6/03/20

Agenda for Math 5710 ♬ Meeting #10 ☻☺ 7/06/20 (8:00 a.m. – 9:10 a.m.)

1. Hello:

2. Note the syllabus' activity list for today:

10: M/7/06	1. Construct the following concepts, comprehend associated communication structures, and discover interrelations among them: data relevance, data reliability, data validity, data usability, validation studies, standard error of measurement, and discrete data v. continuous data 2. Take advantage of Quiz 10.

3. Briefly, raise and address issues and questions stimulated by the following homework assignment:

   A. Study our notes from Meeting #9 ; comprehend Jim's sample responses to the Quiz #9 prompts that are posted on *Canvas*.
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   B. Comprehend the entry from Line #033A–D & 33E-i from our *Glossary* document.

   C*. In light of the following goal statement for a proposed study, write a paragraph explaining whether or not there should be measurement validity concerns with either data relevant to the dependent variable (salaries of the study subjects) or the dependent variable (subjects' scores on the *Stanford-Binet Intelligence Test*. (Please post the resulting PDF using the appropriate Canvas Assignment link.):

      The proposed study examines the correlation between the salaries of professional economists working for corporations in the in California and their scores on the *Stanford-Binet Intelligence Test*.

   D*. Examine each of the following multiple choice prompts; for each circle the lower-case letter in front of the one correct choice:

      i. Which one of the following is a sufficient condition for an accurate assessment:
         a) Wise value judgments based on valid measurement results.
         b) Objective data from valid measurements.
         c) Non-subjective judgments.

      ii. Which one of the following is NOT a measurement?
         a) Hearing a person answer a question.
         b) Recognizing that a person does not know the answer to a question.
         c) Noting that a person hesitates before answering a question.

iii. Gloria scored 80 and Robert scored 20 on a test designed to be relevant to students' achievement of the goal of unit on systems of linear equations. Their teacher should NOT conclude from these results that Gloria achieved the goal four times better than Robert because of which one of the following reasons?
   a) A difference of 60 is not great enough to warrant such a conclusion.
   b) Such unit tests do not generate scores from interval scales.
   c) Such unit tests do not generate scores from ordinal scales.
   d) Such unit tests do not generate scores from ratio scales.
   e) The D_o generated by such unit tests rarely approach the targeted D_t.

iv. Which one of the following statements is true?
   a) Results from an interval measurement can tenably be interpreted as if they were nominal.
   b) Results from an ordinal measurement can tenably be interpreted as if they were interval.
   c) Results from a nominal measurement can tenably be interpreted as if they were ratio.
   d) Results from an interval measurement can tenably interpreted as if they were ratio.

    E.   Comprehend Jim's sample responses to Prompts #8-C&D that are posted on *Canvas*.

4.   Pass our eyes over the following entries from out *Glossary*:

    33E.   Measurement usefulness:

    i.   Note: "$D_0 = D_t + D_E$" is read "data from a measurement equals the sum of what the data would be if the measurement were perfectly valid and the influence of measurement error."

    ii.   Definition for *measurement relevance*: A measurement is *relevant* to the same degree that the data it generates are pertinent to the assessment that is influenced by those data.

    iii.   Definition for *measurement reliability*: A measurement is *reliable* to the same degree that it generates data that are internally consistent (i.e., the data reflects a non-contradictory pattern).

    iv.   Definition for *measurement validity*: A measurement is *valid* to the same degree that it both relevant and reliable.

    v.   Definition for *measurement usability*: A measurement is *usable* to the degree that it is practical to administer.

    v.   Definition for *measurement usefulness*: A measurement is *useful* to the same degree that it both valid and useable.

Usefulness

Validity   Usability

Relevance   Reliability

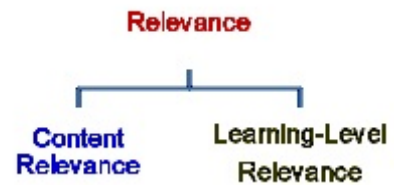5.   Address the following questions:

A.   What is measurement *usefulness*?

B.   What is measurement *usability*?

C.   What is measurement *validity* and how is it reflected by $D_0 = D_t + D_E$?

Validity

Relevance   Reliability

D.   What is measurement *relevance*?

Relevance

Content Relevance   Learning-Level Relevance

E.   What is measurement *content relevance*?

F.   What is measurement *learning-level relevance* or *construct relevance*?

H.   In general what are overall strategies for estimating the degree to which a measurement is *relevant* (i.e., the influence of relevance on D_E of $D_o = E_t + D_E$)?

I.   What is measurement *reliability*?

Reliability

Internal Consistency   Intra-Observer Consistency   Inter-Observer Consistency

J.   What is *internal consistency* of measurement results?

K.   What is *intra-observer consistency* of measurement results?

L.   What is *inter-observer consistency* of measurement results?

M.   In general, what are some overall strategies for designing measurements that are reliable?

     i.   Strategies for enhancing internal consistency?

     ii. Strategies for enhancing intra-observer consistency?

iii. Strategies for enhancing inter-observer consistency?

N. In general what are some overall strategies for estimating the degree to which a measurement is *reliable* (i.e., the influence of reliability on E of *So = St + E*)?

i. Strategies for estimating internal consistency

Sidebar note: Peek at one of the more general formulas for computing a reliability coefficient which can then be used to compute a standard error measurement:

Kuder-Richardson #19 (i.e., "Cronbach's α") :   Standard error of measurement:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{j-1}^{k}\sigma_j^2}{\sigma^2}\right)$$

$$SEM = \sigma\sqrt{1-r}$$

Sidebar note: Remind ourselves of our understanding of correlation coefficients - especially the mother of all correlation coefficients, the Pearson product-moment correlation coefficient:

$$\rho_{(a,b)} = \frac{1}{N}\sum_{i=1}^{N} z_{a_i} z_{b_i}$$

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    ii. Strategies for estimating intra-observer consistency?

    iii. Strategies for estimating inter-observer consistency?

6.   Take advantage of Quiz 10.

7.   Complete the following homework assignment prior to Meeting #11:

    A.   Study our notes from Meeting #10 ; comprehend Jim's sample responses to the Quiz #9 prompts that are posted on *Canvas*.
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    B.   Comprehend the entry from Line #03Eii–v from our *Glossary* document.

    C*.   For each of the following multiple-choice prompts, select the one best response that either answers the question or completes the statement so that it is true; circle the lower-case letter in front of your choice (Please post the resulting PDF using the appropriate Canvas Assignment link.):

        i. Which one of the following is a *necessary* condition for measurement relevance?
           a)   Scorer consistency
           b)   Reliability
           c)   Measurement usefulness
           d)   Learning-level relevance
           e)   Validity

        ii. Which one of the following is a *sufficient* condition for measurement relevance?
           a)   Scorer consistency
           b)   Reliability
           c)   Measurement usefulness
           d)   Learning-level relevance
           e)   Content relevance

        iii. Which one of the following is a *necessary* condition for reliability?
           a)   Internal consistency
           b)   Learning-level relevance
           c)   Usability
           d)   Pertinence to the intended content

iv. Which one of the following is a *sufficient* condition for measurement reliability?
   a) Validity
   b) Relevance
   c) Usability
   d) Internal consistency

v. Which one of the following is a *sufficient* condition for a measurement to be useful?
   a) Usability, internal consistency, scorer consistency, and relevance
   b) Relevance, reliability, validity, and scorer consistency
   c) Usability, content relevance, and learning-level relevance

vi. Which one of the following variables depends on the stated purpose of the measurement?
   a) Reliability
   b) Usability
   c) Usefulness
   d) Scorer consistency

vii. Which one of the following variables depends on the time it takes to administer a test?
   a) Content relevance
   b) Scorer consistency
   c) Usefulness

viii. By designing a measurement in a way to enhance its relevance (e.g., by using a measurement blueprint) and reliability (e.g., by carefully wording directions for prompts so that they are less likely to be misinterpreted), an experimenter is attempting to accomplish which one of the following regarding $D_o = D_t + D_E$:
   a) Solve for D_E
   b) Increase D_t
   c) Increase D_o
   d) Decrease D_E
   e) Decrease $\mid D_E \mid$

ix. By conducting a validation study of a measurement, a teacher is attempting to accomplish which one of the following regarding $D_o = D_t + D_E$
   a) Solve for D_E
   b) Increase D_t
   c) Increase D_o
   d) Decrease D_E
   e) Decrease $\mid D_E \mid$

D.   Comprehend Jim's sample responses to the homework prompts that are posted on *Canvas*.

8.   Note that in his autobiography, Bertrand Russell recalled the crisis of his youth:

> *There was a footpath leading across fields to New Southgate, and I used to go there alone to watch the sunset and contemplate suicide. I did not, however, commit suicide, because I wish to know more of mathematics.*