



PROGRAM ASSESSMENT: FINDING THE RIGHT TOOL

March 8, 2006 ♦ 11:15 am – 4:15 pm

ROUNDTABLE – MSU ROOM 203 – 1:00-1:45 pm

“USING CONCEPT INVENTORIES AS A MEASURE OF
STUDENT LEARNING”

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This presentation will introduce Concept Inventories as an assessment tool. The discussion will include how to develop concept inventories and use them not only for assessing course work, but, also, the potential for use in program assessment.

HANDOUT: KEY CONCEPT INVENTORIES(MaryKay Orgill, UNLV Department of Chemistry, marykay.orgill@unlv.edu)**1. What is a Key Concept Inventory?**

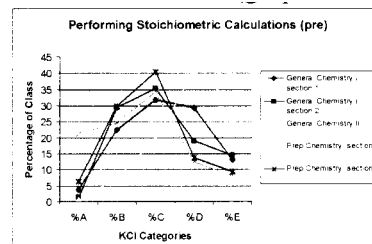
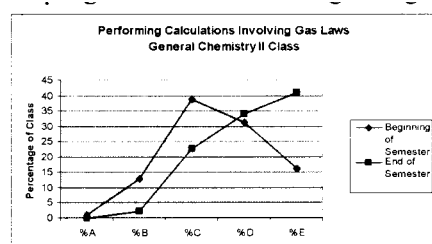
- a. A Key Concept Inventory is essentially a survey of some of the concepts and skills that instructors or departments believe are important for students to learn or acquire in a class or program. Students rank their perceived level of understanding of each of the concepts on the survey.

2. How do I develop a Key Concept Inventory?

- a. An instructor or a department should meet and decide which concepts or skills they believe are the most important for students to learn or acquire in a class or program. We have put 10 items on each of our surveys, but individual instructors or departments can adjust for their needs. It should be kept in mind that students will be less likely to be willing to complete surveys that are overly long.
- b. An example of a first-semester General Chemistry Key Concept Inventory is on the reverse side of this outline. The items on that survey can be replaced with appropriate concepts from individual classes or programs.

3. How do I analyze a Key Concept Inventory?

- a. We first expressed the responses numerically: A = 1, B = 2, C = 3, D = 4, and E = 5.
- b. For us, the most useful analysis of a Key Concept Inventory included the following information:
 - i. Average responses and standard deviations for each item on the inventory,
 - ii. Median responses, and
 - iii. The percentage of students who chose each response on each inventory item.
- c. We also created the following types of graphs to help us visualize how students' perceived understandings change as a result of participating in a class or a program:

**4. What are the possible uses or benefits of Key Concept Inventories?**

- a. Key Concept Inventories are easy to create, give, and analyze.
- b. Key Concept Inventories can focus instruction.
 - i. The creation of Key Concept Inventories requires that instructors and departments identify the important concepts in a class or program. Ideally, instruction should be focused around those key concepts.
 - ii. Giving Key Concept Inventories can let students know which concepts instructors believe are important in the class.
- c. Key Concept Inventories can inform instruction.
 - i. When given at the beginning of a semester, Key Concept Inventories can be used to identify perceived inadequacies in students' understanding. Instruction can be modified to meet the needs of the specific population of students.
 - ii. When given at the beginning and end of a semester, Key Concept Inventories can be used to identify concepts which students feel they understand or do not understand after participating in the class. Instruction can be modified for future semesters.
- d. If a department identifies concepts or skills that are important for their majors, Key Concept Inventories can be used to follow students' perceived understandings and abilities as they move through the degree program.

SURVEY ON UNDERSTANDING KEY CONCEPTS IN CHEMISTRY

Please **fill in the 5-option bubble sheet** with the name of your instructor, the course number and section, and the date. For the spot labeled "form", please fill in the name of your institution. You do not need to indicate your name. For the "identification number", please fill in the last four numbers of your social security number (in the last four spots).

For each of the concepts or skills listed below, **fill in the 5-option bubble sheet** that best describes your understanding of that concept at this point in your learning, using the scale below:

- A. I have not heard of the concept
- B. I have heard of the concept, but I do not understand it
- C. I have some understanding of the concept, but I could not explain it to others
- D. I am reasonably confident of my understanding of the concept, and I might be able to explain it so others could understand it
- E. I am very confident of my understanding of the concept, and I am certain I could explain it so others could understand it

Please mark the 5-option bubble sheet in the appropriate circle to represent your understanding of each concept:	A	B	C	D	E
1. Using the periodic table					
2. Explaining chemical bonding and reactions using electron configuration					
3. Writing and balancing chemical equations					
4. Using kinetic molecular theory to explain chemical reactions and phase changes					
5. Understanding ionic and covalent bonding					
6. Using kinetic molecular theory to distinguish between solutions and suspensions					
7. Understanding acids, bases, and pH					
8. Understanding how scientists design experiments and validate results					
9. Performing stoichiometric calculations (i.e., involving conversion from moles to grams, or from moles of reactant to moles of product)					
10. Performing calculations involving gas laws					

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