**1: Data and scales of measurement**

Lecture objectives:

Students will be acquainted with

1. the terms data, instrumentation, and measurement.
2. The four scales of measurement

**Lecture content:**

Introductory scenario:

Lynda is interested in examining the students’ habits in the use of the campus library. She has decided to collect data from a sample of students belonging to the departments of English, laws, and sport. However, she is undecided whether to collect data through a survey, an observation, or an analysis of records. She eventually opted for a questionnaire with 80 students from the three departments. This will allow her to obtain quantitative data. Another concern she has is how to use measurements in the process of collecting data.

Planning research goes through particular steps. Once the problem is defined, the research design is selected, and the sample is identified, the researcher decides upon the **data** he is interested in; that is to say, what will be measured and the tools necessary for **measurement.**

Data refers to any type of information collected by the researcher from the participants in the study. Data types include a wide array of possible information such as

* Demographical information (age, gender, nationality, race..)
* Scores obtained after a test has been given.
* Responses to an interview or questionnaire questions.

Measurement in quantitative research is a central feature since it helps in deriving quantifiable data. Obviously, no quantification is possible without measurements. The measurement of variables allows the researcher to perform statistical tests, to confirm or disconfirm a hypothesis, to determine the significance of a difference in an experiment.

**Levels of data measurement:**

Whether measurement is used in examining the performance of learners, the attitude towards a study skill, or the time spent in an activity, it is crucial for the researcher to be aware about the type of measurement he/ she is involved in. Different level of measurements, also called scales of measurement, used in research fall into four main categories.

**Nominal**: this scales simply helps in classifying, i.e., placing cases into categories. No quantification or ranking is necessary for the categorisation of items. A student is either majoring at English or at laws; we compare between them by simply categorising them and not by counting any characteristic they have. For example, in a survey that examines the category of learners who use the institute library, the researcher may set four categories of students, freshmen, second year, third year, and master students.

**Ordinal**: this scale allows ranking cases in terms of order. It can be from ‘least satisfied’ to ‘most satisfied’, ‘strongly agreeing’ to ‘strongly disagreeing’, and so on. Though this scales enables to order items in terms of which one is ranked first, second, and so on, it does not indicate the distance between them. The interval between each point and the preceding or following one is not indicated.

**Interval**: in addition to the features of classification and order, this scale adds an equal interval between each point and the other. However, this scale is known for having no absolute zero. If an achievement test in reading comprehension indicates that participant A scores 16, participant B scores 8, and participant C scores 0, this does not mean that participant A is twice better than participant B. Neither is it possible to say that participant C has no reading comprehension skills. The zero in this case is arbitrary, not true/ absolute.

**Ratio**: ratio scale is similar to interval with the particularity that the scale starts at a true zero not an arbitrary one. If for example a researcher is measuring the number of hours spent by student per week in the library, with a ratio scale it becomes possible for this researcher to determine whether student A spends ‘twice as many hours’ as student B. This makes it also possible to say that student C spends no time (true zero) at all in the library. The variable of time spent in the library in the previous example can thus take the value of zero.

Practice

Task 1: indicate which level of measurement is used in each of the examples below

1. A teacher is asking students to give the number of hours they spend in group revision.
2. A teacher is asking respondents to indicate which type of school they have carried their studies in
   1. Private school
   2. Public school
3. A teacher is recording his students’ attitudes towards continuous evaluation. He started with this statement “I find continuous evaluation very effective”. Then, he suggested a five-point Likert scale including strongly agree, agree, undecided, disagree, and strongly disagree.

Task 2: use Google scholar search engine and find a quantitative research. Examine the measurement tool(s) used to quantify data and identify its type.

Task 3: consider possible variables that can be related to the listening ability, think of three ways to measure this ability, one using nominal level, one ordinal, and one interval/ratio.