduct research is communicated to other researchers for review and feedback in journal papers, books, and theses etc.

VARIABLES

- **A VARIABLE** is anything that varies.
- Variable is characteristic, trait or attribute that can be classified or measured.
- VARIABLE is a measurable characteristic that varies.
- **Examples:**
- **1. *Height*** – this varies as you grow older and it varies between individuals.
- **2. *Time*** – could be time in seconds to respond with 'yes' or 'no' to questions.
- 3. ***The political party people vote for*** – note that differences *between* parties are *qualitative* and cannot be represented by numbers.
- 4. ***Feelings towards your friends*** – seems these would be hard to measure but they do change.
- 5. ***Extroversion:*** can measure by a psychological scale which results in 'score' for extroversion.
- **6. *Anxiety* –** again we can use a psychological scale.

TYPES OF VARIABLES

- **Quantitative Variables:** A broad category that includes any variable that can be counted, or has a numerical value associated with it. Example; height, weight, age etc
- **Qualitative Variables:** a broad category for any variable that can't be counted (i.e. has no numerical value) Example; Gender, country, roll numbers.
- **Discrete Variables:** a variable that can only take on a certain number of values. For example, "number of cars in a parking lot" is discrete because a car park can only hold so many cars. No. of Teachers, No. of rooms etc. it cannot have decimal or fractions logically.
- **Continuous Variables:** a variable with infinite number of values, like "time" or "weight". These can have decimal values and fractional state

TYPES OF VARIABLES

- **Independent variable**: independent variables (IV) are those that are suspected of being the cause in a causal relationship. If you are asking a cause and effect question, your IV will be the variable (or variables if more than one) that you suspect causes the effect.
- **Dependent variable :** Dependent variables are those that are influenced by the independent variables. If you ask, "Does A cause [or predict or influence or affect, and so on] ," then B is the dependent variable (DV).
- **Binary variable**: a variable that can only take on two values, usually 0/1. Could also be yes/no, tall/short or some other two-variable combination. It is also called **Dichotomous variable.** Gender can have male and female values.
- **Extraneous variable:** Such factors other than the IV, which can create the same response as, like IV in DV.
- **Control variable**: variable that is kept constant to rule out its effects.

TYPES OF RESEARCH

- What is research:

  Research is a process of steps used to collect and analyse information to increase our understanding of a topic or issue.

- **Three** types of research on the base of research philosophy

1. **Quantitative Research**
2. **Qualitative Research**
3. **Mixed Methods Research**

QUANTITATIVE RESEARCH

- **Definition**

  Quantitative research is the collection and analysis of numerical data to explain, predict, and/or control phenomena of interest.

- **Process**

1. **Key features of quantitative research are:**
2. **Hypotheses that predict the results of the research before the study begins.**
3. **Control of contextual factors that may influence the study.**
4. **Collection of data from sufficient samples of participants.**
5. **Use of numerical, statistical approaches to analyse the collected data.**

- **Philosophy**
- **The quantitative approach assumes the world is relatively stable, uniform, and coherent.**

QUALITATIVE RESEARCH

- Definition
- Qualitative research is the collection, analysis, and interpretation of comprehensive narrative and visual (nonnumeric) data to gain insights into a particular phenomenon of interest.
- Process

1. Key features of qualitative research include:
2. Defining the problem, but not necessarily at the start of the study.
3. Studying contextual factors in the participants' natural settings.
4. Collecting data from a small number of purposely-selected participants.
5. Using nonnumeric, interpretive approaches to provide narrative descriptions of the participants and their contexts.

- Philosophy:
- An important belief that underlies qualitative research is that the world is not stable, coherent, nor uniform, and, therefore, there are many truths.

MIXED METHODS RESEARCH

- Definition

  A mixed methods research design is a procedure for collecting,analysing, and "mixing" both quantitative and qualitative methods in a single study or in a series of studies.

Process:

1. Both quantitative and qualitative data use.
2. Both types of data, together, provide a better understanding of research problem than either type by itself.
3. Quantitative data, such as scores on instruments, yield specific numbers that can be statistically analysed, can produce results to assess the frequency and magnitude of trends, and can provide useful information if you need to describe trends about a large number of people. Qualitative data, such as open-ended interviews that provide actual words of people in the study, offer many different perspectives on the study topic and provide a complex picture of the situation.

- Philosophy
- There are many different ways of interpreting the world and undertaking research, that no single point of view can ever give the entire picture and that there may be multiple realities.

MEASUREMENT SCALES

- Scale is the instrument used to provide the range of values or scores for each variable.
- There are four types of measurement scales

1. Nominal Scale of Measurement
2. Ordinal Scale of Measurement
3. Interval Scale of Measurement
4. Ratio Scale of Measurement

1- NOMINAL SCALE OF MEASUREMENT

1. Nominal means difference with regard to the label or category of a variable.
2. A nominal variable is also called a categorical variable because the values include two or more named categories (i.e., the word nominal comes from the Latin word for name).

Examples:

1. Nominal variables include gender (e.g., female, male), employment status (e.g., full time, part time, unemployed), marital status (e.g., married, divorced, single), and type of school (e.g., public, private, charter). Likewise, nationality, socioeconomic status, race, occupation, or religious affiliation provide examples of nominal scale.
2. A nominal scale describes differences between things by assigning them to categories. Such as professors, associate professors, assistant professors, instructors, or lecturers.

2- ORDINAL SCALE OF MEASUREMENT

- **An ordinal variable classifies persons or objects and it ranks them as well. In other words, ordinal variables have, as their values, rankings in order from highest to lowest or from most to least.**

3- INTERVAL SCALE OF MEASUREMENT

- **An interval variable has all the characteristics of nominal and ordinal variables, but its values also represent equal intervals.**
- **Examples: Scores on most tests used in educational research, such as achievement, aptitude, motivation, and attitude tests, are treated as interval variables.**
- **What equal intervals Means?**
- **When variables have equal intervals, it is assumed that the difference between a score of 30 and a score of 40 is essentially the same as the difference between a score of 50 and a score of 60, and the difference between 81 and 82 is about the same as the difference between 82 and 83.**

4- RATIO SCALE OF MEASUREMENT

- A ratio scale has the equal interval properties of an interval scale and it has two additional features:
- Advantage:
- a. The ratio scale has a true zero. It is possible to indicate the complete absence of a property. For example, the zero point on a centimetre scale indicates the complete absence of length or height.
- b. The numbers of the ratio scale have the qualities of real numbers and can be added, subtracted, multiplied, and divided and expressed in ratio relationships. For example, 5 grams is one-half of 10 grams, 15 grams is three times 5 grams.

Populations

- A population is any group of individuals that has one or more characteristics in common and that are of interest to the researcher.
- A population is defined as a group of individuals with at least one common characteristic, which distinguishes that group from other individuals.
- ***Sampling***
- A *sample* is a small proportion of the population that is selected for observation and analysis. By observing the characteristics of the sample, one can make certain inferences about the characteristics of the population from which it was drawn

Types of Sampling

- Probability sampling
- Probability sampling techniques permit the researcher to specify the probability, or chance, that each member of a defined population will be selected for the sample.
- Non-probability sampling
- Non-probability sampling techniques do not ensure probability, or chance, that each member of a defined population will be selected for the sample.

Simple Random Sampling

- Simple random sampling is the process of selecting a sample in such a way that all individuals in the defined population have an equal and independent chance of selection for the sample.
- Process
- If researchers wished to draw a sample of 50 individuals from a population of 600 students enrolled in a school, they could place the 600 names in a container and, blindfolded, draw one name at a time until the sample of 50 was selected. This procedure is difficult and is rarely used. Rather, a random numbers table or computer- generated list is more common.

The Systematic Sample

- Systematic sampling is sampling in which every Kth individual is selected from a list of all members in the population. K is a variable determined by dividing the number of individuals on the list by the number of subjects desired for the sample.
- Process
- If a population can be accurately listed or is finite, a type of systematic selection can be used. For example, if a sample of 200 were to be selected from a telephone directory with 200,000 listings, one would select the first name by randomly selecting a name from a randomly selected page. Then every Kth name would be selected until the sample of 200 names was complete.

Stratified Sampling

- **Definition:** Stratified sampling is the process of strategically selecting a sample in such a way that guarantees desired representation of relevant subgroups within the sample.
- When we should use Stratefied Sampling: Age, gender, extent of formal education, ethnic origin, religious or political affiliation, or rural-urban residence etc. might provide a basis for choosing a stratified sample.
- Benefit: This process gives the researcher a more representative sample than one selected from the entire community, which might be unduly weighted by a preponderance of unskilled workers.

Cluster Sampling

- Definition: Cluster sampling is sampling in which groups, not individuals, are randomly selected. Clusters can be communities, states, school districts, and so on.
- Benefit& When to Use: When the population of interest is infinite, when a list of the members of the population does not exist, or when the geographic distribution of the individuals is widely scattered
- Disdadvantage: In stratified random sampling, all the strata of the population is sampled while in cluster sampling, the researcher only randomly selects a number of clusters from the collection of clusters of the entire population. Therefore, only a number of clusters are sampled, all the other clusters are left unrepresented.

Non-probability sampling

- Definition:

Non-probability sampling is the process of selecting a sample in such a way that not all individuals in the defined population have an equal and independent chance of selection for the sample.

- Types:

1. Convenience sampling
2. Purposive Sampling
3. Quota sampling
4. Snowball sampling

Convenience sampling

- Definition:
- It is also referred as accidental sampling.
- It is the process of including whoever happens to be available in the sample.
- ***Example***
- Two examples of convenience sampling are seeking volunteers and studying existing groups “just because they are there.”
- For example, you go to store or in any classroom and collects the information from persons volunteer or available there to give information.

Purposive Sampling

- Definition:
- Purposive sampling, also referred as judgment sampling.
- It is the process of selecting a sample that is believed to be representative of a given population. The researcher selects the sample using his experience and knowledge of the group to be sampled.
- Researcher use clear criteria to guide the selection process.
- ***Example***
- For example, if a researcher plans to study exceptional high schools, she can choose
- schools to study based on her knowledge of exceptional schools.
- ***Difference between convenience and purposive sampling***
- In convenience sampling, participants who happen to be available are chosen, and in purposive sampling, researcher deliberately identifies criteria for selecting the sample.

Quota sampling

- Definition:

The process of selecting a sample based on required, exact numbers, or quotas, of individuals or groups of varying characteristics. It is non-probabilistic version of stratified sampling.

- ***Example***
- When quota sampling is involved, data gatherers are given exact characteristics and quotas of persons to be interviewed. 35 working women with children under the age of 16, 20 working women with no children under the age of 16) are selected in the sample.
- **Advantage**
- Widely used in large-scale surveys when data are obtained from easily accessible individuals within well-defined categories.
- **Disadvantage**
- People who are less accessible (e.g., more difficult to contact, reluctant to participate) are underrepresented.

Snowball Sampling

- Definition:

The researcher asks participants to identify others to become members of the sample.

Researcher uses a few existing subjects to identify other individuals who might be appropriate for the study.

This continues, until the researcher has a sufficient number of participants.

Snowballing is most useful when it is difficult to find participants of the type needed.

- ***Example***

For example, you might send surveys to a school manager and ask that the manager forward copies to the principals of schools in that school district. These principals then become members of the sample.

Types of Quantitative Research

Survey Research

What is Survey?

1- Survey research involves collecting numerical data to answer questions about the current status of the subject of study.

2- A survey is a way to obtain information by asking many individuals to answer a fixed set of questions about particular issue.

Correlational Research

- What is Correlational Research?
- It examines the relation between two or more variables.
- Example:
- A variable is a placeholder—such as age, IQ, or height—that can take on different values.
- What is relationship of age to Height?

Correlational Research

- How we measure Correlation?

In correlational research, the degree of relation is measured by a correlation coefficient. If two variables are highly related, one is not necessarily the cause of the other.

What is correlation Coefficient?

A correlation coefficient is a number that indicates the strength of a relationship between two or more events: the closer the number is to –1.00 or +1.00, the greater is the strength of the relationship.

Causal-comparative research

- What is Causal-Comparative Research?
- It investigates differences between two or more different programs, methods, or groups.
- The activity thought to make a difference (e.g. the program, method, or group) is called the grouping variable(independent Variable). The effect is called the dependent variable.
- Example:
- Impact of Ethnicity on Anxiety

Causal-comparative research

- When it is used?
- When researcher does not have control over the grouping variable because it already has occurred or cannot be manipulated.
- It is useful in those situations when it is impossible or unethical to manipulate an independent variable.

Experimental Research

- What is experiment research?
- In experimental research, the researcher makes changes in independent variable to see its affects on dependent variable while controlling variables that can also cause changes in dependent variable.

Types of Experimental Designs

- **Pre-experimental designs**
- **These are so named because they follow basic experimental steps but fail to include a control group. In other words, a single group is often studied but no comparison between an equivalent non-treatment group is made.**

Quasi-Experimental Design

- Quasi designs include compare or control groups. However, they lack randomization (These lack Random assignment of sample to experimental and control group or equivalence of groups in different aspects.

Pretest Posttest Nonequivalent Groups

$O_1 \quad X \quad O_2$

$O_1 \quad X \quad O_2$

Time Series Designs

$O_1 \quad O_1 \quad X \quad O_2 \quad O_2$

Nonequivalent Before-After Design

$O_1 \quad O_1 \quad X \quad O_2 \quad O_2$

$O_1 \quad O_1 \quad X \quad O_2 \quad O_2$

Key:
X = Treatment
O_1 = Pretest
O_2 = Posttest
R = Randomization

Quasi-Experimental Design

1. Research procedure that aims to establish causal effect between an independent variable and variations in a dependent variable, but where there is ***no full control over the allocation of participants*** to the different levels of the independent variable.
2. •The ***lack of random allocation*** is typically considered the demarcation from 'true' experiments in many areas of psychology, such as social and educational psychology.
3. •The lack of random allocation poses a key threat to internal validity, as it increases the ***risk that group/conditions may systematically differ with respect to factors other than the independent variable***.

True Experimental Design

In true experimental design:

1. The sample groups must be assigned randomly.
2. There must be a viable control group.
3. Only one variable can be manipulated and tested. It is possible to test more than one, but such experiments and their statistical analysis tend to be cumbersome and difficult.
4. The tested subjects must be randomly assigned to either control or experimental groups.

Single-subject experimental designs

- Single-subject experimental designs are a type of experimental research that can be applied when the sample is one individual or group.
- This type of design is often used to study the behaviour change an individual or group exhibits as a result of some intervention or treatment.

Experimental Research

- Merits/Advantages/Benefits

1. This method is the **most systematic procedure** of solving problems. It provides reliable information.
2. it is a **revisable** method
3. it **makes psychology and education a scientific** study
4. It **enable** us to **control and direct** human **behaviour**
5. It is **applicable** in educational, individual and social problems.
6. A **cause-effect relationship** of individual's behaviour can be established.

Experimental Research

- Demerits/Disadvantages

1. It is arranged in a **laboratory like situation.** This situation is **artificially arranged.** Behaviour is a natural phenomena and it **may change under artificial environment.**
2. This method is **time consuming and costly**.
3. Moreover it requires specialized knowledge and skills.
4. Psychologists have criticized the fact that mostly the experiments have **conducted on rats, cats and dogs. The results are conducted and then applied on human beings.**
5. It is often **difficult to conduct experiments in social sciences unlike physical sciences.**

Types of Qualitative Research

- What is qualitative Research?

1. Qualitative approaches focus on deep description of aspects of people's everyday perspectives and context.
2. Qualitative approaches assume that respondents or people observed have unique views of their personal experiences or the surrounding environment

Narrative research

- What is narrative Research?

1. Narrative research is the study of how individuals experience the world. The researcher typically focuses on a single person and gathers data through the collection of stories.
2. a narrative typically focuses on studying a single person, gathering data through the collection of stories, reporting individual experiences, and discussing the meaning of those experiences for the individual.

Examples of Narrative Research:

- ▫ A study of the experiences of a female blind student who has moved from a self-contained program to an inclusion setting
- ▫ A study of the experiences of a high school female athlete who has been moved on to a championship-winning university track team.

Ethnographic research

- What is ethnography?

1. Ethnography came from the Greek *ethnos* = folk/people and *graphein* = writing. It identifies its roots in sociologyand anthropology.
2. the study of single group through direct contact with their culture.
3. *Ethnography is the art and science of describing a group or culture. The description may be of a small tribal group in an exotic land or a classroom in middle-class suburbia.*

- *Purpose*:

The purpose of ethnographic research is to attempt to understand what is happening naturally in the setting and to interpret the data gathered to see what implications could be formed from the data.

Case study research

Case study research is a qualitative research approach to conducting research on a unit of study or bounded system (e.g., classroom, school).

Examples:

- Single organisation - school: what is happening with a particular tool/strategy
- ▫ A particular community - rural village ongoing issue/dispute
- ▫ On a particular group ..... Issue to a group
- ▫ An individual - career criminal - examination designed to understand motivations of a career criminal
- ▫ A decision – merging to 2 schools, why was decision taken, how was it implemented , what was outcome
- ▫ An event – an election campaign

CLASSIFICATION OF RESEARCH BY PURPOSE

- **Basic Research**

Basic research is conducted to develop or refine theory, not to solve immediate practical problems.

- **Applied Research**

Applied research is conducted to find solutions to current practical problems.

- **Evaluation Research**

The purpose of evaluation research is to inform decision making about educational programs and practices.

- **Research & Development**

The major purpose of R&D efforts is to develop effective products for use in schools.

- **Action Research**

The purpose of action research is to provide teacher researchers with a method for solving everyday problems in their own settings.

Research Ethics

- **Definition**

These are practices and procedures to ensure protection of human and non-human subjects, appropriate methodology, inferences, conclusions and recommendations based on actual findings and complete and accurate research reports.

- **Advantages of Following Research Ethics**

1. The researcher's **sponsor** is **not mislead**.
2. Private and public **money** is more **easily obtained** if ethical procedures are guaranteed.
3. Researchers' **reputation** will be **enhanced**.

Disadvantages

1. It **takes time** to get subjects' consent and complete the forms.
2. **Subjects** might **refuse** to participate in case of asking him to sign the consent.

1. The right to free consent
2. The right to informed consent
3. The right to confidentiality
4. The right to privacy
5. The right to anonymity
6. Appropriate methodology
7. Appropriate research reporting

1. Norm-referenced Scoring
2. Criterion-referenced Scoring
3. Self-referenced Scoring

- In norm-referenced scoring, a student's performance on an assessment is compared to the performance of others. For example, if we ask how well a Pinecrest Elementary student performed in science compared to other students in the same grade across the nation, we are asking for norm-referenced information.
- The interpretation of the student's score of 78 will be based on how the student performed compared to the class or a national group of students
- in the same grade. Norm-referenced scoring is also called *grading on the curve* where the curve is a bell-shaped distribution of the percentages of students who receive each grade. Standardized tests and assessments frequently report norm-referenced scores in the form of derived scores such as *percentile ranks*.

- In criterion-referenced scoring, an individual's performance on an assessment is compared to a predetermined, external standard, rather than to the performance of others. For example, a teacher may say that test scores of 90 to 100 are an A, scores of 80 to 89 are a B, scores of 70 to 79 are a C, and so on. A student's score is compared to the preestablished performance levels—to pre-established criteria —to determine the grade.
- Anyone who scores between 90 and 100 will get an A. If no one scores between 90 and 100, no one will get an A. If all students score between 90 and 100, they all will get As. This scenario could not happen in norm-referenced scoring, which requires that different scores, even very close ones, get different grades.

- Self-referenced scoring approaches involve measuring how an individual student's performance on a single assessment changes over time. Student performances at different times are compared to determine improvement or decline.

Quantitative Data Collection Methods

- Quantitative Methods
- Paper-and-pencil methods are favoured by quantitative researchers.
- Paper-and-pencil methods are divided into two general categories:
- selection and supply
- *Selection methods* (or *selection items* on an instrument), the test taker has to select from among a set of given answers; these methods include multiple choice, true–false, and matching questions.
- *Supply methods* (or *supply items*), the test taker has to supply an answer; supply items include questions that require the responder to fill in the blank or write a short answer or essay.

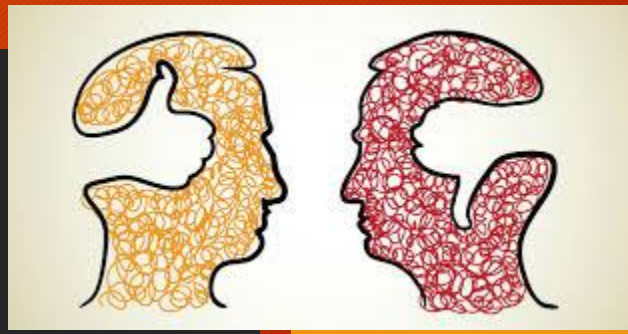
- Quantitative Methods
- Tests
- Scales

Quantitative and Qualitative Data Collection Methods

- WHAT IS A TEST?
- A test is a formal, systematic, usually paper-and pencil procedure for gathering information about peoples' cognitive and affective characteristics. Tests typically produce numerical scores.
- A cognitive characteristic is a mental characteristic related to intellect, such as achievement;
- an affective characteristic is a mental characteristic related to emotion, such as attitude).

- **What is standardised test**
- Standardized test is one that is administered, scored, and interpreted in the same way no matter where or when it is used.
- For example, the SAT, ACT, Iowa Tests of Basic Skills, Stanford Achievement Test, and other nationally used tests ensure that all test takers experience the same conditions when taking them.
- Benefit
- Such standardization allows comparisons among test takers from across the nation.

Attitude Scales



- An attitude scale is an instrument that measures what an individual believes, perceives, or feels about self, others, activities, institutions, or situations. Five basic types of scales are used to measure attitudes:

1. Likert scales
2. Semantic differential scales
3. Rating scales
4. Thurstone scales
5. Guttman scales.

Qualitative
Data Collection Methods

1. Observation
2. Interview
3. Questionnaire

Scale

An instrument, usually a questionnaire, designed to measure a person's position on some dimension.

Examples: Intelligence scale; conscientiousness scale; self-esteem scale, etc

Self-report instruments: Can be responded to by oneself

Others report instrument: Can be responded to by others

More Examples:

1. The Cognitive Emotion Régulation Questionnaire (CERQ) (multidimensional questionnaire constructed in order to identify the cognitive emotion regulation strategies (or cognitive coping strategies) someone uses after having experienced negative events or situations).
2. The Perceived Stress Scale (PSS) (measure of the degree to which situations in one's life are appraised as stressful.)
3. Satisfaction With Life Scale (SWLS) (measure global cognitive judgments of satisfaction with one's life)

Validity Concept and its types

- **Definition**

Validity refers to the degree to which a test measures what it is supposed to measure.

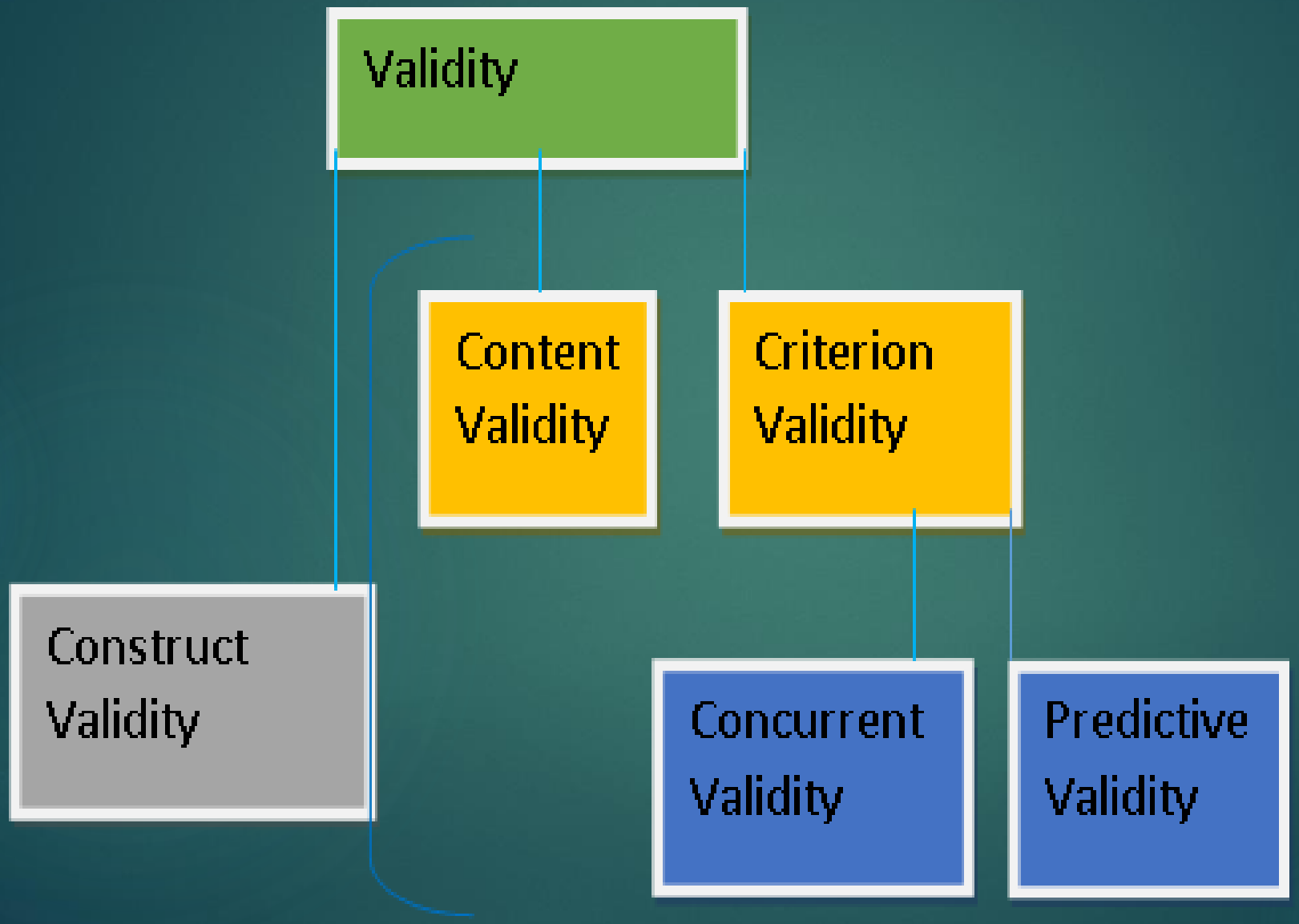
Examples:

1. **A measure of anxiety should truly measure the anxiety and should not measure some different construct.**
2. **A test of intelligence should measure intelligence and not something else.**
3. **A test of blood pressure should measure blood pressure not something else.**

Reliability

- Definition
- **It is the degree to which a test consistently measures whatever it is measuring.**
- **Concept**
- The more reliable a test is, the more confidence we can have that the scores obtained from the test are essentially the same scores that would be obtained if the test were readministered to the same test takers at another time or by a different person. If a test is unreliable (i.e., if it provides inconsistent information about performance), then scores will likely be quite different every time the test is administered. For example, if an attitude test is unreliable, then a student with a total score of 75 today may score 45 tomorrow and 95 the day after tomorrow. If the test is reliable, and if the student's total score is 75 on one day, then the student's score will not vary much on retesting (e.g., likely between 70 and 80).

Types


Validity
Content Validity
Criterion Validity
Construct Validity
Concurrent Validity
Predictive Validity

Data Analysis: Basic Terms

- Statistics: The term **statistics** refers to a set of mathematical procedures for organizing, summarizing, and interpreting information.(Gravetter & WaLLnau, 2017)
- **Data** (plural) are measurements or observations. A **data set** is a collection of measurements or observations. A **datum** (singular) is a single measurement or observation and is commonly called a **score** or **raw score.**
- A **parameter** is a value, usually a numerical value, that describes a population. A parameter is usually derived from measurements of the individuals in the population.
- A **statistic** is a value, usually a numerical value, that describes a sample. A statistic is usually derived from measurements of the individuals in the sample.

Types of reliability

- Test-retest
- Equivalent Forms
- Split half
- Croanbch alpha

Basic Terms

- **Descriptive statistics** are statistical procedures used to summarize, organize, and simplify data.
- **Inferential statistics** consist of techniques that allow us to study samples and then make generalizations about the populations from which they were selected.
- **Frequency distribution** is a table or graph that shows exactly how many individuals (or scores) are located in each category on the scale of measurement.

Measures of Central Tendency

- **Central tendency** is a statistical measure to determine a single score that defines the centre of a distribution. The goal of central tendency is to find the single score that is most typical or most representative of the entire group.
- Mean
- Median
- Mode

Writing items for questionnaires

- Use **short and simple** sentence structures.
- Short **everyday words** are better than long ones.
- **Avoid complex or problematic grammar**, such as the use of **double negatives**. For example, 'You ain't seen nothing yet.'
- **Leading questions which** suggest the expected answer should be avoided largely because of the limiting effect this will have on the variability of the answers. For example, 'Most people think it essential to vote in elections. Do you agree?'
- Choose **appropriate language for the likely participants** – what would be appropriate to ask a group of high court judges may be inappropriate to a group of nursery children.
- Tap as many **resources for items** and questions as feasible.
- Accept that **you cannot rely on yourself alone** as a satisfactory source of questions and ideas for questions.
- **Relax – expertise in question and item writing is a rare commodity**. Most researchers mix trial and error with rigorous item analysis as a substitute.

The Normal Curve

- *Normal Distribution indicate*
- normal, or bell-shaped, curve
- Fifty percent of the scores are above the mean, and 50% are below the mean.
- The mean, the median, and the mode have the same value.
- Most scores are near the mean. The farther from the mean a score is, the fewer the number of participants who attained that score.
- For every normal distribution, 34.13% of the scores fall between the mean and one standard deviation above the mean, and 34.13% of the scores fall one standard deviation below the mean (Figure)
- In other words, 68.26% of the scores are within one standard deviation of the mean (34.13% + 34.13%).
- More than 99% of the scores will fall somewhere between three standard deviations above and three standard deviations below the mean.

Inferential statistics

- Inferential statistics are data analysis techniques for determining how likely it is that results obtained from a sample or samples are the same results that would have been obtained from the entire population.
- Explanation:

In another way, inferential statistics are used to make inferences about parameters, based on the statistics from a sample. In the simplest language, whereas descriptive statistics show how often or how frequent an event or score occurred, inferential statistics help researchers to know whether they can generalize to a population of individuals based on information obtained from a limited number of research participants. As an example, imagine that a depression reduction program was implemented in an experimental research. It was found that people who attended the program scored significantly less on a depression measurement test than those who did not attended that program. (say, *X* E =5.35 and *X* C 5 43). Can this difference be generalized to the larger population or other samples within it? Would the program be equally successful at the district or state levels? Perhaps, although it's possible that the difference between the original two samples occurred just by chance (possibly due to characteristics of the particular individuals or area sampled). And now we get to the heart of inferential statistics, the concept of "how likely is it?". Inferential statistics allow researchers to determine the likelihood that the difference between the two means (*X* C) and mean (*X* E) is a real, significant one, rather than one attributable to sampling error. Inferential statistics use data from samples to assess *likelihood* (i.e., inferential statistics produce probability statements about the populations), not guarantees. The degree to which the results of a sample can be generalized to a population is always expressed in terms of probabilities; analyses do not "prove" that hypotheses are true or false.

Types of Inferential Statistics

- Parametric tests
- **These are considered to be the most powerful tests and should be used** if their basic assumptions can be met. These assumptions are based on the nature of the population distribution and on the way the type of scale is used to quantify the data observations. However, some parametric tests (the *t* test and analysis of variance, in particular) are quite robust and are appropriate even when some assumptions are violated.. The assumptions for most parametric tests are the following:
- 1. The observations are independent. The selection of one case is not dependent on the selection of any other case (there are specific parametric tests for non-independent samples).
- 2. The samples have equal, or nearly equal, variances. This condition is particularly important to determine when samples are small.
- 3. The variables described are expressed in interval or ratio scales. Nominal measures (frequency counts) and ordinal measures (ranking) do not qualify for parametric treatment.

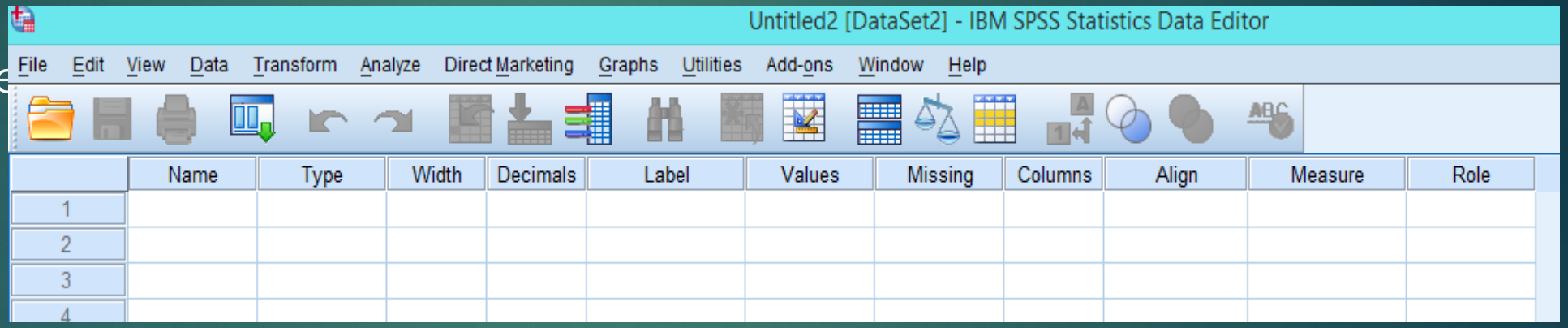
- ***Nonparametric Tests***
- The parametric tests are generally quite robust; that is, they are useful even when some of their mathematical assumptions are violated. However, sometimes it is necessary, or preferable, to use a nonparametric or distribution-free test.
- Nonparametric tests are appropriate when
- 1. The nature of the population distribution from which samples are drawn is not known to be normal.
- 2. The variables are expressed in nominal form (classified in categories and represented by frequency counts).
- 3. The variables are expressed in ordinal form (ranked in order, expressed as first, second, third, etc.).

Introduction to SPSS

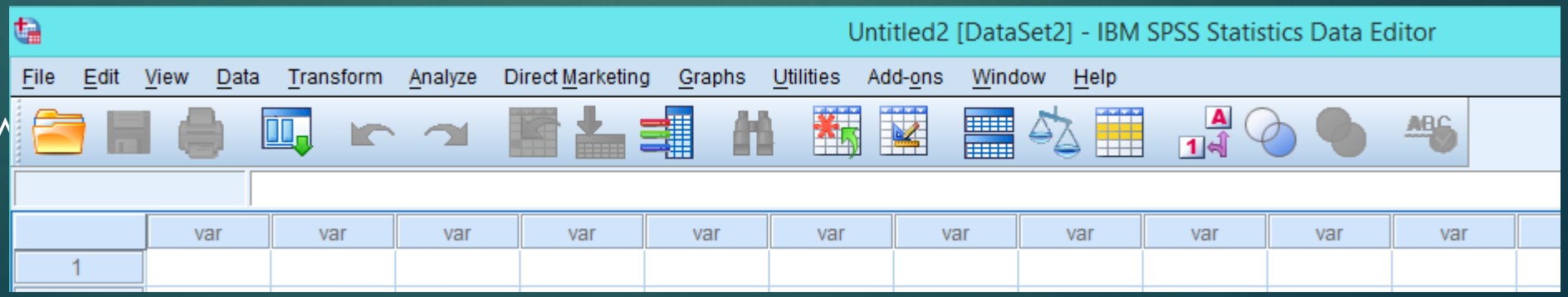
- How to get SPSS

https://www.ibm.com/us-en/marketplace/spss-statistics

- Free 14 days Trial
- Paid annual = 1210 USD to 8050 USD
- **Data Entry**
- Variable Vie

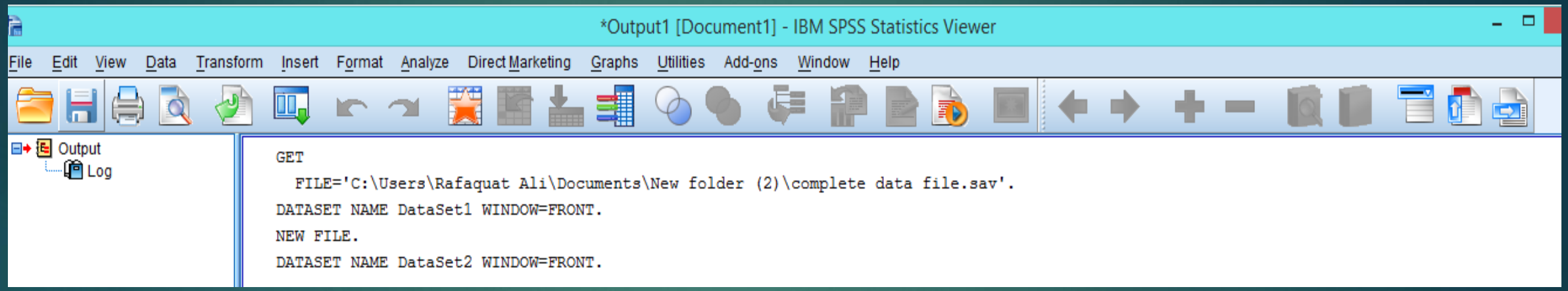


- Data View



Data Entry (Cont..)

- Out Put View



MIXED METHODS RESEARCH DESIGN

- Definition : A **mixed methods research design** is a procedure for collecting, analyzing, and "mixing" both quantitative and qualitative methods in a single study or a series of studies to understand a research problem (Creswell & Plano Clark, 2011).
- Benefits of Mixed Methods Research Design

1. Both quantitative and qualitative methods, in combination, provide a better understanding of the research problem and question than either method by itself.
2. This type of design is an advanced methods procedures because you need to understand *both* quantitative and qualitative research.

- Drawbacks

1. The procedures are time-consuming, requiring extensive data collection and analysis.

Types of Mixed Methods Research Designs

1. The convergent parallel design
2. The explanatory sequential design
3. The exploratory sequential design
4. The embedded design

- Thank you
- For
- Your Patience