### Variables and Scales of Measurement Supplemental Presentation Notes

### Variables

Identify variables in the following statements. Note difference between a variable and categories of a variable.

- 1. There is a difference in weight between males and females.
- 2. The age of a student is associated with reading readiness scores.
- 3. All students in the class are female.

#### Answers

- 1. Weight; Sex (male female)
- 2. Age; Reading readiness score
- 3. No variables

#### Measurement

Process of assigning labels to categories of a variable. (Do not assume numbers are involved; this process is not necessarily quantitative in nature.)

How would one measure student sex in this course? How would one measure student age in this course?

### **Scales of Measurement**

Nominal: categories only Student Sex Race

Types of Flowers

#### Ordinal: categories with inherent rank

I think this course is well organized.

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Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree

Interval: categories with inherent rank and precise, equal intervals

Time in infinity Distance in infinity No education related variables (that I can conceptualize)

Ratio: categories with inherent rank and precise, equal intervals; and also with a true starting or ending point (true zero) Weight in pounds

Length of tabletop

Time to complete lap or run 5 kilometers (can form ratios)

Runner A: 15:00 Runner B: 18:12 Runner C: 21:43 Runner D: 30:00 Runner E: 33:51 Runner F: 45:00

# What scale is this variable?

I think this course is well organized. (Circle number that best reflects your view.)

Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5

# **Types of Variables**

Qualitative vs. Quantitative Variable

Qualitative = nominal (categorical variable) Quantitative = ratio, interval, and some ordinal variables

Examples:

- 1. If everyone buys a bag of apples, and we each count the number of whole apples in each of our bags, what is the scale of measurement for these counts? Is this qualitative or quantitative? (Work through logic of this example.)
- 2. Time required for individuals to complete a given task, such as washing dishes.
- 3. The classification of people into one of three student groups in high school (nerds, athletes, and others).
- 4. What about this, we take the classification used above (nerds, athletes, others) and provide a different label now with numbers, like this: group 1, group 2, and group 3?

# Answers

- 1. Count of apples in a bag: ratio quantitative
- 2. Ratio quantitative
- 3. Categories without rank, therefore nominal
- 4. Nominal

# Independent (IV) and Dependent Variables (DV)

How does one identify the IV? Is manipulation required?

Which are IV and DV for the following?

- 1. There is a difference in weight between males and females.
- 2. Students exposed to accelerated reader (AR) will have lower intrinsic motivation to read scores than students not exposed to AR.
- 3. The greater one's anxiety before a test, the lower will be one's test scores.
- 4. There is an association between test anxiety and academic self-efficacy.

# Answers

- 1. IV = Sex (male/female), DV = Weight
- 2. IV = exposure to AR (exposed, not exposed), DV = motivation to read score
- 3. IV = test anxiety, DV = test score
- 4. Not enough information to determine whether test anxiety or academic self-efficacy is IV or DV