



## An Introduction to **Classroom Assessment Techniques**

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Unhappy indeed are the moments when we discover—often while grading the final exam—that what our students have learned is not at all what we thought we were teaching. Faculty, and for that matter students, need effective ways of monitoring learning throughout the semester. Although individual instructors often do invent, discover, or simply stumble upon a strategy that works, these informal and often serendipitous discoveries rarely become a matter of public record. Thus, a few years ago, Thomas A. Angelo and K. Patricia Cross compiled a volume, *Classroom Assessment Techniques: A Handbook for College Teachers*, describing strategies that college teachers had found useful and that could be used as models for asking the fundamental but often elusive questions "What are your students learning?" and its corollary, "How effectively are you teaching?"

For several years now, we have been promoting the use of Angelo and Cross's strategies, with generally good results. Along the way, it has become quite clear to us that the data faculty obtain from classroom assessment activities can be immensely useful for improving teaching and learning in a variety of ways. For example, such activities can help students learn how to study, encourage teachers to analyze objectively what transpires in the classroom, and guide students in a self-analysis of their own learning processes. But we have also discovered that some of the classroom assessment strategies Angelo and Cross describe have considerably greater applicability for Penn State teachers than do others. Fortunately, those with the most widespread appeal and utility are also among the simplest to use. In the sections that follow, we have briefly outlined those techniques that are easy to use, interpret, respond to, and modify. We have also included examples of how some of these techniques have been adapted and implemented by Penn State teachers. We hope you will be encouraged to try one or two of them in your own classroom. Or better yet, perhaps reading about the techniques others have designed will inspire you to invent one or two of your own. If you do, please let us know so that we can pass it on to others. As always, we welcome your feedback and comments about your experiences--successes or failures--with classroom assessment techniques. If in experimenting with these ideas you have questions or would like to discuss your results, please feel free to stop by or call.

### **General Recommendations for Use of Assessment Techniques**

As you read through the classroom assessment techniques described below, consider which one has the most potential for a course you are teaching. Why? What do you think you might learn by using this technique? How do you think the feedback you receive will be useful to you? As with most other decisions about teaching, responsible and effective use of classroom assessment techniques begins with a clear understanding of purpose and expected outcomes. Will you need to modify the basic procedure(s) to suit your particular situation? For example, as an alternative to having students respond individually to a task, some Penn State teachers have had good success with asking students to work in pairs or small groups. This variation will give you a less accurate gauge of any individual's performance, but it does provide a reasonable estimate of class performance and can help to consolidate feedback in large class sections. In addition, group

activities of this sort can be an extremely effective way to introduce students to one another and to encourage group learning. Many other variations are possible. The descriptions that follow are meant to provide a general outline of possibilities, not a rigid prescription.

Next, should student performance be anonymous? Although Cross and Angelo recommend that classroom assessment techniques be ungraded, some faculty at Penn State have found it more successful, especially early on, to "count" them. Even 1% of the final grade (perhaps with a grading scheme of check, plus, and minus) will encourage students to take them seriously. These techniques seem to work best when they are viewed as a source of feedback and not as a system for evaluating student performance. Achieving the right balance may take a bit of experimentation.

As you design the activity, keep it simple. What do you want students to do? What kind of response do you think you will get? Don't ask for more data that you need; don't ask for more data than you are willing to use. Read through the completed questions or tasks you have written--or better yet have someone else read them--and check to see that they will in fact solicit the kinds of information you are looking for.

Introduce the activity by letting students know why you are using these techniques. How will the information you collect help them? Even a simple statement about how such information makes it easier for you to plan subsequent class sessions may be enough. Genuine but judicious explanations of the technique and its purpose seem to work the best.

Once you have collected the students' responses, sort and analyze the data. Look for any patterns. What is the most common response? How common is it? Any bimodal distributions? What did you not already know? What suspicions were confirmed? What do you plan to do about it? For the most part, student responses will probably sort easily into a few general categories. If you have a large number of responses (75 or more), begin your analysis with a sample of the total set of responses (but be sure it is a random sample).

When you have analyzed the data, share at least some part of that analysis with your students. What did you expect? What did you not expect? How will this activity affect their experience as learners in the classroom? Students seem to benefit greatly from knowing how you will be using the information they provided you and, perhaps more importantly, how they can use their responses as a guide for improving their skills as learners.

Finally, don't feel you have to rush into using these techniques in every class or during every session. Begin slowly. And if you cannot see how a technique will work in a particular class, don't force it. Premature or frivolous use of these techniques can actually be counterproductive. These basic descriptions have already served as a source of fruitful ideas for many Penn State faculty. There is much richness in them. But do avoid the only real danger in classroom assessment--too much data and not enough time or experience to know what to do with those data.

## A Brief Overview of Techniques

### Background Knowledge Probe

Asking students for general information about their background and preparation for a course is a fairly common practice among college teachers. Background knowledge probes are simple questionnaires that extend this activity to include a few focused questions about concepts that students will need to know to succeed in the course. Asking questions of this sort can help to highlight important concepts for the students as well as to inform the instructor about the students' knowledge and abilities.

Background knowledge probes can be used at the beginning of a course, at the start of a new unit or lesson, or prior to introducing an important new topic. Once collected and analyzed, the data can be extremely useful when planning subsequent sessions or units of the course. Although many classroom assessment activities can be done for credit, it is usually best to make these probes an ungraded activity.

Discovering that your students' background and preparation are at odds with your expectations can throw even the best-planned lesson or syllabus off-track. However, knowing is certainly better than not knowing. At the very least, such data help you guide students to the appropriate resources for any supplementary assistance they may need.

### Misconception/Preconception Check

The **misconception/preconception check** is a variant of the background knowledge probe, but it focuses directly on those kinds of prior knowledge (or beliefs) that may actually hinder learning. This technique can be particularly useful in courses dealing with controversial or sensitive issues, or those in which students may have developed intuitive but inaccurate theories. Assessing this ahead of time will save considerable frustration later on.

When preparing questions of this sort, begin by asking yourself the following questions: What misconceptions or preconceptions might be commonplace among students who take this course? Which of these are most likely to interfere directly with learning for the course? How can I deal with these misconceptions once they are identified?

Generally speaking, misconceptions are not dislodged simply by admonishing students to stop thinking that way. Rather, students typically need to deal directly with their preconceived notions before they can be successfully led to an understanding of why those beliefs are untrue. For example, many college students believe that it's cold in winter because the earth is further from the sun, even though they have almost certainly been taught otherwise. In this case, they could be asked to develop an explanation that accounts for other facts, such as the difference in seasons in the northern and southern hemispheres.

Such an activity may involve nothing more than sorting the responses to a set of questions, discussing the general types of misunderstanding with the students, giving them a chance to

explore the limitations of those misunderstandings, and then letting them respond to a new set of problems with an opportunity for additional feedback and self-correction. (See example below.)

### **Minute Paper**

A quick and extremely easy way to collect written feedback on what students have learned, with only minimal investment of time and energy, is an activity often referred to as the **minute paper**. The instructor simply stops class two or three minutes early and asks students to respond briefly to the following two questions: "What was the most important thing you learned during this class" and "What important question remains unanswered for you?" Despite their simplicity, minute papers assess more than mere recall. To select the most important or significant information, learners must evaluate what they recall. Repeated use of minute papers helps students learn to focus more effectively during lectures.

Obviously, this technique lends itself to countless variations (see sample below). For example, you can encourage students to give more substantive responses by asking them to write their minute papers as if they were communicating the most important point from that class period to someone who had been absent. Another variation is sometimes called the **muddiest point**, which directs students to describe what was most confusing about a particular lesson or topic.

### **Documented Problems**

**Documented problems** are a natural extension of the not uncommon request to "show your work." By asking students to show both their work and show the reasoning behind their work, teachers can get extremely valuable and detailed information about any conceptual difficulties or lingering misconceptions students may have, as well as an overview of the basic strategies they are using to solve problems. In addition, documented problems are an extremely effective means of helping students clarify their thinking and gain more deliberate control over their approach to problem solving. Documentation of a problem can be something as simple as a brief paragraph or two of what was done (and why) or extensive as a line-by-line report of each step in a mathematical proof. Having students write out the reasoning behind each step of a problem gives the teacher very detailed feedback about the students' skills and understanding. It also gives students the opportunity to assess how well they understand a particular type of problem.

Although relatively easy to imagine using, this assessment technique can actually be difficult to implement. Students are often not accustomed to writing simply and clearly and need to be told how to explain what they have done. Thus, they may need to be given instructions about what constitutes a good written explanation or how to get their points across. Also, because many students may continue to focus on just getting the right answer, they may need frequent and very direct encouragement to focus on the processes—not products—of problem solving.

### **Categorizing Grid**

In many disciplines, especially at an introductory level, a first step to real problem solving is learning how a variety of conceptual taxonomies work. In other words, students need to learn the rules for what goes with what. **Categorizing grids** can be a useful diagnostic aid in these

situations. Courses in the biological and life sciences, for example, lend themselves easily to the use of this technique. To begin, you will need to identify a key taxonomy and then design a grid that represents those interrelationships (see example below). Keep it simple at first. Avoid trivial or ambiguous relationships, which tend to backfire by focusing students on superficial kinds of learning. Although probably most useful in introductory courses, this technique can also be used to help develop basic study skills for students who plan to continue in the field.

### **Example of Misconception/Preconception Check**

*Sample provided courtesy of Wayne H. Bylsma (Psychology)*

On the first or second day of a social psychology class, I set up the issue of common sense vs. the scientific method. We then play a round of "Socialpsychobabble." This consists of randomly picking students to come up and answer a question. They introduce themselves and then I ask a question, such as "Do you think that most people would over- or underestimate how attractive they think they are as compared to how other people view them? Would this differ between men and women? If so, how?" The answers to these questions are based on research data.\* Usually students answer about half correctly.

In addition to giving them a chance to get to know a few other students in a large class, and to preview some of the issues the course would address, this activity helps point out that even though "common sense" will sometimes generate the same answer, we are more willing to trust claims about human nature that are derived via the scientific method.

\*[Research suggests that everyone overestimates, but among men there is no relationship between self-ratings and ratings by others whereas among women there is a small relationship.]

### **Example of a Variation of the Minute Paper**

*Sample provided courtesy of Katherine R. Chandler (English)*

I have students answer a couple of questions for each paper they turn in because I've found that their answers reveal a lot about what they've learned and need/want to learn. I think they **think** about their writing if I ask them to do this; otherwise, it tends to be just another task completed. Just before they hand in their papers, they answer questions or complete sentences like the following.

Paper 1: I'm most satisfied with . . . I'm least satisfied with . . . I'm having problems with . . .

Paper 2: In writing this essay, what did you learn that surprised you? When editing your paper, what were you unsure about?

Paper 3: Point out specific places in your argument at which you were aware of accommodating your audience (their knowledge or attitudes). Point out places in which you used sentences for rhetorical effect.

Paper 4: Why did you choose this particular arrangement? What would you do differently if you had more time?

Paper 5: What particularly pleases you about this argument? What in your writing process has changed since the beginning of the course?

The questions change according to the nature of the assignments, but I learned that it is better to limit yourself to just a couple of questions. Students are able to ponder them more and provide more revealing answers if they aren't given too many. I like to interact with their self-assessments in my comments on their papers, as if we're holding an ongoing conversation about their own particular writing through the semester. I also learn what I need to be addressing from their comments.

### **Example of Categorizing Grid**

*Sample provided courtesy of Robert Mitchell (Biology).*

| <b>Divisions of Aorta</b> | <b>Primary Branches</b> | <b>Subdivisions</b> | <b>Region or organ supplies</b> |
|---------------------------|-------------------------|---------------------|---------------------------------|
| Ascending aorta           |                         |                     |                                 |
| Arch of the aorta         |                         |                     |                                 |
| Thoracic aorta            |                         |                     |                                 |
| Abdominal aorta           |                         |                     |                                 |