Classroom Assessment Techniques

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Frequently Asked Questions about Classroom Assessment Techniques (CATs)

1. What is "Classroom Assessment"?

"Classroom Assessment" is a formative rather than a summative approach to assessment. Its purpose is to improve the quality of student learning, not to provide evidence for evaluating or grading students. It provides faculty with feedback about their effectiveness as teachers, and it gives students a measure of their progress as learners. The aim of classroom assessments is to provide faculty with information on what, how much, and how well students are learning. Such assessments are created, administered, and analyzed by teachers themselves.

Currently the most comprehensive study on classroom assessment techniques appears in the book, Classroom Assessment Techniques: A Handbook for College Teachers, by Thomas A. Angelo and K. Patricia Cross (San Francisco: Jossey-Bass, 1993 [Second Edition]).

2. What Are the Advantages of Using Classroom Assessment Techniques?

- They are formative in nature. Unlike final exams or major term papers, CATs provide faculty with feedback on student learning while the teaching/learning relationship is still intact, so that faculty can intervene during the semester (as opposed to the next semester) to help students learn more completely.
- They are speedy. They often consume just a few minutes of classroom time to administer, and can be read easily and quickly by faculty.
- They are flexible. They can be tailored to the unique and specific concerns of the instructor.
- They can be anonymous for students (although they need not be). The aim of classroom assessment is not necessarily to grade individual student work or to provide individual students with feedback on their performance; rather, the aim is to provide the instructor with feedback on student learning. Anonymity may prove useful in freeing students to express not only what they do understand but also what they do not understand.

3. What Are the Benefits of Using Classroom Assessment Techniques?

Benefits to Faculty

- Classroom Assessment helps faculty to focus on student learning. By determining what students have learned and what is unclear, instructors can focus the class more effectively to meet the learning needs of that group. This may mean reviewing some areas, or spending less time in other areas. Unlike student evaluation surveys [summative evaluation] which are typically given at the end of the semester,

Classroom Assessment provides an on-going formative evaluation. The instructor can find out what can be changed immediately to help students to learn.

Benefits to Students

- Students may be hesitant to ask questions during class. Classroom Assessments give students opportunities to provide anonymous feedback to their instructor about their learning. Students often discover, as the instructor reviews the feedback, that others in the class had similar questions. (Theirs was not a "dumb question" after all).
- Classroom assessment activities can themselves be positive learning activities for students; they can be developed both to promote (and not just measure) writing skills or critical thinking skills, and to increase student motivation to take themselves and their learning more seriously. In addition, students may become more involved in their learning when they find that others in the class learned some interesting things that they had not picked up from the class session. Through greater involvement, students are likely to become more self-directed learners, and may be more motivated to successfully complete the class.

4. When Are Classroom Assessment Techniques Used?

Classroom Assessment Techniques may be used in any type of class. Some techniques are for use in small groups; some are designed to check students' immediate understanding; others are for application and critical thinking.

5. Do These Techniques Really Work?

These techniques are not new -- effective teachers have been using various methods for years to find out what students are learning or not learning. However, research on (including the evaluation of) effective techniques to measure both student learning and teaching dates back to 1988, with the Classroom Research Project funded by the Ford Foundation and the Pew Charitable Trusts. Since 1988 a number of articles have been published on the subject and hundreds of workshops have been conducted nationally, regionally, and locally.

Research about the impact of Classroom Assessment indicates the following:

- Student Involvement in Learning: Students believe that Classroom Assessment contributes to greater involvement in learning because they are forced to think about what they have learned.
- Faculty Development: Classroom Assessment has helped many faculty re-think how they teach their classes. Classroom Assessment provides the input needed to learn more about what is working and what needs to be changed in their classes.

6. How often should Classroom Assessments be used?

Some faculty ask students to respond to a question at the end of every class meeting; some faculty integrate the assessments throughout each class meeting. Others use Classroom Assessments at the most critical points in the course, e.g., before a major exam or project. Some use assessments to evaluate the effectiveness of class activities or tests. Still others have used Classroom Assessment to help students to evaluate their own learning progress. The frequency and types of assessments used depend on the class, the teacher, and the reasons for assessing students' learning progress.

7. **Does Classroom Assessment have to be anonymous?**

   Anonymous feedback results in responses that are more candid. However, if the assessments are used in the form of homework assignments or small group activities within the class, anonymity is not possible.

8. **What kind of questions should be asked?**

   It is best to ask learner-centered questions ("What have you learned?") rather than teacher-centered questions ("How do you like my teaching?"). The learner-centered questions will show clearly whether or not the teaching is effective. Questions should be asked only if you really want to know the answer and are willing to respond to the feedback to meet student needs.

A Selection of Techniques

1. Assessing Prior Knowledge, Recall, Understanding
2. Assessing Skill in Synthesis and Creative Thinking
3. Assessing Skill in Application and Performance
4. Assessing Skill in Analysis and Critical Thinking

Angelo and Cross suggest that new users of Classroom Assessment Techniques will be most successful if:

- They use only those techniques that appeal to their intuition and professional judgment;
- They start with techniques that are quick and easy to use in a classroom setting in which the faculty member and the students are comfortable;
- They only use CATs that they have previously tried on themselves;
- They allow more time to complete the task the first time than might seem necessary; and,
- They "close the loop" by reporting back to students what they, as faculty, have learned from student feedback and how that information can be used to improve student learning.

The ten techniques described below, represent a sampling of ideas, as starting points, i.e., ideas to be adapted and improved upon. All ten are techniques for assessing Course-related Knowledge and Skills

Each described technique includes examples of questions or questionnaires used in various disciplines, as well as step-by-step procedures.

1. Background Knowledge Probe (Assessing Prior Knowledge, Recall, and Understanding)

Description: This technique is designed to collect specific and useful feedback on students' prior learning. "Background Knowledge Probes" are short, simple questionnaires prepared by instructors at the beginning of a course (e.g., the instructor requests that students list courses they have already taken in the relevant field), at the start of a new unit or lesson, or prior to introducing an important new topic. Such "probes" may require students to write short answers, to circle the correct responses to multiple-choice questions, or both. They can be used as both pre- and post- assessments: before instruction, to find out the students' "baseline" knowledge level; and immediately after, to get a rough sense of how much and how well they have e learned the material.

Purpose: This technique is meant to help teachers determine the most effective starting point for a given lesson and the most appropriate level at which to begin instruction. By sampling the students' background knowledge before formal instruction on that topic begins, these probes also provide feedback on the range of preparation among students in a particular class.

Suggestions for Use: It can be used as early as the first class meeting. It works well in classes of any size. To assess changes in students' knowledge and concision in responding, the same or similar questions can be used at the midpoint and at the end of the lesson, unit, or term.

Turning Collected Data into Useful Information: For fast analysis responses can be sorted into "prepared" and "not prepared" piles. For a detailed analysis answers can be classified into the following categories: [-1] = erroneous background knowledge; [0] = no relevant background knowledge; [+1] = some relevant background knowledge; [+2] = significant background knowledge. By summing the individual numerical ratings for each question, the instructor can find out whether the class as a whole has more knowledge about some topics than about others.

2. The One-Minute Paper (Assessing Prior Knowledge, Recall, and Understanding)

Description: The instructor stops the class two or three minutes early and asks students to respond briefly in writing to some variation of the following two questions: "What was the most important thing you learned during this class (today)"? " What important question remains unanswered?" (Or, "What are you still confused about?")

Purpose: This technique allows faculty to assess the match between their instructional goals and students' perceptions of these goals and their own learning. Further, because the instructor learns what students perceive to be their own learning problems, the likelihood that the students will receive answers to those questions during the next class period is enhanced. The task asks students to evaluate information and to engage in recall.

Suggestions for Use: The task works well in small and large classes. It can be used frequently in courses that present students with large amounts of new information on a regular basis.

Turning Collected Data into Useful Information: Often it is sufficient for the instructor simply to tabulate the responses, making note of any especially useful comments.

3. The Muddiest Point (Assessing Prior Knowledge, Recall, and Understanding)

Description: The instructor asks students to jot down a quick response to the following question: "What was the muddiest point in [the lecture, the homework assignment, the reading, the film, etc.]"?

Purpose: This technique provides speedy feedback on what students find least clear or most confusing. Presumably, this information helps faculty decide what to emphasize (more) and how much time to spend on topics. Students must also quickly assess what they do not understand and must be able to articulate their confusion (which is itself a complex and useful skill).

Suggestions for Use: This technique can be used frequently in courses that present students with large amounts of new information on a regular basis, and it should be presented at the end of a lecture/assignment. The task should be used sparingly in classes that emphasize integrating, synthesizing, and evaluating information.

Turning Collected Data into Useful Information: Often it is sufficient to group responses according to the particular muddy point. An alternative is to group points according to whether they involve facts, concepts, principles, and so forth.

4. The One-Sentence Summary (Assessing Skill in Synthesis and Creative Thinking)

Description: The instructor asks students to answer the questions about a given topic: "Who does what to whom, when, where, how, and why"? Then the student is asked to transform responses to those questions into a single, grammatical sentence.

Purpose: Faculty gauge the extent to which students can summarize a large amount of information concisely and completely. Students are constrained by the rules of sentence construction and must also think creatively about the content learned. Students practice the ability to condense information into smaller, interrelated bits that are more easily processed and recalled.

Suggestions for Use: The task works well when there is information that can be summarized in declarative form, including historical events, political processes, the plots of stories and novels, chemical reactions, mechanical processes.

Turning Collected Data into Useful Information: Assess answers to each of the initial questions separately. Often it is easiest to grade responses to each of the questions as "inadequate" (incorrect), "adequate", and "more than adequate". A matrix with the questions as the columns and the three grading categories as the rows can quickly alert the faculty member to whether students are more proficient at the whos and whats rather than the hows and whys.

5. Directed Paraphrasing (Assessing Skill in Application and Performance)

Description: The instructor asks students to paraphrase part of a lesson for a specific audience and purpose, using their own words. This is especially useful for pre-professional students who will be asked in their careers to translate specialized information into language that clients or customers can understand.

Purpose: This technique allows faculty to examine students' understanding of information and their ability to transform it into a form that can be meaningful to specific audiences other than the student and instructor. This task is more complex than simple paraphrasing (or summary) in that the faculty member directs the student to speak/write to a particular audience and purpose.

Suggestions for Use: The task works well when students are learning topics or concepts that they will later be expected to communicate to others. When this is not the case (perhaps in general education classes in the humanities), the faculty member might want to ask students to write to other students in the class or to other freshmen on campus.

Turning Collected Data into Useful Information: Answers can be grouped into four sets -- confused, minimal, adequate, and excellent. Then examine responses within and across the four evaluative categories for accuracy, suitability for the intended audience, and effectiveness in fulfilling the assigned purpose. An alternative is to circle the clearest (best) point made by each student and the worst (muddiest) point. Then the responses from students can be grouped to find patterns of clarity and confusion.

6. **Application Cards (Assessing Skill in Application and Performance)**

Description: After students have been introduced to some principle, generalization, theory, or procedure, the instructor passes out index cards and asks students to write down at least one possible, real-world application for what they have just learned.

Purpose: This technique allows faculty to determine quickly whether students understand the applications of what they have learned. Students are forced to link new information with prior knowledge. They may also have an increased interest in the material covered if they are asked to speak immediately to the ways in which this new material can be applied in real world settings.

Suggestions for Use: Most classes cover material that can/should be applied. The technique is often used in the social sciences, in technical fields, and in pre-professional courses.

Turning Collected Data into Useful Information: Answers can be separated into four groups -- great, acceptable, marginal, and not acceptable. Responses might be discussed in the next class, with some attention given to factors that argue for and against sets of responses.

7. **Student-generated Test Questions (Assessing Skill in Application and Performance)**

Description: Students are asked to prepare two or three potential test questions and accompanying correct (or A+) responses.

Purpose: This techniques assesses at least three aspects of student learning:
Instructors see what their students consider the most important or memorable content, what they understand as fair and useful test questions, and how well they can answer the questions they have posed. This information not only provides direction for teaching but can also alert the teacher when students have inaccurate expectations about upcoming tests. Responding to this technique helps students assess how well they know the material, and receiving feedback can refocus their studying.

Suggestions for Use: It can be used in any course in which students take tests. It is best administered two or three weeks before a major test, such as midterm or final examination, to allow time for feedback and for appropriate adjustments in teaching and studying.

Turning Collected Data into Useful Information: A form or checklist could be used to sort the types and range of the questions (the level of questions, relevance of the topics, clarity of responses): Make a rough tally of the types of questions students propose (e.g., how many require only a knowledge of facts and principles? how many require synthesis or analysis?); then take a quick look at the range of topics the questions span (Are some important topics left out?). A few questions selected from the students' responses can be used as examples in giving feedback.

8. Paper or Project Prospectus (Assessing Skill in Application and Performance)

Description: The term "prospectus" is used here to denote a brief, structured first-draft plan for a term paper or term project. The "Paper Prospectus" prompts students to think through elements of the assignment such as the topics, purpose, intended audience, major questions to be answered, basic organization, and time and resources required. The "Project Prospectus" may focus on tasks to be accomplished, skills to be improved, and products to be developed.

Purpose: This technique assesses students' skill at synthesizing what they have already learned about a topic or field as they plan their own learning projects. The technique can also give the instructor useful information about the students' understanding of both the assignment and the topic -- as well as their planning skills -- before it is too late in the semester to make suggestions and shape direction.

Suggestions for Use: It is appropriate for any course that requires students to write term papers or to carry out substantial projects. The timely feedback is given well before they begin substantive work on the papers or projects they have been assigned. In fields such as social work, education, and counseling psychology, instructors can employ the prospectus to help students plan internship and fieldwork projects.

Turning Collected Data into Useful Information: The range of topics and approaches are noted as well as to what degree the prospectuses are related to the content and skills on which the course is focused. A short summary list of suggestions is offered to the class as a whole, including suggestions about strengths they can build on and elements that need work.

9. Pro and Con Grid (Assessing Skill in Analysis and Critical Thinking)

Description: Students are asked to jot down a quick list of pros and cons on a particular topic or issue.

Purpose: The grid gives faculty a quick overview of a class's analysis of the pros and cons, costs and benefits, or advantages and disadvantages on an issue of mutual concern. This assessment forces students to go beyond their first reactions, t o search for at least two sides to the issue in question, and to weigh the value of competing claims. The grid provides important information on the students' depth and breadth of their analyses and on their capacity for objectivity.

Suggestions for Use: This technique can be used in any course where questions of value are an implicit part of the syllabus. This assessment works well in many humanities, social sciences, and public policy

courses. It can also be used to assess students' awareness of potential costs and benefits or of alternate technical solutions to the same problem. Used in these ways, this technique can be applied in many science and mathematics courses.

Turning Collected Data into Useful Information: The instructor starts by listing the points that students have put forth as pros and as cons and by doing a simple frequency count. Which points are most often mentioned? The instructor then compares the students' grid with his/hers: Have they omitted some points that are considered extraneous? How balanced are the two "sides" of the grid? These are possible matters to report on and to discuss in class when the students are given feedback.

10. Analytic Memo (Assessing Skill in Analysis and Critical Thinking)

Description: The analytic memo is basically a simulation exercise. It requires students to write a one- or two-page analysis of a specific problem or issue. The person for whom the memo is being written is usually identified as an employer, a client, or a stakeholder who needs the student's analysis to inform decision making.

Purpose: This technique assesses students' ability to analyze assigned problems by using the discipline-specific approaches, methods, and techniques they are learning. In addition, it assesses students' skill at communicating their analyses in a clear and concise manner.

Suggestions for Use: Because preparing and assessing the analytic memos takes quite a bit of time and effort, this technique is best suited to seminars and small classes. It is particularly useful in disciplines that clearly relate to public policy or management, such as political science, economics, criminal justice, social work, education, environmental studies, management, and public health. It works best when used early in the term, as means to help students prepare for later graded memo-writing assignments.

Turning Collected Data into Useful Information: The goal (and challenge) is to extract useful information while severely limiting the amount of time and energy spent. A short list of three or four major points to look for in each memo allows for systematic and quick readings of the memos. The list might include "content" (breadth of the analysis and quality of the information), "skill" (were relevant tools or methods used in the analysis?), and "writing" (clarity, conciseness, appropriateness of format). Make up a simple grid on which you can check off "Well done," "Acceptable," or "Needs work" for each of the major points. For example, if more memos need work on analytic "skill" than on "writing quality", the next lesson could focus on the former.

Selective Bibliography

Angelo, Thomas A. and Cross, K. Patricia (1993). Classroom Assessment Techniques. San Francisco: Jossey-Bass.

Angelo, Thomas A. (editor) (1991). Classroom Research: Early Lessons from Success. New Directions for Teaching and Learning, Volume 46. San Francisco: Jossey-Bass.

Banta, Trudy W. (1996) Assessment in Practice: Putting Principles to Work on College Campuses. San Francisco: Jossey-Bass, 1996

Banta, Trudy W. (1993) Making a Difference: Outcomes of a Decade of Assessment in Higher Education. San Francisco: Jossey-Bass.

Ellwein, Mary Catherine (1992). "Research on Classroom Assessment Meanings and Practices." Commonwealth Center News 5, 1 (Fall/Winter 1992), 2 passim.

Ewell, Peter (editor) (1985) Assessing Educational Outcomes. New Directions for Institutional Research #47. San Francisco: Jossey-Bass.

Jones, Robert M. and John E. Steinbrink (1993). "Assessment Planning: Measuring Improvement in Teaching." The National Teaching and Learning Forum. 2 (1993): 7-8.

Terenzini, Patrick T. (1989) "Assessment with Open Eyes: Pitfalls in Studying Student Outcomes." Journal of Higher Education 60: 644-664, November/December, 1989.