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| **THEME 19. DATA ANALYSIS IN QUALITATIVE, QUANTITATIVE, MIXED METHODS RESEARCH** |

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| Learning outcomes  This lesson offers you opportunities to:   * Gain an overview about data analysis in qualitative, quantitative, mixed methods research; * Learn about key steps in data preparation; * Develop note-taking skills while watching speech; * Develop knowledge how to analyse in qualitative, quantitative, mixed methods research.   *Key-words: quantitative, qualitative, mixed methods research, data cleaning, mean, standard deviation, data cleaning, data transformation, data integration, data reduction, data validation, descriptive statistics, inferential statistics.* |

**Quantitative data analysis** is the examination of numerical data to discern patterns, correlations, or trends, and to evaluate hypotheses via statistical methodologies. It entails the organization, summarization, and interpretation of data using descriptive and inferential statistical methods to derive data-driven conclusions. This study often utilizes statistical software tools (e.g., SPSS, R, or Excel) and prioritizes impartiality and replicability in result interpretation.

Essential procedures include data cleansing, summarizing data using metrics such as mean and standard deviation, and conducting statistical tests to address research inquiries or assess the importance of results.

Computerized data analysis denotes the use of software and digital instruments to process, organize, and analyse data effectively. It automates intricate computations, pattern identification, and visualization operations, allowing researchers to handle extensive datasets and do various statistical, qualitative, or mixed-methods investigations. This method improves precision, velocity, and consistency relative to human analysis. Common instruments for computerized data analysis include statistical software such as SPSS, R, and Python, in addition to qualitative tools like NVivo.

**SPSS (Statistical Package for the Social Sciences)** is a software application extensively used for statistical analysis throughout social sciences, industry, healthcare, and several other domains. SPSS, created by IBM, offers instruments for data administration, statistical analysis, and graphical depiction. It is intuitive, providing both point-and-click interfaces and syntax-based instructions, therefore catering to users with diverse degrees of competence. Principal attributes of SPSS:

* ***Data Management:*** Import, cleanse, and alter datasets.
* ***Descriptive Statistics:*** Compute metrics such as mean, median, and standard deviation.
* ***Inferential Statistics:*** Conduct t-tests, ANOVA, regression analysis, and further methodologies.
* ***Graphs and Visualization:*** Generate charts, scatter plots, and histograms for enhanced insights.
* ***Extensions:*** Integrate with programming languages such as Python and R for enhanced functionalities.

**Data preparation for analysis** include the organization, cleansing, and transformation of raw data into an organized and useable format for efficient analysis. This process guarantees the precision, uniformity, and dependability of the data by rectifying mistakes, managing absent values, and standardizing formats. Thorough preparation is crucial to guarantee that the analysis yields reliable and significant findings.

**Key steps in data preparation:**

**Data cleaning** involves finding, rectifying, or eliminating mistakes, inconsistencies, and inaccuracies within a dataset to guarantee its quality and dependability for analysis. This phase includes addressing missing values, rectifying data input errors, eliminating duplication, and standardizing formats. The objective of data cleaning is to generate a dataset that is precise, comprehensive, and devoid of noise, allowing significant and reliable analysis.

**Data transformation** is the process of turning unrefined data into an organized and standardized format to enable analysis. This entails altering the data's structure, format, or values by methods like scaling, encoding, normalizing, aggregation, or pivoting. The objective of data transformation is to improve the usability, interpretability, and comparability of the dataset.

**Data integration** is the amalgamation of data from several sources into a cohesive and consistent dataset to facilitate thorough analysis. It entails the integration, alignment, and standardization of data to guarantee its compatibility and significance for research or decision-making purposes. The objective of data integration is to provide a comprehensive perspective of information by removing redundancies and inconsistencies across sources.

**Data reduction** is the practice of decreasing data amount while preserving its fundamental attributes to enable effective analysis and interpretation. It encompasses strategies like removing extraneous variables, consolidating data, and using dimensionality reduction methods to reduce complexity while preserving data integrity and insights.

**Data validation** is the procedure of verifying and confirming the correctness, consistency, and quality of data prior to its use for analysis or decision-making. It entails validating that the data adheres to established rules, standards, and formats to avert mistakes and inconsistencies. The objective of data validation is to confirm that the dataset is dependable and appropriate for its intended use.

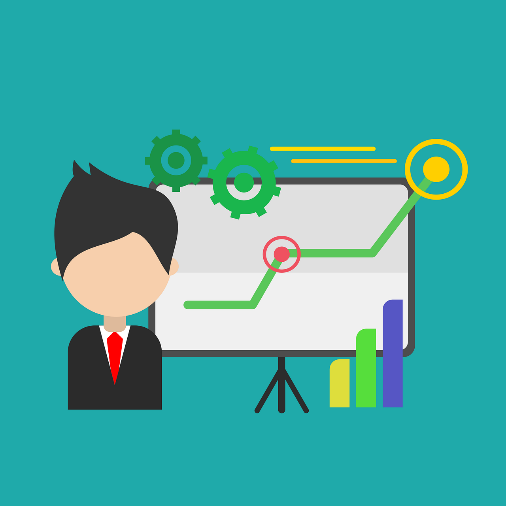
**Fundamental statistical** ideas are essential principles and terminology used in statistics to analyze, interpret, and effectively display data. These principles provide the foundation for making informed judgments and extracting insights from data, using either descriptive or inferential methods.

**Descriptive statistics** pertains to the field of statistics that focuses on summarizing and arranging data to elucidate its principal characteristics. It offers a method to display extensive data in a comprehensible format using metrics such as central tendency, variability, and dispersion. The objective is to provide a clear and succinct summary of the information, often using numerical summaries and visual representations, without drawing judgments or making predictions.

**Inferential statistics** is the discipline within statistics that entails making predictions, generalizations, or conclusions about a population derived from a sample of data. In contrast to descriptive statistics, which only reports existing data, inferential statistics use probability theory to derive conclusions that extend beyond the current dataset, including estimating population characteristics, testing hypotheses, and generating predictions.

A variety of ***platforms and tools*** exist for the analysis of quantitative data, from basic spreadsheet applications to sophisticated statistical software. Below are many prevalent platforms used for quantitative data analysis: Microsoft Excel, SPSS (Statistical Package for the Social Sciences), R, Python, SAS (Statistical Analysis System), Stata, MATLAB, Tableau, Google Sheets, Power BI, etc.

**Qualitative Data Analysis**

Qualitative data analysis is the examination, interpretation, and understanding of non-numerical data, including text, audio, video, or photographs, to reveal patterns, themes, meanings, and insights. It is often used in disciplines like as social sciences, anthropology, and psychology to investigate experiences, perceptions, and social phenomena. In contrast to quantitative analysis, which emphasizes numerical data and statistical metrics, qualitative data analysis aims to comprehend deeper meanings, linkages, and underlying structures within the data.

**Key Methods in Qualitative Data Analysis:**

1. **Thematic Analysis**: The process of recognizing and evaluating recurring themes or patterns that emerge from the data. Coding is often used by researchers in order to classify data into categories that are based on concepts or ideas that are repeated.
2. **Grounded Theory**: The process of developing ideas or conceptions inductively based on the facts, as opposed to testing hypotheses that have already been established. Coding in a methodical manner and continuous comparison are both required.
3. **Content Analysis**: Analyzing the frequency of certain words, phrases, or ideas in textual data, as well as the context in which they are found. Quantitative and qualitative approaches are also possible.
4. **Narrative Analysis**: Examining the narratives that individuals share in order to get an understanding of how they generate meaning and make sense of the experiences they have had.
5. **Discourse Analysis**: Analysis of the construction of meaning in spoken or written discourse, with a particular emphasis on language and communication, as well as the social environment in which it occurs.
6. **Phenomenological Analysis**: The investigation of lived experiences, as well as the manner in which people interpret and make meaning of such experiences in their day-to-day operations.
7. **Case Study Analysis**: The process of conducting a comprehensive investigation of a given instance (person, group, or organization) in order to obtain insights about certain occurrences or settings.

A variety of platforms and software tools exist for the study of qualitative data, including both basic manual coding and sophisticated software that facilitates intricate data analysis. These instruments assist researchers in managing, organizing, and analyzing non-numerical data, including text, audio, video, and photographs. Below are many prevalent systems used for qualitative data analysis: NVivo, ATLAS.ti, MAXQDA, Dedoose, QDA Miner, HyperRESEARCH, Transana, Excel (manual coding), Google Docs/Sheets (manual coding), online survey platforms.

**Mixed Methods Data Analysis**

Mixed methods data analysis is the integration of quantitative and qualitative data inside a singular study to get a more thorough comprehension of a research issue. It entails the integration and analysis of both numerical (quantitative) and non-numerical (qualitative) data to provide complementary insights. Mixed methods research may augment the validity of results by using the strengths of both data sources, enabling researchers to explore various facets of a research subject from diverse viewpoints.

**Key Approaches to Mixed Methods Data Analysis:**

**Convergent Design**: Quantitative and qualitative data are gathered and processed independently; however, their findings are examined and combined during the interpretation phase to see whether they converge or provide complimentary insights.

**Explanatory Sequential Design**: Quantitative data is first acquired and analyzed, then followed by the gathering and analysis of qualitative data to elucidate or interpret the quantitative findings in more detail.

**Exploratory Sequential Design**: Qualitative data is first gathered and evaluated to investigate a phenomenon, followed by the collection of quantitative data to validate or generalize the qualitative results.

**Embedded Design**: One category of data (qualitative or quantitative) is integrated inside the other, often used when one category is prioritized or considered subordinate to the major study emphasis.

**Transformative Design**: A particular theory or framework directs the use of both qualitative and quantitative data, with the objective of tackling challenges related to social justice, empowerment, or equality.

Mixed methods analysis offers a more comprehensive and nuanced knowledge by triangulating results from several data kinds and methodologies. It is especially beneficial when the study subject needs several viewpoints to fully understand the complexity of the events under investigation.

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| **Activity 1. Reading. Read the text and answer the following questions.** |

1. What is the primary difference between qualitative and quantitative data analysis?
2. What are the key features of NVivo that make it a popular choice for qualitative data analysis?
3. How can qualitative data analysis software help ensure transparency and reproducibility in qualitative research?
4. How can researchers use the findings from qualitative data analysis to inform policy or practice?
5. How do qualitative data analysis platforms help researchers present their findings in an organized and understandable format?

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| **Activity 2. Watch the video about “Research Design: Decide on your Data Analysis Strategy”, take notes while watching.** |

You tube link: <https://www.youtube.com/watch?v=rNulPTwLFMQ&ab_channel=Scribbr>

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| **Activity 3. Speaking. Answer the following questions.** |

1. What kind of data analysis methodologies are you familiar with?
2. What are the applications of statistics?
3. In what ways might descriptive statistics be utilized?
4. Under what circumstances may one use a statistical test?
5. What do regression and correlation analyses seek to identify?
6. How do comparison tests, such as T-tests and ANOVAs, function?
7. What are the different components of your research design?
8. What is theme analysis and how can it be utilized?
9. What is discourse analysis and how can it be utilized?
10. What kind of data analysis did you get from the video?

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| **Activity 4. Listening. Complete the notes below. Write ONE WORD ONLY for each answer.** |

**Data Analysis Strategy**

* In quantitative research, you have to decide which 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and statistical tests you’ll use to analyze the data.
* In qualitative research, you should consider what approach you take for categorizing and 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the data.

**Some common approaches to data analysis**

* With statistics, you can: summarize your sample data, make estimates about a population and test 3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* For example, if you're collecting data on students’ test scores, you probably want to calculate 4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ statistics like the mean, which describes the average score and the standard deviation, which describes the variability of the scores.
* Then, to test the hypothesis about a relationship between 5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, you can use a statistical test.
* Regression and correlation tests look for 6\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between two or more variables.
* Comparison tests, like as T-tests and ANNOVAs, look for differences in the 7\_\_\_\_\_\_\_\_\_\_\_\_\_ of different groups.

**Various aspects of your research design**

* In qualitative research, your data will usually be very dense with information and ideas.
* Instead of something it up in numbers, you will need to comb through the data in detail, interpret its meanings, and 8\_\_\_\_\_\_\_\_\_\_\_\_ the parts that are most relevant to your research question.

**Approaches**

* Thematic analysis focuses on finding 9\_\_\_\_\_\_\_\_\_\_\_\_\_ in the data. You label recurring topics or concepts and then group them into broad themes.
* Discourse analysis pays more attention to things like social context of 10\_\_\_\_\_\_\_\_\_\_\_\_\_. You analyze not only what is said, but also how it said.

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| **Activity 5. Vocabulary. Match the words with an appropriate definition.** |

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|  | **Words** | **Definitions** |
| 1 | Research | 1. a large amount of information stored in a computer system in such a way that it can be easily looked at or changed |
| 2 | Data-collection | 1. describing something, especially in a detailed, interesting way |
| 3 | Data-analysis | 1. a value, discovered by measuring, that corresponds to the size, shape, quality, etc. of something |
| 4 | Qualitative | 1. involving or shown by a series of numbers |
| 5 | Qualitative | 1. a detailed study of a subject, especially in order to discover (new) information or reach a (new) understanding |
| 6 | Database | 1. It is the process of systematically applying statistical and/or logical techniques to describe, summarize, and interpret data. |
| 7 | Statistical | 1. Research that seeks to understand phenomena by exploring the meanings, experiences, and perspectives of participants |
| 8 | Descriptive | 1. the collection and interpretation of data in order to uncover patterns and trends |
| 9 | Measurement | 1. Research that focuses on quantifying variables and analysing numerical data to identify patterns, test theories, and make predictions |
| 10 | Numerical | 1. It is the process of gathering information or data from various sources to answer research questions, test hypotheses, or analyse phenomena. |
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