

Assessment of Learning in Student-Centered Courses



*Institute for Transforming
Undergraduate Education*



University of Delaware

PBL2002: A Pathway to Better Learning

June 16-20, 2002



Session Outline

Classroom assessment: what's important?

Connecting assessment with learning objectives: examples

Assessment methods and strategies

Other types of assessment



What Is Assessment?

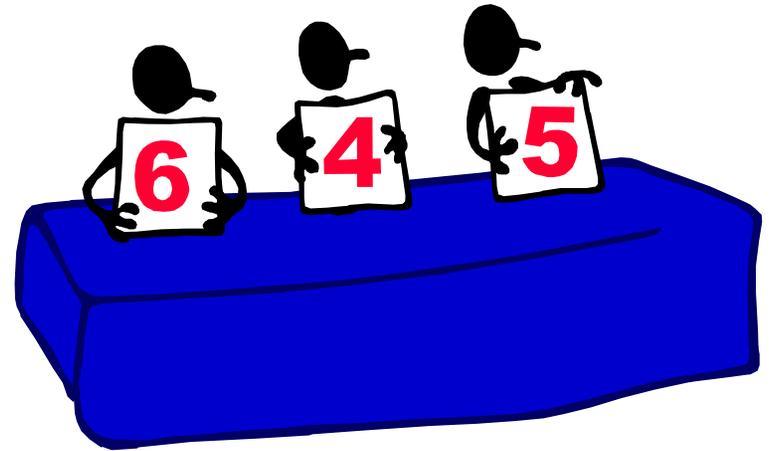
“An assessment is an activity, assigned by the professor, that yields comprehensive information for analyzing, discussing, and judging a learner’s performance of valued abilities and skills.”

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



First Principle for Assessing Student Learning

Assessment of student learning *must* be directly connected to the learning objectives of your course. You should make these connections clear to students in your syllabus.





Classroom Assessment Should Also:

- be based on understanding how students learn
- accommodate individual differences
- be clearly explained to students (grading criteria)
- be valid and have a reliable process
- allow for timely feedback
- allow faculty and students to reflect on learning
- be an integral part of course development

From: Brown, Race, & Smith (1996). *500 Tips on Assessment*



Assessment Decisions

“Learning drives everything.”

- Barbara Walvoord

- 1. What do you want your students to learn?**
- 2. How will you tell if they’ve learned it?**



1. What do you want your students to learn?

“Grading drives everything.”

- Students

Define goals through learning objectives

Content issues

Process/skill issues

Attitudes

Develop ways to assess those goals



Types of Learning Objectives

Content-oriented: subject-specific

- **Basic knowledge and understanding of specific concepts, techniques, etc. in the discipline**

Process-oriented: global skills

- **Effective communication: verbal and written**
- **Acquiring and evaluating information**
- **Working effectively with others**
- **Higher-order, critical thinking**



2. How will you tell if they've learned it?

Summative assessment

- Traditional grading for accountability**
- Usually formal, comprehensive**
- Judgmental**

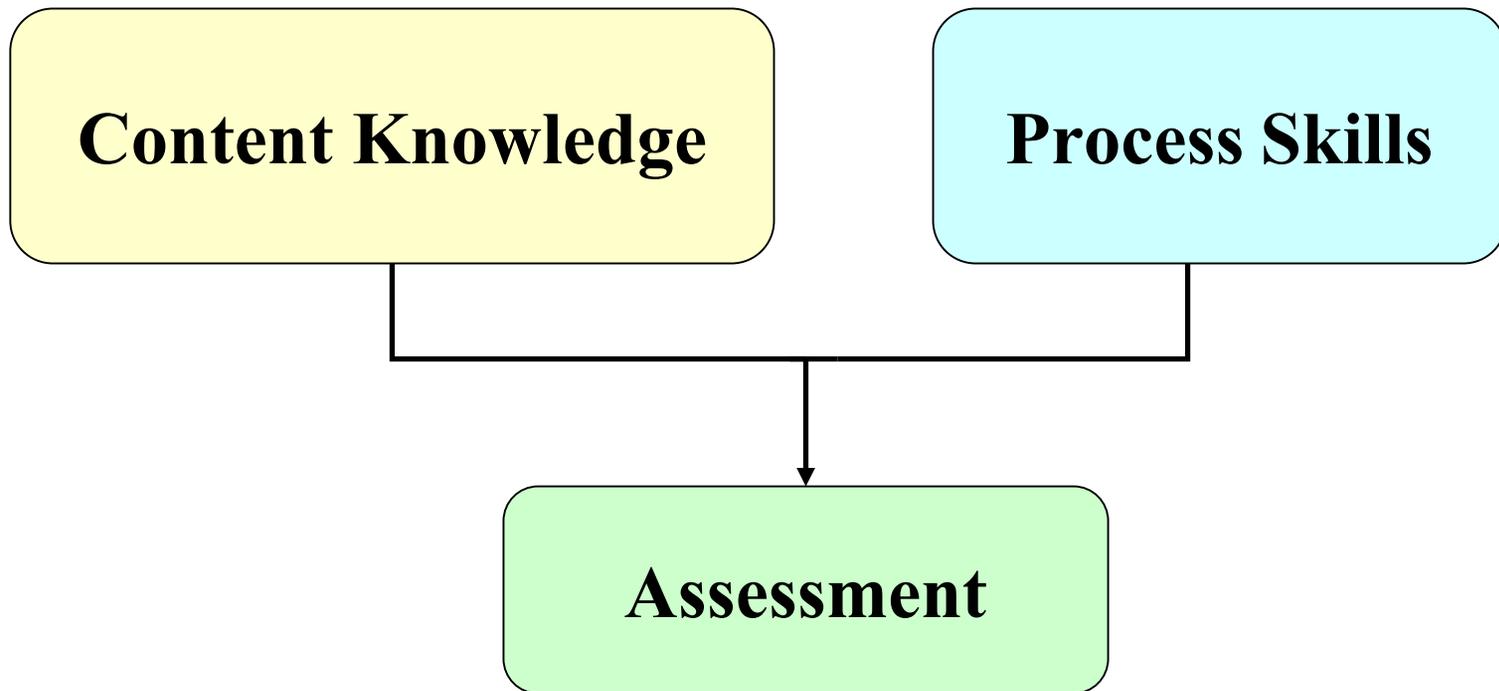
Formative assessment

- Feedback for improvement/development**
- Usually informal, narrow/specialized**
- Suggestive**



Assessment and Learning Objectives

Bringing content and process together





Matching Assessment with Objectives

Student Outcomes	Exam	Survey	Project	Portfolio	Observation
Know information					
Use information					
Extend knowledge					
Plan Study					
Communicate knowledge					
Analyze/interpret data					
Use reasoning					



An Example: Probing Critical Thinking Skills in a Chem Exam

Goal: to design a 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)**



Traditional Exam 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 Higher-order 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.



Assess at Several Bloom Levels

Example: Analysis of exam components

	# of points		total
Knowledge	9	→	9 (F)
Comprehension	+36	→	45 (D⁻)
Application	+22	→	67 (C⁺)
Analysis	+20	→	87 (A⁻)
Synthesis	+9	→	96 (A)
Evaluation	+4	→	100



Rubrics: Combining Formative and Summative Assessment

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.**
- Expected qualities or features of work at each level are clearly described for each criterion.**



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; sets public standards

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; numerical values facilitate use in judging

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?



Examples: Linking Assessment to Learning Objectives

Group Discussion and Report Out

10 minutes





Other Ideas for Assessment in PBL Courses

- **Group problem on exams (in-class or take home)**
- **Grade product from problem**
- **Ask questions related to problem on exam**
- **Concept maps**
- **Presentations or debates**
- **Posters**
- **other?**



Assessment of Individual Contributions to the Group

Get input from both peers and instructor

Assess more than once

Focus on constructive feedback



Sample Peer Evaluation Form

Scale: 5: Almost always 4: Usually 3: Frequently 2: Sometimes 1: Never

Name of Group Member:

Your Name:

1. Contributes to effective group functioning

2. Fulfills his/her role responsibility

3. Asks questions that help the group

4. Listens respectfully to group members

5. Asks groups members for help or clarification

6. Completes assigned tasks on time

7. Contributes ideas that help the group

8. Comes to class and group meetings on time

Overall rating of this person

5: Excellent 4: good 3: satisfactory 2: needs work 1: poor



Sample Peer Evaluation Form

Describe the one feature of (this person or your group) that you think has contributed the most to the success of the group.

Describe one way in which (this person or your group) could improve in order to help the group work better.



Questions and Reflections

