How do I know what I’m teaching?

How can I construct effective test questions?

While we are all familiar with what it is like to take a test, few of us have ever actually designed and administered a test. This is an important skill for teachers to have, because a well-constructed test can be an accurate barometer of what students have learned and can facilitate further learning.

There are other benefits to tests as well. Tests help:

• motivate students and structure their efforts by making clear your goals as a teacher;
• give you feedback on how successful you have been at presenting the material;
• reinforce learning by giving students feedback on their work;
• ease the final grading process by giving you data on students’ progress over the term.

This module will present ways you can design and administer tests in a manner that will help you assess and facilitate student learning. Keep in mind:

• Tests should typically measure the learning objectives you have identified as you planned the course.
• Test writing can be as challenging and time consuming as grading, and it is often more important to student learning.
• Different types of test questions assess different kinds of understanding, and the most effective tests integrate a variety of question types.

Designing Tests

One of the most underestimated aspects of testing is the process of design. A well-designed test can be a useful learning tool for students; a poorly designed test, by contrast, can create a frustrating experience that only assesses students’ abilities to take it.

Some basic tips for designing tests include:

• Create new tests each time you teach a course.
  Each time you teach a course, you probably do so a little bit differently; different ideas and concepts are emphasized. Using old tests usually means you are not testing on what you have actually taught.

• Leave yourself time to write the test.
  Do not write the test the night before it is to be taken. Give yourself one to two weeks to refine the test questions and format.

• Create a bank of questions during the term.
  You do not need to wait until just before an exam to write the questions. If you pay attention to the questions and discussion in class, you will probably have ideas after each class about what the students are comprehending as well as what they are questioning. Write test questions down as they come to you. This helps to ensure that you test all of what you have taught, covers what the students know and should know, and saves you work down the road.
• Pay attention to the layout of the exam. The layout should be clear, crisp and easy to read. If you have different kinds of questions, group them together. If point values change, state what the value is for the question(s) as appropriate.

What Will You Test?
The first step in designing an effective test is clarifying just what it is you want to evaluate. This means asking two questions:

• What content do you want the students to know?
• What do you want them to be able to do with the content (recall, discriminate, analyze, etc.)?

What you decide should be largely in line with the course goals and objectives you mapped out at the start of the term. These goals state what students should know and should be able to do, and they have presumably driven what you have taught.

At the same time, the class will invariably take on a life of its own. The goals you identified before the class may not reflect all that has been taught. Students will struggle with topics and ask questions you had not anticipated – and you may even have decided not to cover all of the goals as a result. You must be ready to look beyond your goals as you design your tests.

How Will You Test?
Different types of questions, and different kinds of tests, are better suited to testing certain skills. In addition, the various forms of questions available to you have their own practical strengths and weaknesses.

Objective Questions (multiple choice, true/false, matching, fill-ins): These types of questions are best at testing recall of facts and the ability to discriminate between choices. A true/false question gives a student a 50/50 chance of guessing correctly. With the exception of multiple choice items, objective questions are fairly easy to write.

Short-Answer Questions: These are useful questions to test students’ recall of facts, but they can also let you see if students are able to identify the key concepts for a particular question and state them concisely, omitting extraneous information.

Essays: These are excellent formats for testing higher-level skills such as analysis, synthesis, evaluation and application. Research shows that students study more efficiently for these kinds of tests and achieve higher-level learning (McKeachie, 1999).

Problems: These questions are useful in testing application of knowledge and understanding of concepts. However, problems that are too lengthy can be tedious for students and become tests of endurance.

Performance Tests: These tests are common in the arts, where students must perform a particular skill or task. It is important that you set your criteria for assessment in advance and tell the students what these will be.

Take Home Exams: These tests allow students time to do a richer analysis of some topic. If you use them, you should set clear limits on the number of pages or words, and state whether students can collaborate or not.

It is possible, of course, for one test to combine many types of questions (e.g. objective, short answer, and partial take-home). In fact, it is probably preferable since this will permit you to test different kinds of knowledge and skills.
How Do You Construct the Questions?

Once you have a sense of what you want to test and how, it is time to begin generating the questions. Some instructors construct a matrix (content down the side, skills and objectives across the top) and check off the appropriate box each time they write a question to be sure their questions are balanced.

Here are some basic tips for constructing questions:

Multiple Choice: You should state the problem succinctly – the “stem” (the leading part) of the question should be short and direct. The correct answer should be unquestionably so (some recommend asking students to select the “best” answer) and the other possible answers you provide should be plausible.

Essay and Short-Answer: The question you pose should be a clear and concise statement of what you are looking for. Do you want students to compare two theories of cold fusion? Should they describe and explain three problems with the idea of free trade and then state their position? Davis (1993) recommends not giving students a choice of essay questions, saying it can create unnecessary anxiety and distract them from the task of answering the question.

How Many Questions Should I Give?

It is important to allow your students enough time to complete the exam comfortably and reasonably. Inevitably this will mean you must make some choices about which questions you will ask. Consider the following rules of thumb for how long students typically need to answer different forms of questions (McKeachie, 1999):

- One minute per objective-type question.
- Two minutes for a short answer requiring one sentence.
- Five to ten minutes for a longer short answer.
- Ten minutes for a problem that would take you two minutes to answer.
- Fifteen minutes for a short, focused essay.
- Thirty minutes for an essay of more than one to two pages.

You should add ten minutes or so to allow for the distribution and collection of the exam.

Administering Tests

When it is time to have students take the test, there are several things you should keep in mind to make the experience run as smoothly as possible:

- Have extra copies of the test on hand, in case you have miscounted or in the event of some other problem;
- Minimize interruptions during the exam by reading the directions briefly at the start and refraining from commenting during the exam unless you discover a problem;
- Periodically write the time remaining on the board;
- Be alert for cheating but do not hover over the students and cause a distraction.

There are also some steps that you can take to reduce the anxiety that students will inevitably feel leading up to and during an exam. Consider the following:

- Have old exams on file in the department office for students to review.
Constructing and Administering Tests

- Give students practice exams prior to the real test.
- Explain, in advance of the test day, the exam format and rules, and explain how this fits with your philosophy of testing.
- Give students tips on how to study for and take the exam – this is not a test of their test-taking ability, but rather of their knowledge, so help them learn how to take tests.
- Have extra office hours and a review session before the test.
- Arrive at the exam site early, and be there yourself (rather than sending a proxy) to communicate the importance of the event.

Some instructors seek to ease anxiety by allowing students to bring in information on a 3x5 or 5x8 index card, or a single sheet of paper. They believe this helps students choose the most important ideas to write down. Others feel it provides a distraction that hurts student performance during the test. This is an individual choice you must make.

In addition, some professors give the questions to students in advance. Typically, they give a larger number of questions than will be on the exam. Students (we hope) prepare for them all, and thus learn more material than can be covered in a test.

Returning Tests

The process of returning exams can also promote student learning.

- Return the exams promptly, preferably within five days, so that the material is still fresh in the students' minds.
- Discuss the general results in class. In what areas did the students do well? Where did they struggle? What does the exam tell you about what they are learning?
- Have extra office hours after the exam to discuss concerns, but consider asking students to wait twenty-four hours to formulate their questions and calm down if necessary if they are upset about the results.

Sources


