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Given their commitment to access, teaching, and community service, their diverse student bodies, and limited resources, metropolitan universities face unique challenges in using assessment well. If it is to serve as a lever for improving the quality of higher learning in these institutions, assessment should encourage broad participation, focus on the needs of students and teachers, and require little additional time or money. This article describes Classroom Assessment—an approach that meets these three criteria—and gives examples of how it can be used successfully to improve teaching and learning in metropolitan universities.

Classroom Assessment

Involving Faculty and Students to Improve Higher Learning

Defining Classroom Assessment

It is in the individual classroom that the central work of higher education—teaching and learning—takes place. Consequently, if assessment is to respond to what Peter Ewell (1991, 115) terms "assessment's initially motivating question—how to better understand and improve collegiate learning," then college teachers and students must become actively and personally involved at the classroom level. One way to achieve this, and to increase the overall effectiveness of assessment, is to build from the bottom up. Classroom Assessment is one among several recent "grass roots" approaches that aim to make assessment more participatory and more immediately applicable to the improvement of learning.

Since the word *assessment* is subject to a range of interpretations, it is important to clarify its meaning as used in the term *Classroom Assessment*. K. Patricia Cross draws the following useful distinctions:

> "Most people think of assessment as a *large-scale* testing program, conducted at *institutional or state* levels, usually by *measurement experts*, to determine what students *have* learned in *college*. Classroom Assessment questions almost every working word of that definition. A definition of Classroom Assessment looks more like this: Classroom Assessment consists of *small-scale* assessments conducted *continuously* in college classrooms by discipline-based *teachers* to determine what students *are* learning in *that class*." (Cross 1989, 4, emphasis original)

The primary purpose of Classroom Assessment is to improve learning: first, by providing teachers with the kind of feedback they need during the teaching-learning process to inform their day-to-day instructional decisions; and second, by providing students with information that can help them learn more effectively. It is formative assessment, intended to inform *and* form the instructional process in progress.

In Classroom Assessment, the simple "tools" used to collect student feedback are known as Classroom Assessment Techniques, or CATs. Unlike tests or quizzes used to evaluate student learning, CATs are ungraded and usually anonymous. Classroom Assessment aims to assess the whole class's learning in order to inform instruction, not to evaluate the achievement of an individual student in order to assign a grade.

While CATs are not tests, neither are they simply teaching techniques by another name. CATs are meant to be used *between* teaching and testing, to discover how well students are doing in time to help them improve. All faculty use teaching techniques to achieve their instructional goals. A growing number also use CATS to find out how well their teaching techniques are working.

A third common confusion concerns the relationship between Classroom Assessment and teacher evaluation by students, which typically occurs at the end of the term. The process can be a useful source of reliable and valid information in personnel decisions on how well faculty are teaching. A number of colleges and universities also use teacher evaluation as a formative tool to help faculty improve their teaching. In most cases, however, teacher evaluation is a type of *post hoc*, summative evaluation that has little direct impact on the quality of teaching or learning.

Furthermore, on most campuses neither the content of the teacher evaluation form nor the process are controlled by the individual faculty member being evaluated. The department, school, or institution as a whole administers the teacher evaluations, collects and analyzes the data, and reports the results. Classroom Assessment, by contrast, is *teacher-directed.* Faculty members who use Classroom Assessment have control over every step of the process. They decide what questions to ask and what kind of information to collect, how to collect that feedback and how to analyze it, with whom to share the results of their Classroom Assessments, and what instructional changes to make in response to those results.

Another characteristic of teacher evaluation is that the instructor often waits several months for the results. The students who have done the evaluating almost never see the results, nor do they benefit from results directly because the process usually takes place at the end of term. As a consequence, students may be less motivated to provide detailed, constructive comments. Classroom Assessment, on the other hand, takes place in the course of instruction. It gives faculty immediate feedback on the effects and effectiveness of their teaching and helps them, as well as the students, understand and improve the learning that is taking place.

Of course, all good teachers collect feedback on their students' learning and use their observations to adjust their teaching. Faculty listen

carefully to students' questions and responses, observe body language and facial expressions, and glean information from assignments. Classroom Assessment is firmly rooted in this good teaching practice but seeks to make it more systematic, more explicit, and more effective. Very few instructors, for example, keep any record of the feedback they collect, or let their students know what conclusions they have drawn from their observations and what changes they plan to make as a result. In Classroom Assessment, however, faculty involve students explicitly and actively in the instructional "feedback loop."

Assessment in Metropolitan Universities: Challenge and Promise

Metropolitan universities, as a class, are characterized not only by their locations, but also by their ongoing commitment to broad access, their diverse student bodies and curricula, their emphasis on teaching and learning, and, in too many cases, by declining levels of financial support and increasingly limited resources. If assessment efforts are to be useful in metropolitan universities, then, they must mesh well with institutional missions and cultures. Institutions that succeed at assessment do so largely because they have found ways to involve faculty and students, to adapt to the diversity of the campus, to link assessment to instructional needs, and to keep costs and time demands under control.

By design, Classroom Assessment meets each of these four criteria. It is learner-centered and faculty-controlled, directly involving teachers and students in the assessment process. It respects diversity by encouraging individual faculty members to create and adapt assessment techniques to fit their own course goals and content, and the specific needs of their students. Because the assessor and the person charged with responding to assessment are the same, Classroom Assessment greatly increases the probability that information collected will be used to improve teaching and learning. It requires little faculty time or effort, costs very little to implement, and demands no specialized technical skills. Since it is rooted in good teaching practice, faculty generally recognize this approach as an extension of a familiar and valuable element of teaching. For these reasons, Classroom Assessment is relatively easy to implement and maintain.

For those metropolitan universities that have not yet implemented comprehensive assessment plans and are struggling to find ways to involve faculty and students in ongoing programs, Classroom Assessment can serve well as a first step in assessment. Once faculty experience firsthand the value of assessment for understanding and improving learning in their own classrooms, they are more likely to appreciate the need to cooperate and get involved in other, broader forms of assessment. Classroom Assessment can be a means of building a campus assessment program from the ground up, rather than from the top down.

How Faculty Use Classroom Assessment Techniques: An Illustration

One way to understand how faculty use Classroom Assessment is to imagine that instead of reading the first few pages of this article you had just heard them presented as part of a classroom lecture. As the lecturer, I could quickly assess your understanding of the central concept by stopping at this point and asking you to write a list of words and phrases that define or describe Classroom Assessment. I might hand out slips of paper or index cards for this purpose and then give the students two minutes to carry out this CAT, known as *Focused Listing* (Angelo and Cross, 1993, 126–131). Then, I would collect their lists and, during a break in that session or before the next class meeting, I would compare your responses with my own Focused List, shown below:

Classroom Assessment is:

- Learner-centered
- Teacher-directed
- Formative
- Ungraded
- Usually anonymous
- Simple and quick to do
- Firmly rooted in good teaching practices

By quickly comparing your definitions with mine, I would gain a clear picture of how well you understood my lecture, how much terminology you had retained, where gaps in understanding were, and how best to proceed. I would then summarize the responses, let you know the results, and suggest the next steps we should take to ensure mastery of that content.

I find it particularly valuable to see students' definitions of a key topic in a course *before* I give a lecture on that topic. Their feedback gives me a clear sense of what they already know, what misconceptions and biases they may have that could interfere with learning, and where I need to begin in order to teach them most effectively. After the lecture, I may use Focused Listing again; this time, to see if and how their understanding has changed in response to instruction. Sometimes I use this CAT a third time, after a few weeks have passed, to show myself and my students how their course-related concepts have changed and matured over the longer term—or to discover what they have forgotten!

Most faculty who practice Classroom Assessment use quick and easy one-shot techniques like Focused Listing to discover what and how much their students are learning. The *Minute Paper* is another example of a simple, quick CAT that has been used to good advantage by hundreds of college teachers in all disciplines. The Minute Paper, originally developed by a physics professor at the University of California at Berkeley (Wilson, 1986), asks students to respond anonymously to the following two questions at the end of the class period:

1. What is the most important thing you learned in class today?
2. What question remains uppermost in your mind?

By quickly scanning students' responses to the Minute Paper, the teacher can make accurately focused adjustments in the following class to capitalize on what students have already learned well and clear up confusions that can impede further learning.

One of the guiding aphorisms of Classroom Assessment is "Adapt, don't adopt," and faculty have repeatedly demonstrated their creativity in doing just that. For example, Frederick Mosteller, professor of statistics at Harvard University, adapted and further streamlined the Minute Paper to use in his undergraduate statistics courses. He reported getting very useful feedback simply by asking students to answer one question: "What was the 'muddiest point' in my lecture today?" (Musteller, 1989) As with the Minute Paper, faculty from many disciplines are now experimenting with Mosteller's Muddiest Point technique and, in turn, further adapting it to fit their needs.

Assessing Four Dimensions of Higher Learning

Before faculty can meaningfully assess student learning, they need to identify what kinds of learning they want to focus on. In my own teaching, I have found it useful to categorize the kinds of learning my courses are designed to promote into four distinct, though interrelated, dimensions.

Declarative Learning (Learning What). Declarative learning means mastering facts and principles. From preschool through doctoral programs, it is easily the most common type of learning promoted in American classrooms. The term declarative refers to the fact that we commonly assess how well students have learned relevant facts and principles by asking them to declare what they know in writing or in speech.

Procedural Learning (Learning How). Acquiring the skills to carry out the processes and procedures involved in doing things is procedural learning. Some of this is general, such as thinking, speaking, and writing clearly. In addition, each discipline has its own procedural learning, such as drawing skills for the artist or taxonomic skills for the botanist and paleontologist.

Conditional Learning (Learning When and Where). Conditional learning leads to the ability to evaluate the conditions under which the application of declarative and procedural knowledge is likely to be most successful. It is often taught by means of examples and modeling. The case study method, laboratory work, and clinical instruction focus directly on developing judgment and skill at application, as does coaching in the arts and in athletics.

Reflective Learning (Learning Why). Reflective learning is the development of habits of mind and heart required for the responsible exercise of citizenship and professional practice, and for the pursuit of individual happiness. Reflective learning cannot be limited to general education. In each academic discipline, there are particular questions of values, beliefs, and attitudes that students must confront in order to

understand and participate fully in the "culture" of that field. In computer and information science, for example, there are ongoing debates about the ethics of information access and database management. And throughout the medical and life sciences, technical advances are raising ethical and moral questions of great importance.

Examples of Classroom Assessment in the Four Dimensions

The four brief examples below are meant to illustrate how faculty in different disciplines employ simple Classroom Assessment Techniques to understand and improve learning in each of the dimensions described above. Though each example ostensibly focuses on assessing learning in a single dimension, this approach is merely a useful simplification. In the classroom, of course, effective learning is always multidimensional, and students learn content, skills, applications, and self-awareness best when these dimensions are clearly interrelated and mutually reinforcing. Similarly, assessing learning in one dimension can help improve learning overall.

Assessing Declarative Learning

The three CATs mentioned above—Focused Listing, Minute Papers, and the Muddiest Point—are all used to collect feedback on students' learning of facts and principles. The example below concerns a further use of a CAT in assessing declarative learning: finding out what students know—or believe they know—about a topic *before* instruction begins. Partial or incorrect prior knowledge can be a great obstacle to learning. Using Classroom Assessment, teachers can find out from what points their students are starting and can better adjust their instruction to the diversity of preparation in each class.

In an upper-division course on the history of pre-Columbian cultures in the Americas, a professor asked students to respond to a CAT known as a *Misconception/Preconception Check* (Angelo and Cross, 1993, 132–137) by taking a few minutes to write their best answers to the following three questions, but not to put their names on their responses:

1. About how many people lived in North America in 1491?
2. About how long had they been on this continent by 1491?
3. What significant achievements had they accomplished by that time?

For questions 1 and 2, she wrote the lowest and highest answers on the board. In both cases, the ranges were large and there was little agreement. For question 3, she listed all the different answers. When one of the students asked her what the right answers were, she acknowledged the importance of the question, but told the class it first had to consider an even more critical question: "Where did you learn the answers to the first three questions?" Trying to answer this, students quickly realized that many of their *pre*conceptions about pre-Columbian America were likely to be *mis*conceptions.

The professor then assigned the students to work in pairs to seek out the "right" answers in the library. The students found, of course, that there was no one universally accepted right answer for any of the questions, but that some answers were based on better evidence and more plausible arguments than others.

Assessing Procedural Learning

The article by Richard Larson in vol. 3 no. 4 of *Metropolitan Universities* describes the growing use of portfolios in the assessment of writing. An abbreviated version of a portfolio, called an *Annotated Portfolio* (Angelo and Cross, 1993, 208–212), can be very effective as a CAT in assessing a variety of procedural skills. It contains a very limited number of examples of a student's work, supplemented by the learner's own annotations regarding the significance of the examples he or she has included. In one Freshman Composition class, the instructor at mid-term asked students to select three short pieces of class-related writing that clearly demonstrated progress made toward improving their writing, and to write a brief essay explaining exactly what he or she had improved and pointing out the evidence for that improvement in the three pieces of writing. Examples of good Annotated Portfolios were made available. However, most of the portfolios handed in by the students a week later focused on superficial improvements—such as better spelling, grammar, or punctuation—even though the sample portfolios described more substantive elements of writing skills. Most students had difficulty documenting even these "surface" changes with evidence from the pieces they had chosen.

The instructor returned the portfolios with comments and asked the class as a whole to identify the features of well-documented examples and to critique weak ones. He explained that, while a correct and polished surface was important, it could not compensate for a dearth of ideas, unclear thinking, lack of evidence, or faulty argumentation. He went back to the examples to illustrate his assertion that attention to ideas had to come before editing. At the end of the session, he invited the students to rewrite and resubmit their Annotated Portfolios.

Assessing Conditional Learning

Learning to recognize the connections between courses, particularly the relationship of liberal arts courses to preprofessional programs, is a prime example of conditional learning. In a required introductory psychology class for a less-than-motivated group of aspiring business majors, the professor used the *Applications Card* (Angelo and Cross, 1993, 236–239) technique to improve such learning. At the end of each lecture, she asked students to write down, in a couple of minutes, one or two possible applications of what they had heard to a business or management situation. At the beginning of the next class meeting, she shared three or four excellent examples with the class, praising the anonymous authors for their ability to see creative applications. Then she presented one or two examples of unacceptable applications, altered just enough to avoid offending their creators, and asked the class to speculate on why they were

off the mark. Several students were usually willing to volunteer their analyses.

Reviewing the Applications Cards took the first five or ten minutes of class, but generated a great deal of student interest and enthusiasm. Students learned from each other's examples, and the instructor collected a treasure trove of business-related applications to use in future lectures. Both the quality and the quantity of good applications increased over the weeks, and students continued to comment on how much they appreciated having a professor who helped them see the "real world" applications of psychology. Through the regular use of this simple CAT, students developed their skill at making connections between liberal learning and their professional aspirations.

Assessing Reflective Learning

A speech communications instructor, intrigued by recent research on apparent gender differences in ways of learning and communicating, decided to assess his students' awareness of their own preferred style. He used a CAT called a *Self-Assessment of Ways of Learning* (Angelo and Cross, 1993, 295–298), which presents students with short quotes from two very different speakers. Speaker A clearly favors a very combative, debating-team approach to discussions. Speaker B, on the other hand, prefers a more empathetic, less confrontational approach to discussions. Students responded to the assessment by indicating, anonymously, whether they preferred approach A or B in the classroom, and whether they themselves usually used approach A or B in classroom discussions. They were also asked to indicate their gender. This simple survey indicated a gender difference in what students thought they were using—approach A by men and B by women—but considerable agreement as to a preference for B. The resulting class discussion heightened the students' awareness of diversity in approaches to communication.

Costs and Benefits of Classroom Assessment

From 1988 to the present, the University of California at Berkeley Classroom Research Project, jointly funded by the Pew Charitable Trusts and the Ford Foundation and directed by K. Patricia Cross, has worked closely with groups of faculty on several college campuses to develop Classroom Assessment Techniques. After the first two years, we surveyed experienced participants in the Classroom Research Project to explore faculty views on the costs and benefits of using Classroom Assessment. The following summarizes our findings.

The Costs of Participating in Classroom Assessment

The three most frequently mentioned costs were, respectively: Time required, sacrifice of some content coverage, and frustration when closure is not reached. Classroom Assessment takes faculty time, no matter how

simple the CAT used: Out-of-class to plan the assessment, analyze feedback, and prepare a response, and also to discuss Classroom Assessment experiences with colleagues; and in class to administer the CATs, and collect and respond to feedback.

Many faculty felt that they were able to cover less content as a result of using Classroom Assessment, partly because of the time needed to administer and respond to the CATs, but more importantly because the assessments had convinced faculty of the need to review important material not learned well enough. Most said that before using CATs, they would simply have proceeded. But faced with feedback indicating inadequate learning, they chose to respond. Even when faculty felt sure that they had taught somewhat less, but taught it better, they still regretted the loss of content coverage.

Faculty noted the paucity of final answers, or lack of closure, as the third major cost of participating in Classroom Assessment, which often raises more questions about student learning than answers. Some commented that they could have spent a week pondering their students' responses to a single assessment question because the data were so rich. Student responses are sometimes puzzling, or even opaque. One question often leads to another. And a response that works well for one class may not work at all the following semester—even in the same course.

The Benefits of Participating in Classroom Assessment

The participants in the Berkeley project were quite clear that the benefits of engaging in Classroom Assessment far outweighed the costs. The three most frequently mentioned benefits of participation were collegiality, positive student response, and intellectual excitement and renewal.

The single most frequently mentioned benefit of Classroom Assessment was that derived from meeting and working with other colleagues. Faculty valued the opportunities to engage in clearly focused discussions on teaching and learning with colleagues and to collaborate on projects aimed at understanding and improving the quality of student learning. While individual faculty members can practice Classroom Assessment independently, many of those who have enjoyed the greatest success with Classroom Assessment have done so as members of a group.

Many faculty reported the unexpected enthusiasm with which students respond to requests for feedback on their learning, especially when the purpose and outcomes of the assessments were made explicit and the results clearly used to improve classroom learning. Knowing that data are being gathered to help them learn better, and not simply to grade them, students are usually not only willing but anxious to participate in Classroom Assessments. Many faculty have reported higher levels of student-faculty interaction and more active classroom participation as outcomes.

Most of the participants in our project were veteran faculty members at midcareer or beyond. Many of them found a new outlet for their intellectual energies in Classroom Assessment. They spoke of being

"revitalized" and "challenged" by the opportunities to apply their discipline-based skills of inquiry to pursuing questions about teaching and learning in their courses.

The benefits faculty ascribe to Classroom Assessment were, in many ways, mirror-images of the costs. For example, although faculty members often complained that meeting with their fellow Classroom Assessors cost them time, those same individuals overwhelmingly endorsed their interaction with colleagues as the most important benefit. And it was student responses to the CATs, and their active engagement in the process, that most often convinced faculty to trade off some breadth of coverage for more depth in learning. The ultimately unfinishable and unpredictable nature of Classroom Assessment that sometimes frustrated faculty also constituted the open-ended, dynamic quality that they valued as a source of intellectual excitement.

Three Guidelines for Success

Three "design rules," guidelines for effective assessment in metropolitan universities, may be helpful to readers responsible for designing comprehensive assessment programs and to those thinking about using assessment in the classroom:

- First, assessment efforts should actively and meaningfully involve faculty and students in the ongoing process;
- Second, assessment should provide timely, well-focused feedback to those who have the greatest ability to apply information collected to improve educational quality—that is, to faculty and students;
- Third, assessment should be an intrinsically educational activity, one that reinforces and furthers the teaching and learning goals it seeks to assess.

Overall, we must make sure that any assessments we design contribute to improving the quality of higher learning where it matters most—in our classrooms and in the minds of our students. Classroom Assessment is one low-cost, low-risk option to consider in the development of assessment at metropolitan universities.

Acknowledgment

All of the CATs and most of the examples discussed have been adapted from *Classroom Assessment Techniques: A Handbook for College Teachers, Second Edition* (Angelo and Cross, 1993). For these illustrations of good practice in assessment and teaching, I owe a debt of gratitude to my co-author and to the many colleagues whose experiences, creativity, and skills are reflected in these examples.

Suggested Readings

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