

**Level: Master 1 (Didactics)**

**Module: Methodology in Assessment and Testing**

# Data Analysis

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# *Data Analysis*

- ❖ Data analysis refers to the process of summarizing and interpreting the gathered information. It represents an important step in reporting the research findings. It may be qualitative or quantitative.

# Quantitative *Data Analysis*

- ❖ Quantitative data analysis refers to the numerical form of interpreting the collected information. It involves the use of a set of statistical techniques including descriptive and inferential statistics.

# Descriptive Statistics

- ❖ Descriptive statistics aim at describing and summarizing the gathered data. They include frequencies, percentages and measures of central tendency as well as measures of variability.
- ❖ Frequencies and percentages may be provided within a text or they may be represented in tables called frequency tables. Percentages may be demonstrated through graphic representation involving the use of bar-graphs or pie-charts.

## Measures of Central Tendency

- ❖ Measures of central tendency are used for the description of the central point of a set of data. These statistics are : the mean, the median and the mode.

## Measures of Central Tendency

❖ **The mean** is the average score of a group of individuals. Its formula is as follows:

$$\bar{x} = \frac{\sum x}{n}$$

$\sum x$  = the total of scores

$n$  = the number of scores

For instance, in the following list of scores: 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, the mean is (10).

## Measures of Central Tendency

- ❖ **The median** shows the middle value of a group of scores. For an odd number, the median is the middle score; for instance, in a list of scores including the following values: 5, 6, 7, 8, 9, 10, 11, 13, 15, the median is 9.
- ❖ For an even number, the median is the average of the two scores which are in the middle; for example, in a list of scores including the following values: 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, the median is 9.5  $[(9+10)/2]$ .

## Measures of Central Tendency

- ❖ **The mode** is the number that frequently occurs in a distribution of scores. For instance, in the following list of values: 6, 8, 9, 10, 9, 12, 9, 14, 9, 11, 9, the mode is 9.



# Measures of Variability

- ◆ Measures of variability are statistical procedures that are employed to identify the dispersion of data around the mean; they denote the spread of a set of values .  
Measures of variability include the range and the standard deviation.

## Measures of Variability

◆ **The range** refers to the difference between the highest and lowest value in a dataset. Its formula is as follows:

◆  $\text{Range} = (\text{largest value} - \text{smallest value})$

◆ For example, in a list of scores including the following values: 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, the range is 11 (16-5).

## Measures of Variability

- ◆ **The standard deviation** is a measure of variability that determines the dispersion of data; it helps to show if the values are close to or far from the mean.

## Measures of Variability

The formula of the standard deviation is as follows:

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

$s$  = standard deviation

$x$  = each score

$\bar{x}$  = the mean

$n$  = number of scores

# Inferential Statistics

- ❑ Inferential statistics refer to the statistical procedures that are employed to draw conclusions about the features of the target population depending on the data collected from the selected sample. They aim at making predictions.
- ❑ Inferences can be made from quantitative data through the use of inferential statistics such as the chi-square test.

## Inferential Statistics

- **The chi-square test** is a very useful technique that helps to determine the difference between the observed and expected data. Its formula is as follows:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

$O$  = observed frequencies

$E$  = expected frequencies

## Quantitative *Data Analysis*

- ❖ Quantitative data analysis is an essential process that helps the researcher to summarize the research results in an accurate and objective way. It provides numerical data that can lead to make inferences related to the generalization of the findings.

# Qualitative Data Analysis

- ❖ Qualitative data analysis is the process of describing and interpreting the collected information through the use of words. It relies on the researcher's understanding and explanation of the obtained results. It aims at providing a detailed description of the studied issue.



# Procedures of Qualitative Analysis

- ❖ Qualitative data analysis involves the use of various procedures depending on the nature of the gathered information and research objectives. Among these techniques, one can list: qualitative content analysis and discourse analysis.

## Procedures of Qualitative Analysis

- ❖ Qualitative content analysis refers to the interpretation of the content of the data collected from texts or responses to open-ended questions. It helps to analyse the meaning of texts, the content of textbooks, the recorded information obtained through observation or the informants' answers to the questions of a questionnaire or an interview.
- ❖ Discourse analysis refers to the procedure utilized for the analysis of the purposes and aspects of language use in a specific social context. It is useful for interpreting conversations or written texts.

# Steps of Qualitative Analysis

Qualitative data analysis involves the following phases :

- ✓ Organizing and preparing the collected information: this stage refers to the arrangement of the gathered data.
- ✓ Reviewing and exploring the gathered data: this phase implies the act of reading and evaluating the amount and quality of the collected information.
- ✓ Coding : coding refers to the classification of the gathered data into distinct categories. It means summarizing the content of each response and classifying answers together according to their content.
- ✓ Describing : this step concerns the description of the analysed items in a detailed way.
- ✓ Interpreting : this stage implies the explanation and interpretation of the collected information.

# Qualitative Data Analysis

- ❖ Qualitative data analysis supplies textual information provided in the form of texts. To give more explanations, the researcher may use summary tables or diagrams to summarize and recapitulate the main points listed previously within the text.
- ❖ Qualitative data analysis helps the investigator to provide arguments and details. However, it may be unreliable and subjective since it relies on the informants' opinions and the researcher's point of view. Therefore, quantitative data analysis should be also employed in order to ensure the reliability and objectivity of the findings.

# References

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