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Deanship of Skills Development

CLASSROOM ASSESSMENT TECHNIQUES

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BOOKLET

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عمادة تطوير المهارات

إنجاز متميز .. والتزام بالتطوير

بسم الله الرحمن الرحيم

Classroom Assessment

Techniques

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Classroom Assessment Techniques

Imagine the following scenario. You have been teaching a course for several weeks and your students appear attentive and engaged. During lecture, they nod in the appropriate places and laugh at your jokes. When you ask if anyone has any questions, no one raises their hand. When you ask if they are ready to move to the next topic, they respond in the affirmative. When a colleague inquires about the class, you tell them it is going great, the students are learning a lot. Then you give the first exam and the students perform poorly. Most of the class gets low marks. How can this be? It couldn't be your teaching, which has clearly been effective. Instead, you search for explanations in terms of students' test preparation and cognitive abilities. As you move on to the next section of material, you are disappointed with the class.

The scenario above illustrates a classroom where the teacher waited until a formal, marked exam to get accurate information about her students' performance. The teacher used verbal and nonverbal responses to her teaching methods as an indicator of student learning. It wasn't until the first exam was marked that the teacher realized that her teaching might not have been so effective after all. Now she is well into the term and simply plows through to the next topic, dismayed that the students aren't getting it.

Unfortunately, this scenario is all too common in higher education. However, as teachers, we have pedagogical strategies at our disposal to helps us avoid this situation. These tried-and-true strategies are referred to as Classroom Assessment Techniques (CATs).

What are Classroom Assessment Techniques?

CATs are brief, non-credit exercises intended to assess student understanding of course material. They allow teachers to assess quickly what students do and do not understand and, as a result, adjust their teaching methods. In the same vein, CATs afford students the opportunity to demonstrate their own level of understanding and thus help to eliminate the "illusion of understanding" (Svinicki & McKeachie, 2011, p. 190). In addition to assessing course related knowledge, CATs can be used to expose attitudes and values of students or to gauge students' reactions to specific instruction (Palomba & Banta, 1999).

CATs have the added benefit of incorporating an active learning component to the class. Although well-organized and stimulating lectures can enhance learning (Lowman, 1995; McKeachie, 2002), some form of active learning is typically needed for deeper, more persistent learning to take place (Halpern & Hakel, 2003). If used skillfully, CATs can shift a traditional lecture to an interactive one.

In this booklet I am not going to provide an exhaustive list of CATs. For that, I encourage you to consult Angelo and Cross (1993), the definitive source for CATs. Their book describes 50 CATs including suggestions for use, examples from different disciplines, step-by-step instructions, the pros and cons of each, and ideas for adapting the technique. Instead, I will describe a few of the most widely applicable techniques that are useful for opening a lecture (or a new section of material), breaking up a lecture to make it more interactive, and closing or summarizing a section of material. I will also describe CATs that target high-order thinking, specifically application of material, creative thinking, and critical thinking. First, let's explore a few of the assumptions behind classroom assessment.

Assumptions of Classroom Assessment Techniques

In order to authentically incorporate CATs into one's classroom, Angelo & Cross (1993) argue that teaching should be learning-centered and that assessment should be formative, early, and ongoing.

Teaching Should Be Learning-Centered

For a CAT to be effective, it must fit within one's metaphor for teaching. Take a moment and complete the following: A teacher is a _. How did you complete this sentence? A coach? Mentor? Judge? Boss? Each of us has a metaphor for teaching and learning (even it we have never articulated it) and these models drive

our behavior in the classroom. For instance, unless one's metaphor includes some sort of support component (as opposed to simply enforcing rules) then the idea of using a CAT falls flat.

The traditional metaphor of teaching conjures the image of a fountain (the teacher) spouting water (knowledge) into an empty bucket (students). Classrooms are typically arranged to support this model—the teacher up front while eager students surround him to gain wisdom. Unfortunately, this teacher-centered approach leads to a passive classroom in which students may participate with little or no engagement (MacGregor, 1990). Because the teacher and the texts are seen as the sole sources of knowledge, students have little to contribute to their learning. In this model, CATs can be used to inform the teacher about how effective he or she is being in transmitting information.

In contrast, consider the image of a roaring campfire—a fire of intellectual development. In this student-centered model, teachers ignite analysis, reflection, application, and curiosity in students. The teacher's main role is to provide the kindling to inspire learning. This model encourages an active classroom where students shift from passive listeners to engaged problem solvers, acknowledging themselves and their peers as sources of knowledge (MacGregor, 1990). In this model, CATs can be used to give both the teacher and the student information about students' understanding of course content.

Most of us have been trained in the teacher-centered model, and the transition student-centered learning environment takes conscious effort. Transforming our classroom takes an alignment of our own mental models, course objectives, in-class teaching methods, and assessments. Keep your own metaphors and your own course objectives in mind as we begin exploring CATs in more depth.

Assessment Should be Formative, Early, and Ongoing

Experts talk about the distinction between formative and summative assessments (e.g., Scriven, 1967; Taras, 2005). Summative assessment includes marked assignments whose sole purpose is to evaluate students' performance and indicate their level of mastery of the subject matter. It is the mark or grade that they earn. In contrast, formative assessment is typically unmarked work that is only evaluated for the purposes of providing feedback. Feedback to the teacher allows for an adjustment of teaching methods to address areas of needed remediation for students. Likewise, feedback to students enables them to recognize what they have already mastered

and where they should focus more attention. Obviously, if a teacher is committed to giving students formative feedback, it is important to begin this process early in the semester and to continue it on a regular basis. Each of the CATs I describe below are CATs from Angelo and Cross (1993).

Useful CATs for Beginning a Class Session

Background Knowledge Probe

To begin a lecture on a new topic, it is often helpful to know the students' backgrounds with regard to the topic. That is, are they already familiar with it? Or is it brand new to them? Do they already have certain biases or attitudes about the topic? This type of information, gained through a background knowledge probe, can help teachers know where to begin their lessons and can aid in facilitating discussion. In this technique, teachers design and administer brief surveys to gather relevant information prior to beginning the lesson. These surveys can be done as formally or informally as you would like. You can prepare a paper (or electronic survey) consisting of multiple choice or open-ended questions. Or you could simply ask for a show of hands to questions you ask verbally. For the technologically advanced teachers, background knowledge probes can be achieved through a student response system (i.e., "clickers"). The key is to see where your students are on a topic and adjust your lesson accordingly.

For instance, when giving workshops on CATs, I begin by asking participants how many and what type of CATs they already use. If everyone reported using background knowledge probes, I'd likely minimize that part of my presentation. In contrast, if everyone responded with, "What's a CAT?" I'd likely spend more time covering some of the basics.

Background knowledge probes aren't limited to assessing just what students already know, they are also useful for getting a read about how student feel. In some cases, this information can be useful to teachers. For example, knowing students' attitudes about controversial issues such as assisted suicide might help a teacher facilitate class discussion in a medical ethics course.

Misconception/Preconception Check

While the background knowledge probe provides teachers with information about what the students know prior to a lesson, the misconception/preconception check allows teachers to find out if students have prior knowledge or beliefs that

might interfere with their learning. The process looks the same—students are asked about knowledge prior to covering class material—but the purpose it to uncover any barriers they might have to learning due to erroneous information or beliefs. This CAT is especially useful in classes where students hold deeply ingrained attitudes such as sociology, psychology, or theology.

Angelo and Cross (1993) described a history teacher who begins class by assessing students' beliefs about pre-Columbian America. She asks students to indicate how many people lived in North America in 1491, for how long had they been there, and what had they achieved by that time. Of course student's answers vary widely and they come to realization that much of what they know about the topic is based on stereotypes or assumptions. This realization clears the way for them to begin the process of learning.

Useful CATs for Checking Students' Learning During Class

Think-Pair-Share

One of the most useful and widely applicable CATs is think-pair-share. In this technique, teachers pose a question or dilemma for students, gives them time to think about it, and ask them to share their thoughts with a partner. The teacher can then ask if there were any issues, concerns, or questions that arose, or could randomly call on a few pairs to share their thoughts. This CAT provides a perfect opportunity to break up a lecture with an engaging activity that can shed light any student confusion or misunderstandings The whole process takes a relatively short time to implement.

Teachers can use almost anything as the prompt for students to consider. Mathematics professors can pose a challenging multiple-choice question that requires calculations, have students work them individually, compare answers with their partner, and then take questions from the class. Likewise, in a psychology course, I have asked students to explain a specific behavior using contemporary psychological perspectives. Once students have their individual examples they compare them to their partner's examples, and then the class discussion ensues. The questions you can pose to begin the process are limitless and can range from strictly objective to opinion-based, depending on the nature of the material.

Classroom Assessment Techniques

Tell Your Partner

Another quick and easy CAT that takes little preparation on the teacher's part is tell your partner, a technique that is especially useful when covering complicated, detailed, or technical information. Using this CAT teachers arrange students in pairs and ask the partner on the left to explain X while the partner on the right explains Y. For instance, in a biology course the partner on the left will explain (in his or her own words of course) the process of neural transmission to the partner on the right. Later in the class the partner on the right will explain action potentials to the partner on the left. When covering experimental designs in research methods, I ask the partner on the left to explain a repeated measures design while the one on the right explains counterbalancing.

Again, you can provide any prompt to get the process started as long as it meets your specific objectives. Like other CATs, tell your partner allows teachers to identify sources of misunderstanding or confusion. However, this CAT has the added benefit of encouraging students to see themselves and their peers as sources of knowledge.

Useful CATs for Good for Ending Class or a Topic Area

Muddiest Point

At the end of a lecture or section of material, teachers can utilize the muddiest point as way to assess areas of remaining confusion for students. The ease of this technique belies its usefulness; it is incredibly efficient. By simply asking, "What was the muddiest point in this lecture/reading/discussion/assignment/etc.?" teachers uncover points for remediation and students exercise metacognitive skills (how students think about their own thinking processes) as they identify and articulate information that they don't understand. The muddiest point can be used in any class, but is especially useful in large classes where students are less likely to speak up when confused. If collected at the end of class, teachers can begin the next session by clearing up some of the concepts, issues, or ideas that their students do not understand well. You can also use the think-pair-share technique to have students clear up muddiest points for each other.

Minute Paper

Another efficient technique that requires little energy from teachers and provides much information about what students are learning is the minute paper. With this technique, teachers ask some version of "What is the most important thing you

learned in class today?" and "What questions do you still have?" Students have a brief time to jot down responses and turn them in as they leave the classroom. Like the muddiest point, teachers are able to see if there are common areas of confusion, but it has the added benefit of informing teachers about what students are finding important. Hopefully, what students report as the most important issues learned in class match the teacher's objectives. If not, adjustments can be made. As with the muddiest point, minute papers can provide a "springboard for the start of the next class" (Orr, 2005, p. 109). Again, this technique encourages students to use their metacognitive skills in assessing what they have learned and what they have not. It also helps them tease apart bigger concepts from smaller details.

Let's shift now to CATs that are useful for targeting specific high-order thinking skills as identified by Angelo and Cross (1993).

Useful CATs for Teaching Application of Material

Directed Paraphrasing

We as teachers often want students to go beyond surface-level understanding of a concept; we want them to be able to apply it to a variety of practical situations. One way to assess whether students can truly do achieve this important skill is to ask them to paraphrase concepts for a specific audience. In order to complete directed paraphrasing, students must understand material at a level that allows them to clearly communicate it.

For instance, a chemist might ask students to paraphrase the principles behind chemical bonding to someone else, say their 7-year-old nephew. Or, a sociologist might ask students to paraphrase to their grandmother, who has never been to college, the connection between income and social class. This exercise forces students to monitor their own level of understanding of the concepts and apply it in different scenarios. Plus, it's an activity that students enjoy

When using directed paraphrasing, it is important that teachers choose an appropriate and challenging audience. Be sure it is not too easy, but also that it can be done in a reasonable time frame by whatever level of student is in the course (e.g., asking first-year students to explain thermodynamics to experts in the field is probably not a reasonable task).

Application Cards

After covering a specific theory, concept, or phenomena, a teacher might directing assess application skills by using application cards. After covering the material, the teacher hands out index cards and asks students to write one real-life application of what they just learned. Of course, this activity could also be conducted electronically via a discussion board. With this technique teachers can see how well students are able to understand and apply novel concepts, while students are able to see the real world relevance of what they are learning.

For instance, when covering memory in an educational psychology class, the teacher might provide the following prompt. "Psychologists have long noted the effects of "primacy" and "recency" on recall of information. These effects have some implications for classroom teaching and learning. Suggest one or two applications of these implications for teachers using the lecture method". (Angelo & Cross, 1993, p. 237). In another example, after covering a section on CATs that are good for beginning a class, I might ask workshop participants to list two applications of those CATs in one of their classes. After collecting responses, teachers (or workshop leaders) can use them for a basis for class discussion and clear up any misapplications.

Useful CATs for Encouraging Creative Thinking

One Sentence Summary

If one of your teaching goals is to encourage synthesis and creative thinking skills in your students, then the one sentence summary is a useful technique. With this technique a teacher asks students to answer the question "Who does what to whom, when, where, how, and why?" (Angelo & Cross, 1993, p.183). It requires students to concisely summarize material using the constraints of a single sentence. It is a complex task and requires students to understand, apply, and creatively articulate course material. It's not easy, but if students can do it then they have a deep understanding of the material.

For instance, what if I asked you, the reader, to complete a one sentence summary of the background knowledge probe. An appropriate response might be: Teachers (who) use background knowledge probes (what) on students (whom) at the beginning of class (when) in the classroom (where) by asking them what they already know about a topic (how) in order to adjust their teaching methods (why). When using this technique, I have found it helpful to give students hints by providing

the *who* or the *what* (or both) for them, especially if the technique is brand new to them. I have also let them work on their one sentence summaries in pairs. Students get better at this task with practice. As I mentioned, this task can be complex, so be sure that you can summarize the material yourself before assigning it to students.

Approximate Analogies

The basic analogy goes like this: A is to B as X is to Y. Using approximate analogies, the teacher provides the first half of the analogy (i.e., A is to B) and students are required to complete the second half (i.e., X is to Y). To complete this task, students must understand the first relationship and be able to apply it in order to create the second relationship. As such, this technique assesses understanding, application, and creative thinking.

For example, a composition teacher might provide the following prompt: A thesis statement is to an essay as _ is to _. You can also provide more direction if you wish. Such as, Jane Austen is to the English novel as _ is to the Arabic novel. Both you and your students can have some fun with approximate analogies as long as the prompts are clear and doable.

Useful CATs for Enhancing Critical Thinking Skills

Categorizing Grids

As a written version of sorting information into stacks or piles, categorization grids require students to organize course information. Teachers present students with a grid containing two or three categories and a scrambled list of various terms, images, concepts, equations, etc. Students then organize the list by placing terms under the related category in a limited time. In order to complete this task, students must understand the hierarchical nature of the material and identify the relevant relationships. In addition to exercising critical thinking skills, this technique quickly provides both teachers and students with information about what students understand. Categorization grids are simple enough to incorporate into most classes. As with other techniques, you can have students compare their grids using think-pair-share.

Sometimes a teacher's goal is to demonstrate the complexity of an issue, to help students recognize that sometimes there are no right or wrong answers. The pro and con grid can be useful in assessing this goal. As you might guess, with this

technique students simply list the pros/cons, advantages/disadvantages, or benefits/ costs of the topic at hand. These lists provide an indication of how deeply student are analyzing information.

This techniques works quite well in humanities or social sciences courses, but can also be applied to other disciplines. For instance, in a bioethics course, students can create a list of pros and cons of the human genome project or of stem cell research. In a counseling course, students can list the pros and cons of a particular counseling technique. In a literature course, students can list the pros or cons of a specific character taking a certain action (e.g., Hamlet taking revenge on Claudius). Because many students use pro and con lists in their own decision-making, this technique is a good first step in helping students to think critically about academic material.

Getting Started with Classroom Assessment Techniques

Angelo and Cross (1993) offered the following suggestions for integrating CATs into your classes. First, if a technique doesn't appeal to you, don't use it. Your teaching techniques must match your personality, teaching style, academic discipline, and course objectives, not to mention your students. Taken together, these multiple factors make us unique in each classroom. If you try to force a technique, students will know and it will not be effective. Second, start small. Try out one or two of the CATs described here and see how they work. Slowly integrate CATs into your teaching style that resonate with you. Third, socialize students. If you (or your students) are new to these techniques explain why you value them and what you hope to gain in terms of facilitating their learning.

Finally, allow for more time than you think you will need for any given CAT. It is true that you might have less time to lecture, but remember that you are creating more time for students to learn. It's tempting to think that if you cover less content via lecture then students don't learn as much, but CATs will encourage discussion and bring to light issues that need clarification. As a result, students can learn more by being actively engaged in these activities than they will by passively listening to all the words you speak out loud in lecture.

Keep in mind that using CATs effectively requires a three-step process. First you must plan to use the technique. What are your goals? Which CAT will you use? Why? How will it fit in the flow of class time? Next, you implement the CAT. Don't feel

restrained by the descriptions above. Instead, use them as a guide as you experiment each technique to make it effective in your teaching. Most of these techniques can be easily adapted to an online or hybrid format. Finally, you must respond to the information you get from the assessment. That is, you must, "close the loop" (Angelo & Cross, 1993, p 30). This last step is crucial to making these exercises effective assessments for you and you students.

With these steps in mind I encourage you to begin exploring the utility of these (and other) CATs in your classroom. I think you will find it to be a rewarding experience that moves your classroom towards an active, student-centered environment.

Summary

- CATs are brief, non-credit exercises intended to assess student understanding of course material. They are useful to both teachers and students in terms of assessing what students know and where remediation should occur. They also increase active learning in the classroom.

- In order to effectively incorporate CATs into the classroom a teacher should be learning-centered (and opposed to teaching-centered). Further, they should hold the assumption that assessment should be formative, early, and ongoing.

- There are many CATs at one's disposal. The *background knowledge probe* and the *misconception/preconception check* are good ones to use to begin a class. *Think-pair-share* and *tell your partner* are good techniques to break up your lecture and make it more interactive. To end a class, one might consider the *muddiest point* and the *minute paper.*

- CATs can also be used to assess and encourage specific cognitive skills. *Directed paraphrasing* and *application cards* are good for assessing application of course material. To enhance creative thinking, *one sentence summaries* and *approximate analogies* are useful. If one wants to encourage critical thinking, *categorization* and *pro/con grids* can be implemented.

- Only use techniques that appeal to you and incorporate them slowly. Socialize students by explaining the purpose of the techniques. Allow for plenty of time to implement them.

- Using CATs effectively requires a three-step process. First you must plan the technique. Second, you must implement. Finally, you must close the loop by responding to the information you uncover.

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– Angelo, T. A., & Cross, K. P. (1993). *Classroom assessment techniques: A handbook for college teachers* (2nd ed.). San Francisco, CA: Jossey-Bass.

– This is the definitive source for CATs. Highly practical, their book describes 50 CATs. It includes suggestions for use, examples from various disciplines, step-by-step instructions, the pros and cons of each, and ideas for adapting each technique. It is a must-have book for anyone interested in this topic.

– Bean, J, C. (2001). *Engaging ideas: The professor's guide to integrating writing, critical thinking, and active learning in the classroom.* San Francisco, CA: Jossey-Bass.

– Any teacher interested in going beyond rote memorization and enhancing critical thinking should have this book. It is useful and practical, full of ideas for effective writing assignments, both in and out of class.

– Svinicki, M., & McKeachie, W. J. (2011). *McKeachie's Teaching tips: Strategies, research, and theory for college and university teachers* (13th ed.). Belmont, CA: Wadsworth.

– This is another book that should be on every teacher's book shelf. It includes relevant and up-to-date information on almost every aspect of teaching from course preparation to maintaining vitality throughout your career. The book jacket calls it "indispensable" and I whole heartedly agree.

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