

## **Assessment:**

### **Designing your classes for meaningful learning**



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Adapted from materials by Michelle Withers, West Virginia University, Clarissa Dirks, Evergreen State College, and Jenny Knight, University of Colorado

## **Learning Outcomes**

You will be able to . . .

- **Distinguish between summative and formative assessment**
- **Use Bloom's Taxonomy to evaluate assessments**
- **Use the principles of backward design to align learning outcomes with formative and summative assessments**
- **Demonstrate the different possible uses of formative assessments**

**Individually:**

**What, in your opinion, is the role of assessment?**

**Assessment: More Than Just Grades**



“... because as we know, there are known knows; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns - the ones we don't know we don't know.”

Donald Rumsfeld



Huh?

### Think-Pair-Share

- How do you know when you know something?
- How do you know when your students know something?
- How do your students know when they know something?

**Buzzword: Metacognition**

## Examples of assessment tools

- Quizzes and exams
- Homework assignments
- Written papers/ reports
- Oral presentations
- In-class activities
- Surveys
- Observations
- Interviews

**Formative:** to modify teaching and learning activities during the learning process (ie, homework)

**Summative:** to monitor educational outcomes (ie, exam, final project)



**Assessments communicate your intent**

### THE MONTILLATION AND USES OF TRAXOLINE

It is very important to learn about traxoline. Traxoline is a new form of zionter. It is montilled in Ceristanna. The Ceristannians found that they could gristerlate large amounts of fervon and then bracter it to quasel traxoline. This new, more efficient bracterillation process has the potential to make traxoline one of the most useful products within the molecular family of lukizes snezlaus.

#### QUIZ:

1. What is traxoline?
2. Where is it montilled?
3. How is traxoline quaseled?
4. Why is traxoline important?

- An exam communicates what the instructor cares about
- If you test them on fact-based knowledge, then that is what they will study!

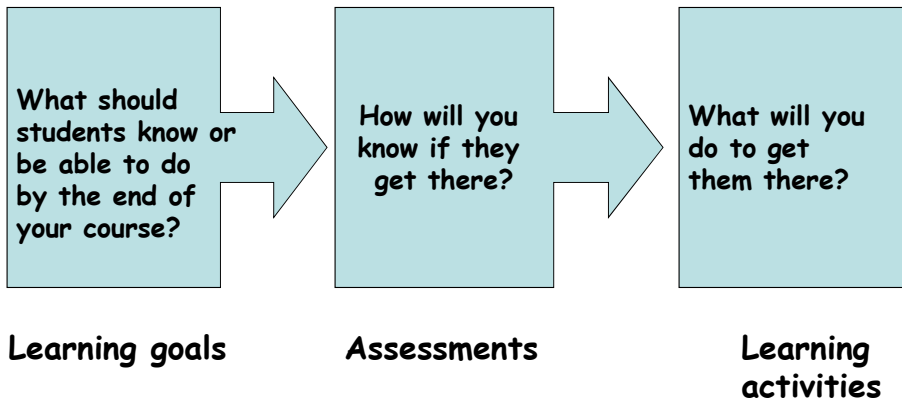
If a camera crew making a documentary on student misconceptions were to question your students at the end of your course or the end of your degree program, what would you be most embarrassed to find out that they didn't know?

(Shout out your ideas)

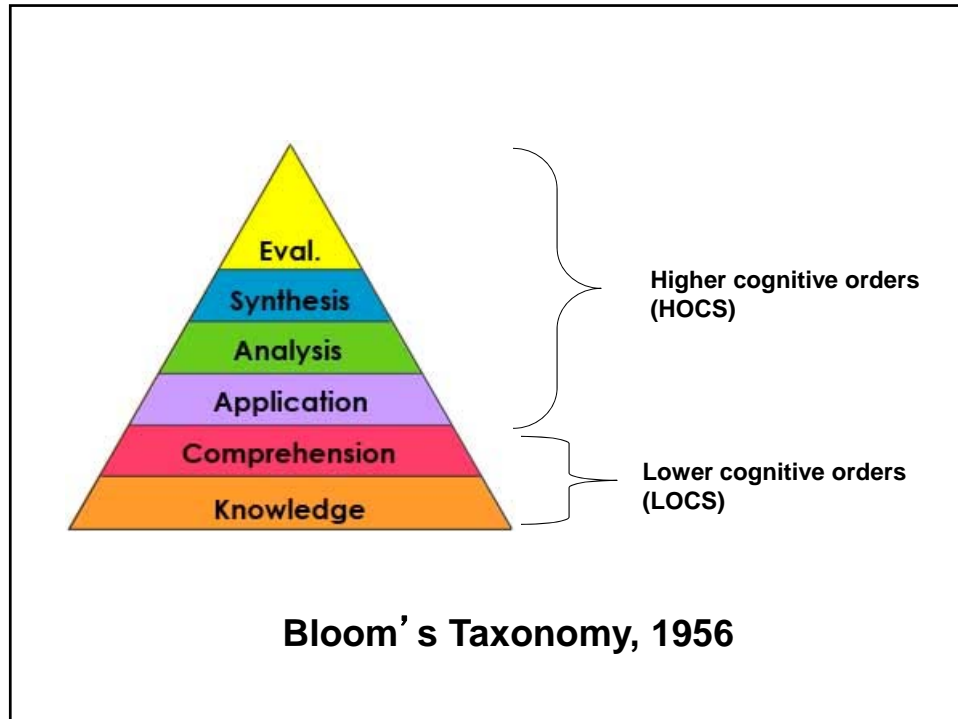
Some of your objectives may be content-independent!

(see Vision and Change)

### Backward Design: Outcomes drive Assessment and Instruction



Know your objective: Bloom's taxonomy can help



**Tools to EnGauge Students:  
Think-Pair-Share  
(8 minutes)**

- Share an exam question...
- Where does it fit in Bloom's taxonomy?
- How did you determine where this question fit? What action verbs were used in the question?

Feel free to use your *Scientific Teaching book*

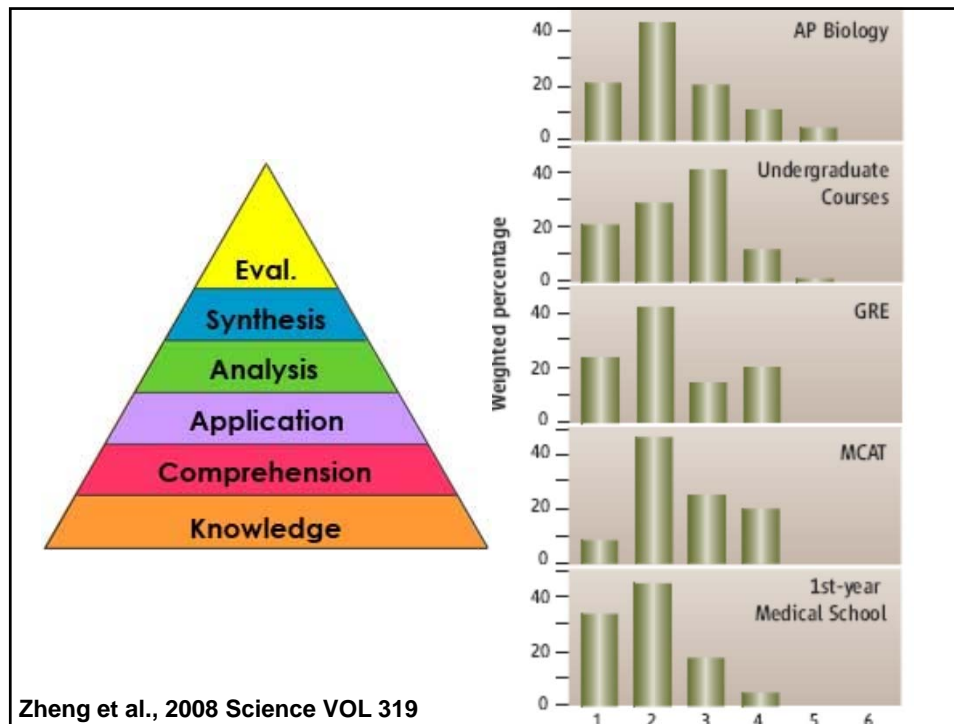
- What was the expected learning outcome?
- How can you take this question to a higher level?

What % of higher order Bloom's level questions would you like to find on an typical intro bio exam?

- A. 0-20
- B. 21-40
- C. 41-60
- D. 61-80
- E. 81-100







**We can do better!**

**Set meaningful learning objectives**

**Design aligned assessments**

**Execute fabulous (and aligned) active learning formative assessments**

<b>Alignment: example (handout)</b>			
Learning or Course Goal	Outcome or Objective <i>(content + behavior)</i>	Summative Assessment (exam question)	Formative Assessment (in class activity)
What will students <u>learn</u> ?	If they have learned it, what will students <u>know and be able to do</u> ?	How will students <u>demonstrate they know it or are able to do it</u> ?	What will students <u>do to learn it</u> ?
Students will understand the transfer of information from DNA to proteins	<b>Students will be able to predict changes in amino acid sequences caused by mutations</b>	<b>Students will predict the new amino acid sequence that results from a mutation in a given gene sequence</b>	<b>Students are given sequence of DNA and corresponding amino acid sequence. Students identify reading frame and predict amino acid changes due to mutations in that sequence</b>

**Return to the exam questions that you just aligned with objectives**

**At each table, pick one objective and its exam question to focus on**

**As a group, decide what kind of an activity your students could do (formative assessment) to help them achieve this objective.**

“Ongoing assessment plays a key role - possibly the most important role - in shaping classroom standards and increasing learning gains.”

Black and Wiliam, 1998

**Formative assessments  
have multiple roles in the  
classroom**

**1. Assessments help  
confront misconceptions**

**Example method: clicker**



As the acorn grows into the tree, from where does the majority of the biomass come?

- A. Air
- B. Soil
- C. Water
- D. Sun

What do you do if students get this wrong?

<http://www.learner.org/resources/series26.html>



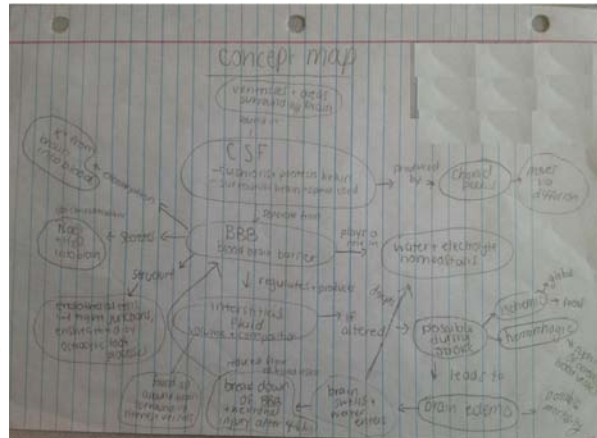
2. Assessments help students distinguish between what they know and what they don't know.

Example method: Group Brainstorm



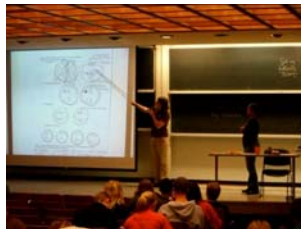
## Anatomy and Physiology Course

- Make a concept map using these key words:
  - Blood-brain barrier
  - CSF
  - Blood
  - Interstitial fluid
  - Ion concentration in the brain
  - Brain edema
  - stroke



## 3. Assessments can aid construction of new knowledge

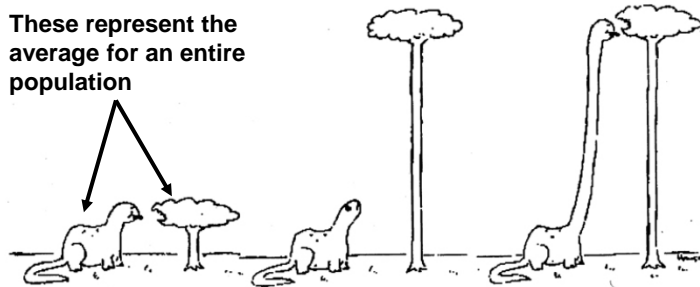
**Example method:**  
**Group work followed by report-out**



**Based on your understanding of natural selection and traits that vary along a continuum,**

1. Explain the changes that occurred in the tree and dinosaur populations over time.
2. Create a graph of the offspring's height vs mother's height of the original population, and the next three generations.

These represent the average for an entire population



(AAAS 1999)

#### 4. Assessments allow students and instructors to gauge students' progress during learning.

**Example methods: clicker with peer discussion and revote  
problem solving with group participation**



Brainstorming/group work example

## Darwin at the Olympics

(For this exercise, pretend you are a student who is just learning about natural selection)

- **Work with your group to modify the 100-meter dash such that it would become an example of natural selection.**

## Representative answers

- “Add hurdles”
- “Make the runners run over rocky, uneven ground to select for the ones with best balance and speed”
- “Release a tiger behind the runners”
- “Kill the losers”
- “Only the first two runners across the finish line can reproduce”

**Which are actual examples of natural selection, and why?**

## Recap: Learning Outcomes

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## Assessment Resources

- Angelo, T. and P. Cross. 1993. Classroom Assessment Techniques: a handbook for College Teachers. Jossey-Bass, San Francisco, CA. 427 pp.
- Field Tested Learning Assessment Guide: FLAG  
<http://www.flaguide.org>
- Student Assessment of Learning Gains: SALG  
<http://salgsite.org>
- Huba, ME, and J.E. Freed. 1999. Learner-centered assessment on college campuses: shifting the focus from teaching to learning. Allyn and Bacon, NY.



## Reflection

- Did you change your mind about the role of assessments? If so, how
- What did you learn or experience in the role of student?
- What feedback did the assessments offer the students?