



Creating effective test questions

Maribel Borger, PIE Associate,
Chemistry and Allyson Gates, PIE
Associate, History



— “Assessments are an instructor’s way of gathering information about what students have learned, and they can use them to make important decisions – about students’ grades, the content of future lessons, the revision of the structure or content of a course or program.”

- Susan M. Brookhart in

The Art and Science of Classroom Assessment

Workshop objectives

As a result of this workshop, you will be able to:

1. Connect learning objectives with formative assessments
2. Use Blooms to design test questions that encompass several levels of recall and application
3. Shift from passive to active assessment feedback

Background -- Why we test and how often



- Aids in retrieval and retention
- Identifies gaps in knowledge
- Causes students to learn more when they study
- Improves transfer of knowledge to new contexts
- Improves metacognitive monitoring
- Provides feedback to instructors
- Encourages students to study

Teaching tips!

- Don't rely on 1 or 2 tests. Test early and often!
- Varied assessment offers better evidence of learning

Background -- Learning objectives should be reinforced by what you test

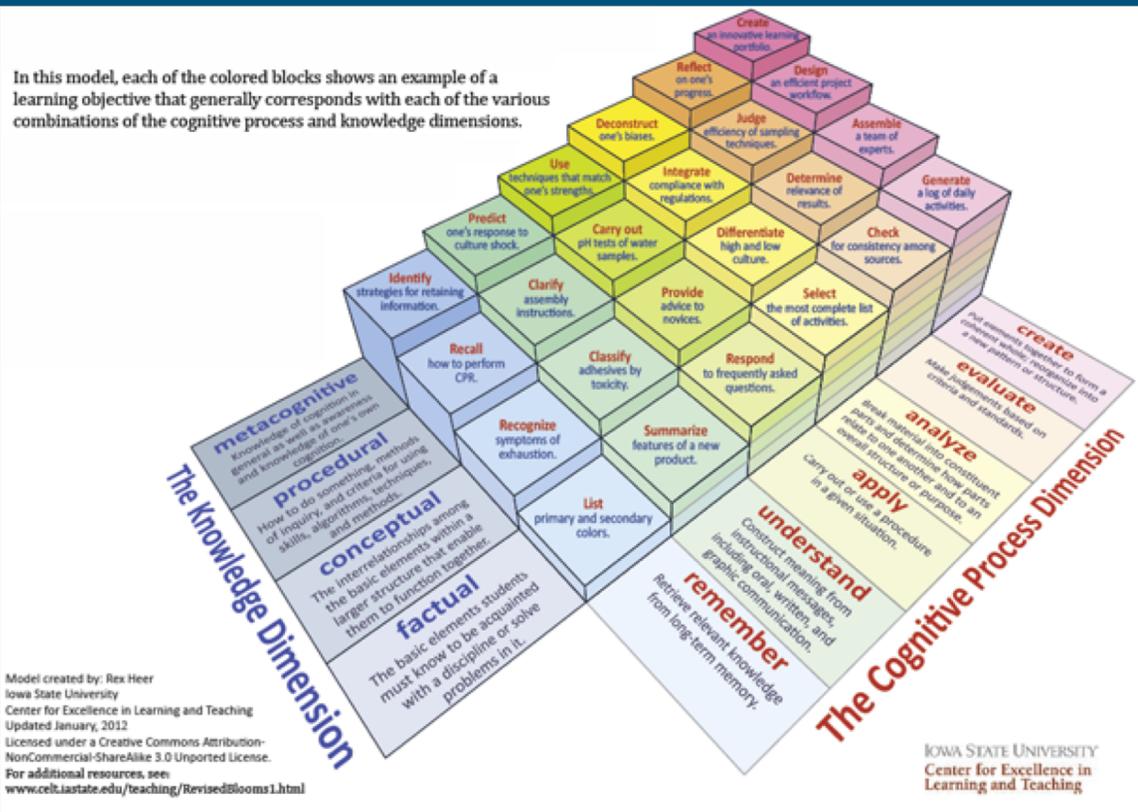
Remember: Some goals may not be measurable by conventional tests

- Start with your learning goals and ask what types of test questions are useful or appropriate to reach that goal
- Clearly specify standards to students
- Good to make assessment motivational
- Bloom levels can help you think about the types of questions.

Make sure each test has some of the easiest and hardest material!

Bloom's taxonomy

- Remember
- Understand
- Apply
- Analyze
- Evaluate
- Create



Examples of Questions for Each Level in Bloom's Taxonomy

Remember

- Who? What? Where? When? How?
- Describe: User types answer here..
- What is User types answer here.?

Understand

- In your own words, re-tell.
- What is the main idea of.
- What differences exist between _ and _?
- Write a brief outline.

Apply

- How is User types answer here. an example of _?
- How is _ related to _?
- Why is User types answer here. significant?
- Describe an example of when _ happens.

Analyze

- What are the parts of _?
- Classify this according to _.
- Create an outline/concept map of _.
- Provide evidence that _ is correct.

Evaluate

- Compare and contrast _ to _.
- Select the best product.
- Critique the play.
- Judge the following in these merits:

Create

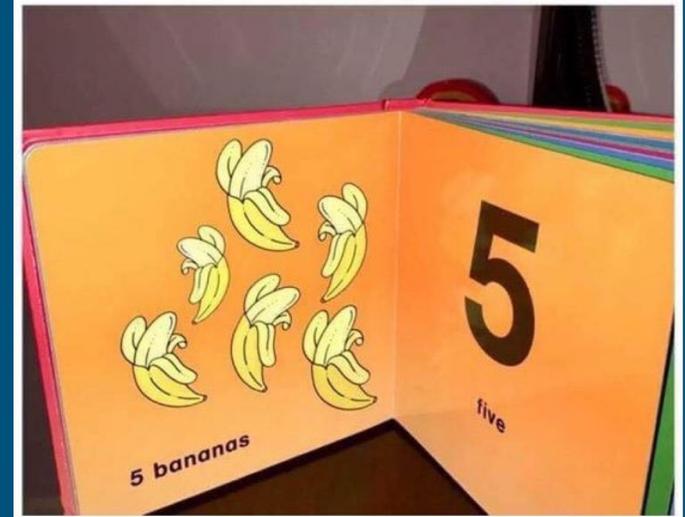
- Organize the following: _
- Predict what will happen next.
- What solutions would you suggest for _?
- How would you design a new _?

Review- Who is it for? What does it entail?

Practical tips before giving the exam:

- Have another instructor check for errors/content/clarity
- Proofread!

Proofreading this book couldn't have been that hard



Practical applications

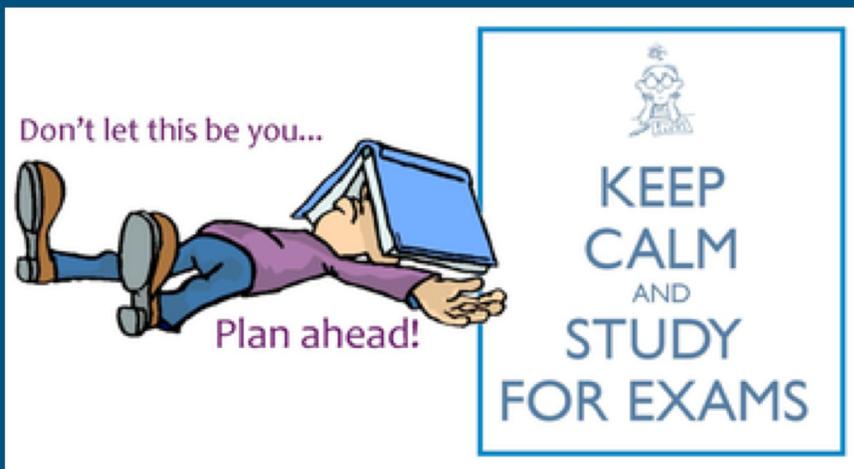
- A. Often base choice of question type off class size
 - 1. MC for lg class
 - 2. SA for medium class
 - 3. Essay for small class
- B. Goals should take precedence
 - 1. Higher level goals often require essay questions, problems, etc that require analysis, integration, application regardless of class size

Teaching tip! If class size allows: Use exit tickets for misconceptions

What effective assessment strategies have you used in your classes? Are they specific to your discipline?

Discuss.

Before the test -- REVIEW



- Use different tools to help your students review and practice
 - Offer study tips

Writing the test -- MULTIPLE CHOICE

Multiple choice can : measure full range of objectives, be reusable , be scalable for large classes, and provide constant feedback.

Best for recall and recognition

Chemistry example:

1. Which property of the following is a chemical property of Ethanol?
- (a) Boiling point of around 351K
 - (b) Flammable
 - (c) Liquid at room temperature
 - (d) Miscible with water

1.

History example:

How did diseases spread through most of the Americas after the arrival of Europeans?

- a. Direct contact with Europeans
- b. Trade routes and refugees
- c. Water supply
- d. Ingestion of the corn supply

The French are negotiating with the Iroquois for a piece of land to build a fort in the middle ground of the Great Lakes region. What would be the outcome of this talk?

- a. The Iroquois would have controlled relations and extracted a great deal from the French, if they even permitted the fort to be built
- b. Both sides would have debated to get something they wanted from the talks, neither would get exactly what they hoped for
- c. The French would have controlled relations and extracted a great deal from the Iroquois, if they even listened to Iroquois demands at all
- d. The French simply would have built their fort and killed any natives who attempted to prevent them doing so

Relatable Post #1199

Multiple choice test: A, B, C, or D? "Well I haven't had a B for like 4 questions so I'll choose that"

so-relatable.tumblr.com

With your table, pick the better option.

1. Suppose you are a mathematics professor who wants to determine whether or not your teaching of a unit on probability has had a significant effect on your students. You decide to analyze their scores from a test they took before the instruction and their scores from another exam taken after the instruction. Which of the following t-tests is appropriate to use in this situation?
 - a. Dependent samples.
 - b. Heterogenous samples.
 - c. Homogenous samples.
 - d. Independent samples.

1. When analyzing your students' pretest and posttest scores to determine if your teaching has had a significant effect, an appropriate statistic to use is the t-test for:
 - a. Dependent samples.
 - b. Heterogenous samples.
 - c. Homogenous samples.
 - d. Independent samples.

Answer: Avoid wordy stems by removing irrelevant data

Now practice writing a good multiple choice question.

Talk with your table about your question:

- What does it ask of students?
- What level of Bloom's is being addressed?

Writing the test -- TRUE/FALSE

- ❑ Every part of the sentence must be true or false
- ❑ Negatives can be confusing
- ❑ Best used when students explain answers as it encourages reflection

Chemistry example:

True or False: Two isotopes of the same element differ only in the number of neutrons found in the nucleus.

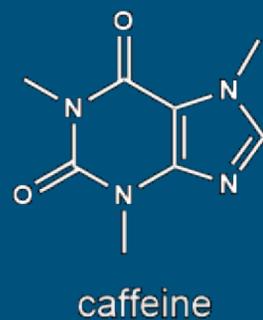
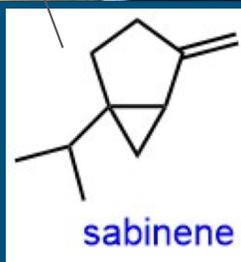
- a. True
- b. False

History example:

True or False: Most people already knew that the Earth was round by 1492.

- a. True
- b. False

Coffee and pie break



Writing the test -- SHORT ANSWER

- Go beyond plain recall
- Make sure the question provides enough information so that students know what constitutes a correct response
- Good for giving partial credit if student knows basic idea

Chemistry: Looking at the periodic table, analyze the columns and rows. Why are they arranged in this specific way?

History:

Name 2 effects of the Seven Years' War.

Is America actually exceptional in relation to the rest of the world?
Provide one example from class supporting your answer.

Writing the test -- ESSAYS

- Word questions carefully to avoid witty answers that may technically answer the question
- Clarify procedures + standards
- Require students to answer same questions

Chemistry:(Lab Report)

Take home assignments

History:

Describe **at least three** factors that led to the Pacific War (between the United States and Japan). Based on these factors, could the United States have avoided this war? Why or why not?

How did perceptions of property change in North America between 1490 and 1877? Please address various types of property and the different peoples living on the continent.

With your table, choose the better option.

Explain in what way a person's failure to apply the smoking cessation step process will impact his or her ability to stop smoking. Provide an example to illustrate your point.

- This example requires student to compose a response. It also requires the student to use reasoning skills and an example to reinforce their argument.

List all the steps to the smoking cessation process. Please list them in chronological order.

- This example only requires the learner to access lower level thinking skills which include memorization and recall.

After the test -- FEEDBACK

Feedback is an integral part of the learning process

Student mistakes can be learning opportunities for both students AND instructors.

What strategies have you used to make feedback more interactive?