

Introduction to Assessment in PBL

Courtesy of Sue Groh



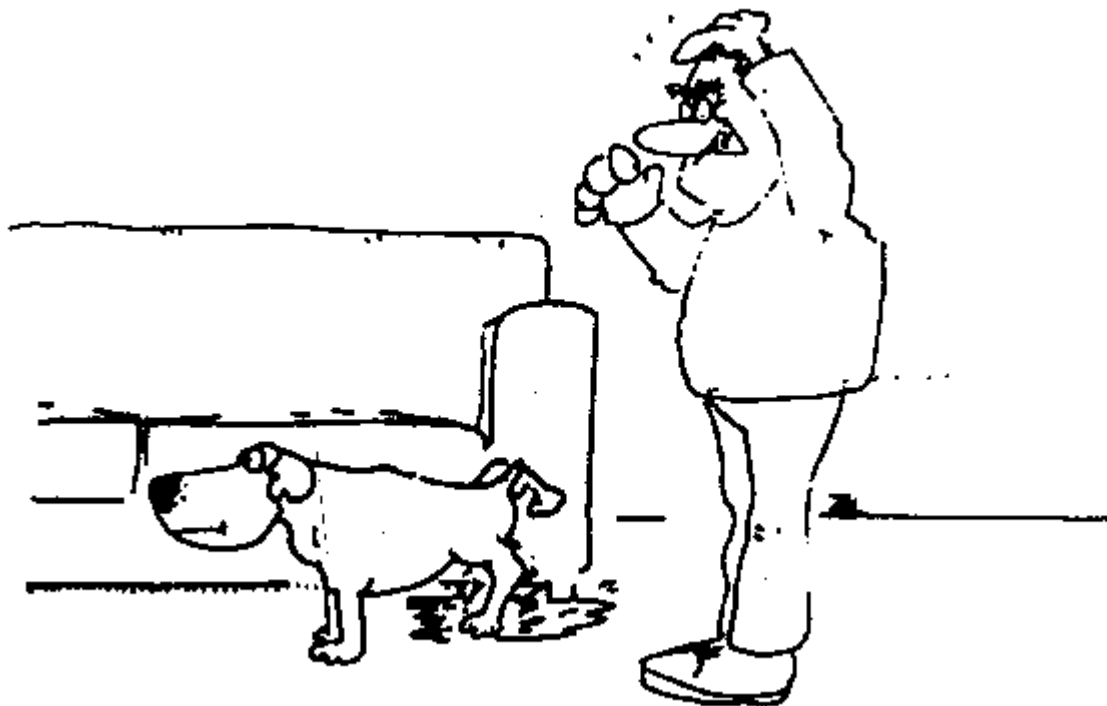
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University of Delaware



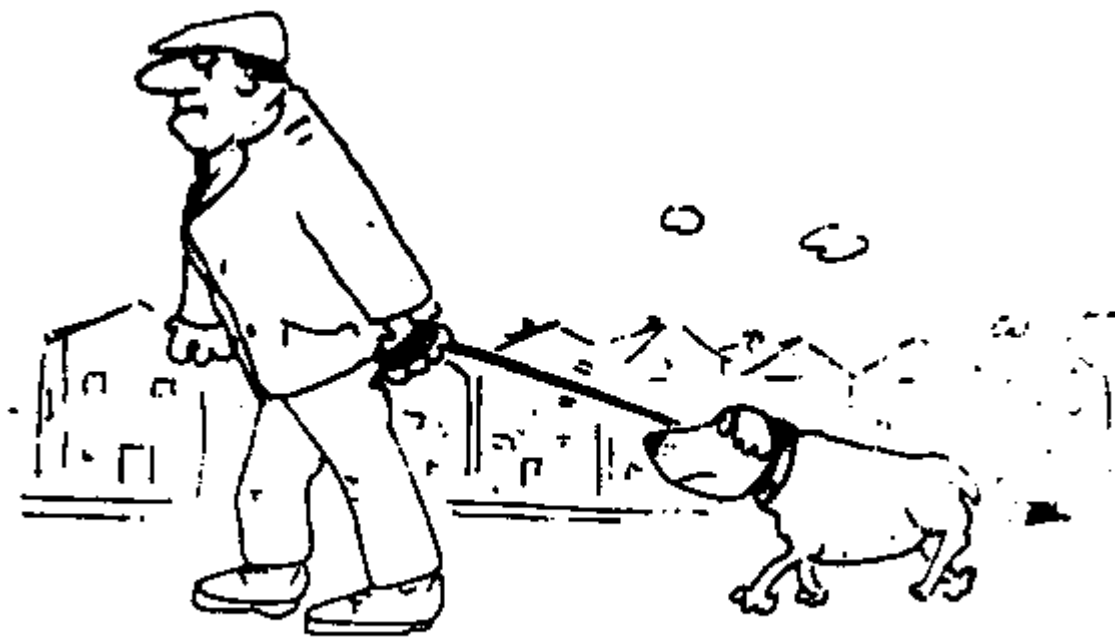


“Covering the Material”





A New Lesson Plan Is Needed



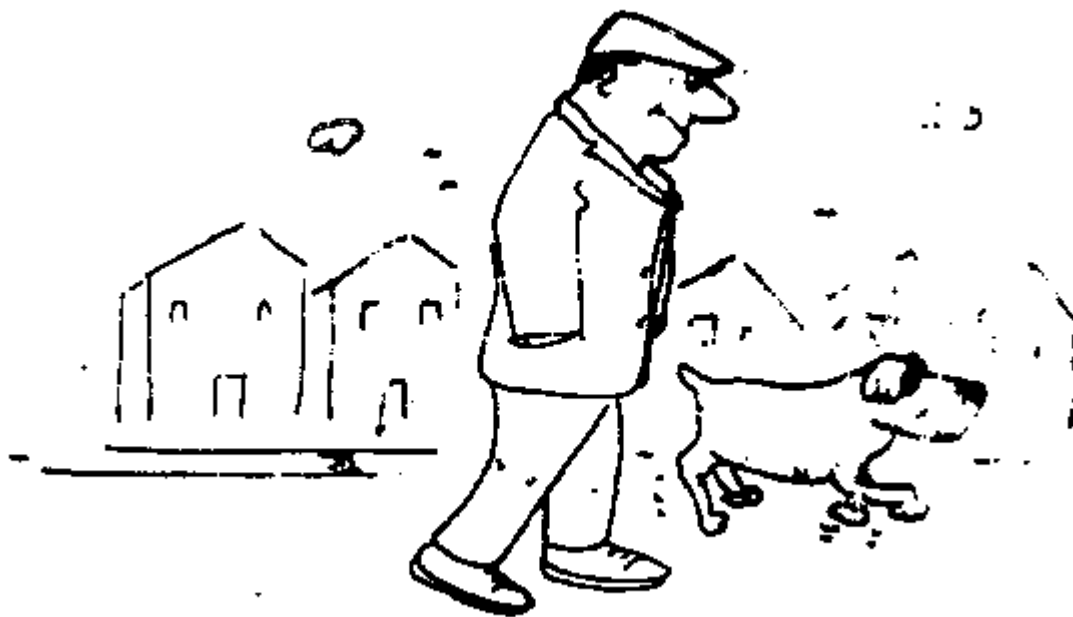


Active Learning?



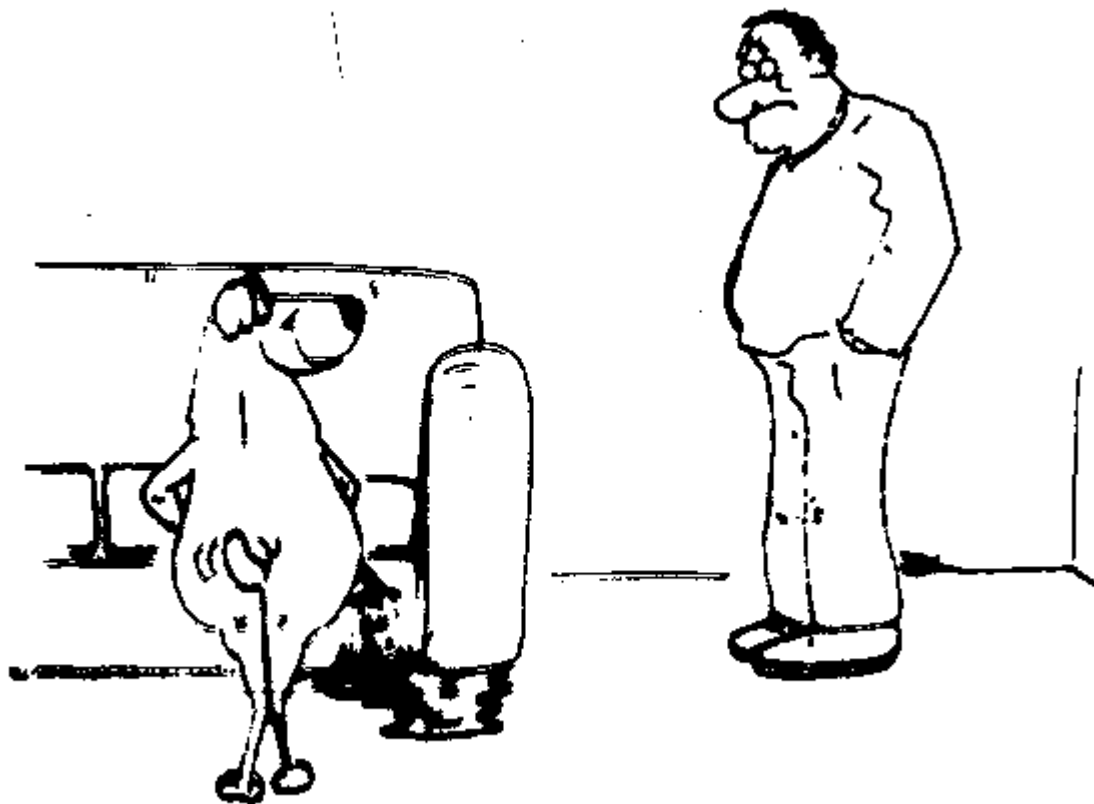


Mission Accomplished?





Lesson Learned...



© John Garratt, *University Chemistry Education* 2(1), 29-33 (1998)



Defining Assessment

“An assessment is an activity, assigned by the professor, that yields comprehensive information for **analyzing, discussing, and judging** a learner’s performance of valued abilities and skills.”

– Huba and Freed, *Learner-Centered Assessment on College Campuses: Shifting the Focus from Teaching to Learning*, 2000

Assessment is more than assigning grades: it implies ongoing interaction and communication between instructor and student.



Assessment Decisions

Faculty Perspective:

“Learning drives everything.”

- Barbara Walvoord

Student Perspective:

“Grading drives everything.”



Key Questions

- What do I want my students to learn?

⇒ Learning objectives

- Content knowledge
- Process skills

- How will I know if they have learned it?

⇒ Assessment strategies

- Summative
- Formative

- How much do I value that learning?

⇒ Look at what counts towards the grade



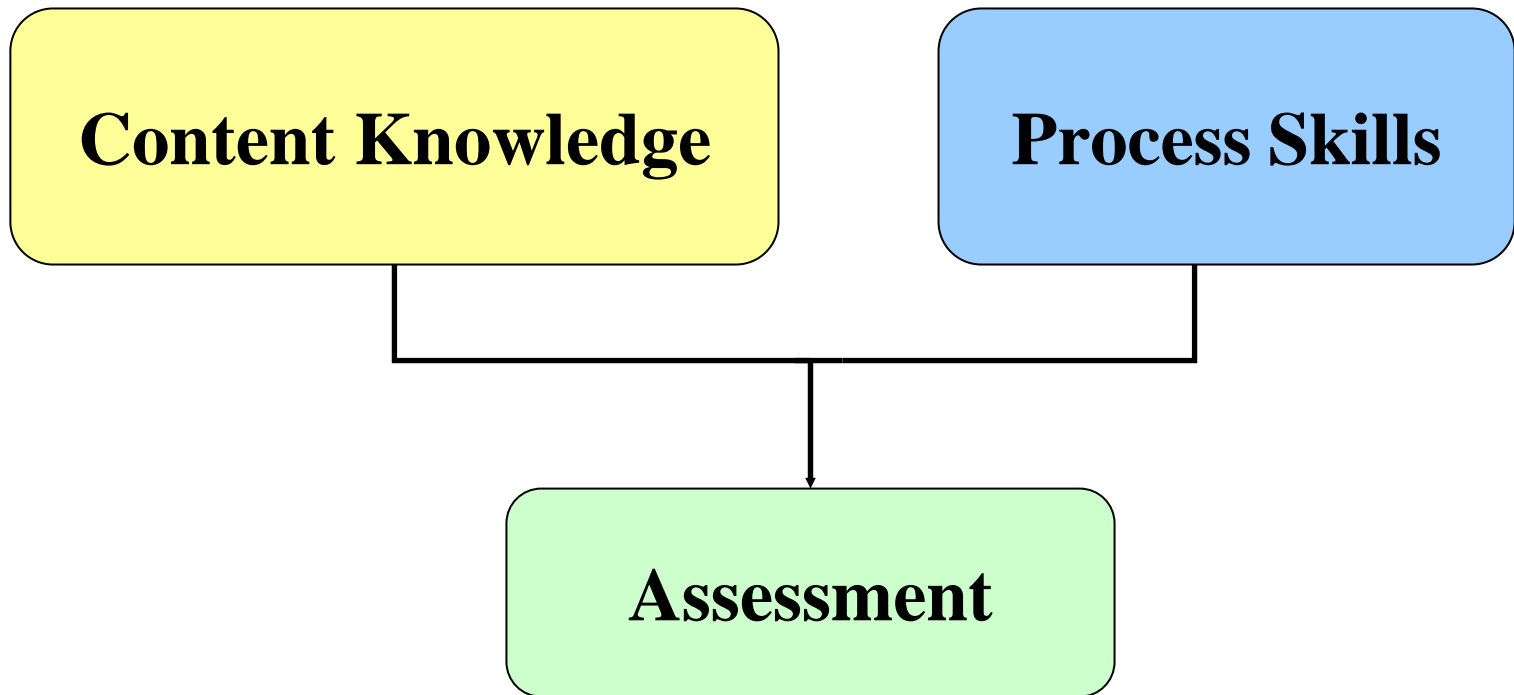
Types of Assessment

- **Summative assessment**
 - **Traditional grading for accountability**
 - **Usually formal, comprehensive**
 - **Judgmental**
- **Formative assessment**
 - **Feedback for improvement/development**
 - **Usually informal, narrow/specialized**
 - **Suggestive**



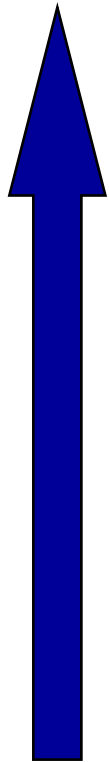
Assessment and Learning Objectives

Bringing content and process together





Bloom's Cognitive Levels



Evaluation - make a judgment based on criteria

Synthesis - produce something *new* from component parts

Analysis - break material into parts to see interrelationships

Application - apply concept to a *new* situation

Comprehension - explain, interpret

Knowledge - remember facts, concepts, definitions



An Example:

Probing Critical Thinking Skills in a Chem Exam

Goal: to design an exam question that:

- goes beyond simple knowledge or comprehension
- uses novel situation or “real world” context
- involves multiple concepts
- requires recognition of concepts involved (analysis), their roles here (application), and how several ideas come together (synthesis)



Chemical Solutions: Typical Questions

Calculate the vapor pressure of a solution of 5.8 g of NaCl in 100 g of water.

Bloom Level: Knowledge

Explain why a solution of NaCl will have a lower vapor pressure than pure water.

Bloom Level: Comprehension



A “Critical Thinking” Exam Question



The relative humidity inside a museum display case can be maintained at 75.3% by placing within the case a saturated solution of NaCl (containing excess solid NaCl). Explain, in molecular level terms, why the humidity remains constant - even when water-saturated air (100% humidity) diffuses into the case.



An Alternative Approach...



Design a solution-based system that could be used to maintain a constant humidity within a museum display case.

Explain in molecular-level terms why this would work.



Assess at Several Bloom Levels

Example: Chem exam	# of points	sum
• Knowledge	9	9
• Comprehension	36	45 (D ⁻)
• Application	22	67 (C ⁺)
• Analysis	20	87 (A ⁻)
• Synthesis	9	96 (A)
• Evaluation	4	100



Evaluating Learning through Rubrics

Rubric: a set of specific criteria against which a product is to be judged

- Criteria reflect learning objectives for that activity
- Several achievement levels are identified for each criterion
- Benchmark features indicating quality of work at each level are clearly described for each criterion

Rubrics can be used for both formative and summative assessment.



Rubric Design

	Achievement Levels			
Criteria	Excellent	Good	Needs Work	Not acceptable
Objective 1	Accepted	Minor revision	Major revision	Rejected
Objective 2	Expert	Advanced	Intermediate	Novice
Objective 3	6-5	4-3	2-1	0



Rubric Construction

	Achievement Levels			
Criteria	Excellent	Good	Needs Work	Not acceptable
State an objective	Describe characteristic features of each level of achievement			



Rubric for Planning of a Middle School Science Unit

	Excellent	Good	Average	Poor
State & national standards	Appropriate; listed for each lesson	Appropriate; listed for most lessons	Incomplete list/ some less appropriate	Few standards, inappropriately listed
Developmental level of lesson	Appropriate; misconceptions addressed in all lessons	Appropriate; misconceptions addressed in most lessons	Most lessons are appropriate; misconceptions addressed in few	Few lessons are appropriate misconceptions not addressed
Includes nature of science, inquiry in	all lessons	most lessons	many lessons	few lessons
Assessment	Variety of activities, well-integrated	Used in most areas but missed in some	Used but with little planning or integration	Little use of assessment throughout unit



Advantages of Rubric Use

- Clarifies expectations
- Efficient, specific feedback concerning areas of strength, weakness
- Convenient evaluation of both content and process learning objectives
- Encourages self-assessment: use as guideline
- Minimizes subjectivity in scoring
- Focal point for ongoing feedback for improvement



Other Ideas for Rubric Use

- Have students participate in setting criteria, performance descriptions
 - Use old student work as “data”
- Have students use rubric to rate own work; submit rating with assignment
- Others



Questions and Reflections

