Tuesday, 21 February 2012, 10:45-11:45 a.m.

I had intended to attend "From Rags to Riches: The journey of general education at the University of Central Oklahoma"—this session was cancelled.

CS 6.9
Assessing Quantitative Reasoning: Highly Do-able Practical Ideas for General Education Assessment, from our Experience.
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Published Program Abstract (page 48):
This will be a highly practical session, describing the process of designing and implementing faculty-driven assessment of quantitative reasoning at the University of Houston. QR, an institutionally-designated option for us, is akin to the Empirical & Quantitative Reasoning component of the new core. We will discuss the realities of the assessment process, from planning and instrument development through dissemination of findings, with practical suggestions derived from our experience. A small-group activity will provide experience in instrument development, a key part of the assessment process, and will highlight the value of the conversations that can be part of the process.

- Quantitative Reasoning is referred to in the university catalog as Mathematics/Reasoning. This area is covered by courses in Psychology, Sociology, Mathematics, Computer Science.
- When you come into a meeting, have an agenda. Don't just ask—"What do you mean by QR?" That question has already been asked by many people for a long time.
- At the University of Houston, a process was set up designed to assess/evaluate this core goal. First, an e-mail invitation was sent out to the faculty, inviting them to a meeting to discuss the QR assessment. (I don't know if was to all University of Houston faculty, or just to those in departments that addressed the QR goal.) A second e-mail message had examples from other institutions on what the term(s) meant. Faculty could bring their own definitions/understanding of terminology with them too. At the meeting, the facilitators went from general concepts to the specific.
- An instrument was devised (by those faculty?—I wasn't clear on this) that would look into QR skills. There was a pre-test of the instrument to see how it might work. In order to recruit students to take the QR instrument (in its pre-test form), notices were put up announcing the test. Participating students received a $10 gift card to take the pre-test. (This proved to be popular.) The students were timed on the responses. The test administrators calculated a range of time needed for the completion of each item on the

test. Completion time ranged from 11 seconds to 100 seconds for the individual items on the pre-test.

- The pre-test appeared to go well.
- Then, the University proceeded to administer the test in freshman and senior level courses. Courses were chosen (but I cannot remember if the speakers said how they were chosen.) A letter was sent to the faculty person to inform her/him that the class had been chosen for this process. A copy of the letter went to the Vice President and to the Dean.
- In each chosen course, a random sampling of students was done for testing purposes.
- The test was administered through BlackBoard.
- They needed well over 50% of the students in the course to participate. To get that level, a high level of communication with the course professor was required. In order to get participation, professors did things like making the taking of the test a "requirement of the course," by offering it as "extra credit," and by informing the students that the professor can continually check to see if the student is participating or not, which implies that there may be consequences for non-participation. Just before the end of the semester, there was a "last week" letter to the faculty person stating how many students has participated. Overall, the University had participation of 73% of the enrolled students in these courses. If an individual student was enrolled in more than one of the sampled courses, they had to decide what to do. (There were cases in which a student took the instrument twice.)
- After all the data came in, these had to be tabulated.
- The data/results—all of them—are then shared with the faculty.
- There was some comment that they purposely put in "distractor questions" and questions with wrong answers—maybe I didn't hear correctly what was being said.
- Doing things like this builds a culture of assessment on a campus.
- Don't overlook the value of asking an open-ended question. Record verbatim comments; these give voice to the responders.
- In the academic assessment process, what was being tested was never referred to as quantitative reasoning.
- In all, there were 40-50 instructors involved, and about 700 students.

- The speakers then conducted a discussion session using a handout—"Quantitative Reasoning Item Discussion." Examples of seven Quantitative Reasoning items were given. We were asked to read each of the seven questions and their multiple choice answers. The seven Quantitative Reasoning Items are designed to assess a student's ability to reason through quantitative problems/situations. We were also asked to evaluate these questions using the scale at the top of the page. Each Quantitative Reasoning Item was to be evaluated based on two ratings—that of "Content" and that of "Difficulty." "Content" and "Difficulty" were rated on a 1 to 5 scale. (See handout.)

# QUANTITATIVE REASONING ITEM DISCUSSION

### Scales: Two ratings for each item

**1. Content**: Does this item represent reasoning your institution intends to develop in your students?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Not relevant | | | | Essential |

**Not relevant**: A student's ability to answer this question tells us little to nothing about his/her education in our institution.

**Essential**: At our institution, we intend and expect to develop this kind of reasoning in our students.

**2. Difficulty**: How does the level of difficulty of this item relate to your expectations for your students?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Too easy | | About right | | Too hard |

**Too easy**: A student's ability to answer this question tells us little to nothing about his/her education in our institution.

**About right**: This illustrates a level of difficulty we expect all our students to be able to handle.

**Too hard**: While we certainly have a number of students who could answer this, we do not expect performance at this level of all our students.

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## Quantitative Reasoning Items

1. On a certain city block are sixteen homes: two single-family homes priced at one million dollars each, and fourteen townhomes priced at $150,000 each. Which would be the larger number: the mean (average) home price, or the median (middle) home price?

a) They would be equal.

b) The mean price would be larger.

c) The median price would be larger.

d) More information is needed to answer.

2. Which of the following pairs of variables is likely to have a negative correlation (that is, as one goes up, the other tends to go down)?

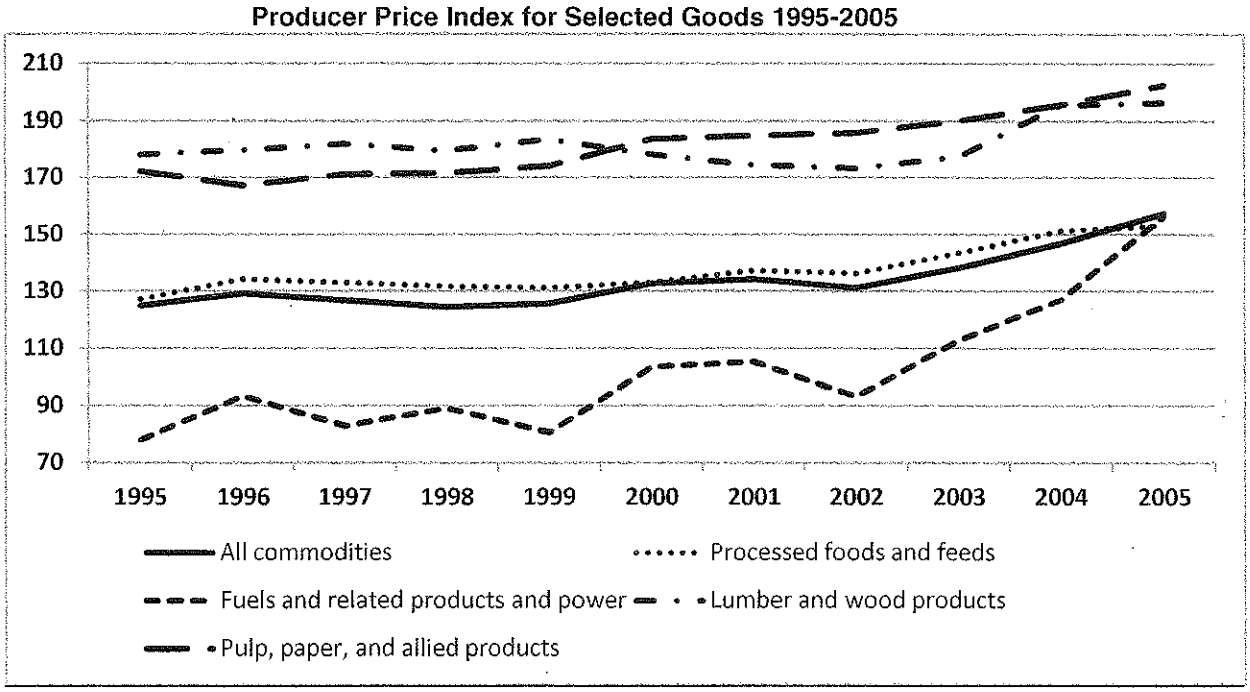
a) The price of jet fuel and the price of an airline ticket

b) The price of gasoline and the number of SUVs sold

c) A person's height and the same person's weight

d) The unemployment rate and the number of homeless people

The Producer Price Index measures the average change over time in the selling prices received by domestic producers of goods and services using a benchmark of 1982 prices = 100. Please use this chart to answer the following question.




3. Which type of goods showed the greatest overall price increase from 1995 to 2005?

a) Lumber and wood products
b) Fuels and related products and power.
c) Processed foods and feeds
d) Pulp, paper, and allied products

4. The area of a circle is proportional to the square of its radius. If the radius of a circle is halved, what is the area of the circle when compared to the area of the original circle?

a) doubled
b) quadrupled
c) halved
d) quartered

5 A survey was taken of 100 residents of a town to investigate telephone usage. It was found that 80 had cell phones, 65 had land lines, and 15 had neither one. Assuming that this survey reflects the actual phone usage in the town, what is the probability that a resident selected at random has at least one phone?

a) 65%

b) 80%

c) 85%

d) 100%

6. Which of the following is the best sale price on an item?

Option 1: 45% off the original price
Option 2: 25% off the original price with a further reduction of 20%

a) Option 1 will result in a lower price

b) Option 2 will result in a lower price.

c) These are the same reduction.

d) More information is needed to answer.

7. Sales of widgets increased by 190% this year.

Which of the following sentences is a summary of this situation?

a) Sales of widgets are about the same as last year.

b) Sales of widgets are one-and-a-half times last year's sales.

c) Sales of widgets nearly doubled this year.

d) Sales of widgets nearly tripled this year.