Week 3. Research Methods

SOLUTIONS TO PREPARATORY QUESTIONS.

Q1. Please indicate which of the following is true about surveys as a design study.

A. Surveys belong to the category of True Experiments.
B. Surveys belong to the category of Quasi Experiments.
C. Surveys belong to the category of Non-Experiments.
D. All of the above are true. **[Correct]**

Q2. You have been tasked by TU Delft to administer a survey to first year MSc students on the perceived study-life balance. This survey is intended for the first year MSc students of all faculties within TU Delft. Describe how you will define the different strata within your target populations and what aspects will you consider while conducting stratified random sampling to ensure less bias and error in survey responses?

Defining Strata within the Target Population:

- **Faculty:** Divide the population based on the faculties within TU Delft. This includes faculties such as Industrial Design & Engineering, Architecture, Mechanical engineering, Aerospace Engineering, etc.
- **Program of Study:** Within each faculty, categorize students based on their specific program of study (e.g., Integrated Product Design, Design for Interaction, etc. in IDE Master Program).
- **Demographic Characteristics:** Consider demographic factors such as gender, nationality, and age to ensure representation across various demographic groups within each program and faculty.

Aspects to Consider in Conducting Stratified Random Sampling:

- **Proportional Allocation:** Ensure that the proportion of students sampled from each stratum (defined above) is representative of the proportion of students in the entire population. For example, if 30% of the total first-year MSc students are from the Faculty of Mechanical Engineering, then 30% of the sample should be selected from this faculty.
- **Random Sampling within Strata:** Within each stratum (e.g., faculty or program), use random sampling techniques to select participants randomly. This ensures that every student within the selected stratum has an equal chance of being included in the sample.
- **Sample Size Consideration:** Adjust the sample size within each stratum based on its relative size within the population. Larger strata may require a larger sample size to ensure representativeness.
- **Stratum Homogeneity:** Aim for homogeneity within each stratum in terms of relevant characteristics (e.g., cultural diversity, gender distribution) to minimize variability within groups.

Q3. Suppose you are planning to conduct a survey to capture the different usage patterns of ChatGPT among students at TU Delft. Therefore, you only recruit participants who have used ChatGPT in their studies. This kind of sampling approach is referred to as?

A. Random Sampling
B. Snowball Sampling
C. Intercept Sampling **[Correct]**
D. Non-Probabilistic Sampling

Q4. Imagine that you and your friend have been tasked with the analysis of interview data. The interview was conducted with high-school teachers about the perceived relevance of a NEW smart awareness tool that can inform them about the levels of attention and fatigue of students in classroom. In this way, the teachers can potentially better self-regulate their teaching pace. Since, this is an entirely new product which has not been tested or analyzed in any other context, and assuming that no theoretical frameworks exist to explain the phenomena, which **coding approach** would you use (**Emergent or A Priori**) and why? Also illustrate the different stages of the coding process that you will follow.

Given that the smart awareness tool is entirely new and lacks existing theoretical frameworks, an **emergent coding approach** would be most appropriate for analyzing the interview data. Here's why:

- **Reasoning:** Since there are no pre-existing categories or theoretical frameworks to guide the analysis, an emergent coding approach allows for the discovery of themes and patterns directly from the data.
- **Flexibility:** Emergent coding offers flexibility in adapting to the nuances and complexities of the data without imposing predetermined categories or biases.
- **In-depth Exploration:** It facilitates in-depth exploration of the interview responses, enabling the researchers to capture a wide range of perspectives and insights.

Stages of the Coding Process:

Open Coding: Begin with open coding, where each line or segment of the transcript is examined independently. Assign descriptive codes to capture the essence of each segment without preconceived categories.
Concept Development: Organize the open codes into higher-level concepts based on their similarities and relationships, and define a codebook.
Grouping Concepts: The concepts are grouped together to form categories or themes. Identify connections between concepts to further refine the analysis.
Theory Formation: Inferential or predictive statements about observed phenomena are made. Explicit causal relationships or correlations are identified.
Constant Comparison and Reliability: Continuously and iteratively compare new data with existing codes and themes to ensure consistency. Refine and modify codebook

based on ongoing analysis and new insights. Conduct reliability checks to ensure higher agreement between coders.

Q5. What is the primary objective of grounded theory in qualitative research?

A. To test pre-existing hypotheses and theories.
B. To establish causal relationships between variables.
C. To generate new theories and conceptual frameworks based on data. **[Correct]**
D. To confirm the validity of existing theories through empirical evidence.

Q6. Which of the following statements best describes **Cohen's Kappa** in the context of **inter-rater reliability**?

A. Cohen's Kappa measures the absolute agreement between raters, disregarding chance agreement.
B. Cohen's Kappa measures the consistency between raters beyond what would be expected by chance. **[Correct]**
C. Cohen's Kappa measures the correlation between raters' scores on a continuous scale.
D. Cohen's Kappa measures the difference in ratings provided by different raters.