Ten Things Every Professor Should Know about Assessment

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Abstract

This article describes ten key assessment practices for advancing student learning that all professors should be familiar with and strategically incorporate in their classrooms and programs. Each practice or concept is explained with examples and guidance for putting it into practice. The ten are: learning outcomes, performance assessments, objective tests, essays, portfolios, rubrics, formative assessment, student self-assessment, grading, and assessment technologies. The audience is professors of all ranks, but particularly those new to the art of teaching, as well as faculty developers.

Keywords: Assessment, teaching, learning, faculty development.

"Not everything that can be counted counts, and not everything that counts can be counted." Albert Einstein

Broadly, by the term "assessment," we are referring to any systematic basis for making inferences about characteristics of people, usually based on several sources of evidence (McMillan, 2007). While assessment can serve many purposes, its main purpose should be to advance student learning. The most effective and frequent assessments are carried out by individual instructors who draw on their expertise to evaluate student performances and products and to give students informative feedback that advances students' understanding, enabling students to perform at higher levels than they would have been able to do otherwise. In this article we describe ten assessment practices or concepts that professors can draw on to improve their teaching effectiveness and advance their students' learning (see Table 1).

Assessments can take many forms and range from giving students exams or essay questions to asking them to build a model or act out a skit. Assessments can be used to determine a grade (summative) or to give feedback (formative), or both.

Assessments are best when their basis is clear to students and students are engaged in the assessment processes themselves. In this regard, assessment rubrics, in which the criteria for a performance are made explicit, are one of the most effective tools available to a faculty member.

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Table 1: Ten Assessment Topics.

1. Learning Outcomes
2. Performance Assessments
3. Objective Tests
4. Essays
5. Portfolios
6. Rubrics
7. Formative Assessment
8. Student Self-Assessment
9. Grading
10. Assessment Technologies

Assessment is not just something that is done to students. Students can best internalize the criteria for an effective performance when they apply the criteria to self-assess their own performances, and when students give each other feedback it can enlighten not only the student receiving the feedback but also the one giving it.

It is important for a number of reasons to have a variety of assessments in a course and not rely on a single exam or project to determine student grades. All forms of assessment have both strengths and weaknesses, but it is through the melding of various approaches that professors can draw on the virtues of one to offset the liabilities of another (Shulman, 1988).

Some assessments, such as multiple-choice tests, are good at assessing content knowledge. Others, such as performance assessments, are effective at assessing the application of skills. Conversely, multiple-choice tests cannot easily measure higher-order thinking, while performance assessments are less effective at assessing dispositions.

As well, since students have different learning styles and perform at different levels depending upon the type of assessment, a variety of assessment formats better enables students to perform at their best and allows a more accurate picture of student learning to unfold.

1. Learning Outcomes

In developing good assessments, where do we begin? We begin with what we want students to know and be able to do—in other words, we begin with learning outcomes (see Table 2). We can't effectively assess student learning unless we ourselves are clear about what we want students to know and be able to do. Moreover, students themselves won't know what we expect them to learn unless we make those learning outcomes clear and explicit to the students themselves.

Table 2. **Examples of Learning Outcomes Statements.**

- Students will be able to name the planets in our solar system.
- Students will be able to type 60 words per minute at a 95% or higher accuracy rate.
- Students will be able to give three reasons why it is important in a democratic society for citizens to have a sound knowledge of science.
- Students will be able to design, carry out, and write a social science research study.
- Students will be able to compare and contrast psychoanalysis and behaviorism.
- Students will be able to build a scale model of a two-story building from their city.

It is important to create or select outcomes that are not so broad that they are difficult to measure, nor so narrow that they are trivial. Also, notice the language used to describe the outcomes. Outcomes described with "action verbs," such as "list" or "compare" better allow the student's behavior to be observed and measured, while more passive verbs, such as "understand" or "appreciate" can be so broad that they are a challenge to measure. For example: "Students will know the states of the union." One might ask: "What does it mean to 'know' the states of the union? Does it mean to be able to list them alphabetically? To be able to fill in the states on a blank map? To be able to describe the economy of each state?" Table 3 has a list of "action verbs" that refer to overt behaviors that can be observed and measured that might be used in creating learning outcomes.

TIP: The clearer the learning target the better students will be able to hit it.

Table 3. Examples of Action Verbs for Learning Outcomes Statements.

Compile	Create	Plan	Revise	Analyze	Design	Select	Utilize
Apply	Demonstrate	Prepare	Use	Compute	Discuss	Explain	
Predict	Compare	Rate	Critique	Build	Enact	Perform	Draw

2. Performance Assessments

Performance assessments are based on observation and judgment of a student product or of a student performing a skill (Stiggins, Arter, Chappuis, & Chappuis, 2004). Springboard diving, for example, is a performance that is observed and can be judged according to the five criteria of Starting Position, Take Off, Approach, Flight, and Entry (Fédération Internationale de Natation, 2006). A three-dimensional architectural model, for example,

Table 4. Examples of Performances and Products.

<u>Examples of Performances</u>	<u>Examples of Products</u>
Demonstrating Lab Procedures	Business Plan
Giving Speech	Curriculum Unit
Teaching Class	Sculpture
Changing Tire	Blueprint
Interviewing Client	Fossil Display

is a product that can be judged according to features such as scale, spatial relationships, and concepts. Rubrics, or detailed criteria, are often used in the assessment of these performances and products (see Table 4).

The assessment approach should fit the assignment or task. For example, a multiple choice test might be the most efficient way to measure factual learning, while evaluating a skill usually requires the student to perform it, with the judgment of its effectiveness best guided by a rubric. As well, an important feature of a high quality performance assessment is the description of the assignment or task itself, such that the task is described with enough detail and clarity that all students have a fair chance of performing at their best (see Table 5).

Issues for the instructor to consider in designing a performance task or assignment include:

- Are the instructions for the assignment clear?
- Does the assignment dependably elicit the desired performance?
- Do all students have access to the necessary materials or resources?
- Do students have sufficient time to complete the assignment?
- Are students given feedback along the way, and from peers as well as the instructor?
- Are students asked to self-assess their performance?

TIP: Clear and detailed assessment criteria are important for performance assessments.

3. Objective Tests

Tests can take a variety of forms. They can require short answers or lengthier written responses from students. They can assess knowledge as well as attitudes. In this section we are distinguishing objective tests, such as quizzes or exams, from more complex forms of

Table 5. Example of a Performance Task.

Performance Task: Social Science Research Proposal

Identify a problem worthy of investigation in your home, school, or work setting. Explain the problem and pose a researchable question. Review the literature related to the problem and present a brief summary with references. Explain who the subjects will be and how they will be chosen. Describe your data collection and analysis plans. Make sure your data collection instrument and processes allow you to address your research question(s). Your proposal will be assessed based on the criteria detailed in the rubric for the assignment.

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assessment, such as essays, performances assessments, and portfolios (which are addressed in other sections of this article).

The most common formats for objective, short-answer tests are: a) *Multiple-choice*, b) *Fill-in-the-blank*, c) *Matching*, and d) *True-false*.

Multiple-choice tests, the most popular of the short-answer objective formats, are versatile, can be used across different academic areas, are reliable to score, and can cover a broad sample of content - though they are less effective at measuring higher-order thinking or application of a skill.

A multiple-choice question contains two basic parts: a problem and a list of suggested solutions. The problem may be in the form of either a question or an incomplete statement, and the list of suggested solutions typically contains one correct solution and a number of incorrect ones, though other formats are possible (see Table 6).

A variety of alternative test options are available as well, such as:

a. *Crossword puzzles,* in which students are given a set of crossword clues to solve, with the answers for the puzzle being terms from the course content;
b. *Incomplete outlines* in which the instructor prepares a partially completed outline with students required to fill in the blanks;
c. *Venn diagrams*, in which students compare two items or topics, such as the French and American Revolutions, identifying how they are different from and similar to each other;

   d. *Game show formats* (which may be better for test preparation rather than tests themselves) such as *Jeopardy*, *Who Wants To Be A Millionaire*? and *Are You Smarter Than a Fifth Grader?*

TIP: Fit the assessment method to the type of learning outcome and instructional purpose.

Table 6. Examples of Multiple Choice Questions.

Multiple-choice questions can take which of the following formats?

Select the:

   a) Best answer

   b) Correct answer

   c) Incorrect answer

   d) All of the correct answers

   e) All of the above*

Typical weaknesses with multiple-choice questions include:

   a) The problem is ambiguous.

   b) The suggested solutions contain clues to the correct answer(s).

   c) The correct solution is significantly longer than the suggested solutions.

   d) All of the above*

(*correct answer)

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4. Essays

Essay responses can be short or extended depending upon the type of thinking or knowledge that the professor aims to promote and assess through the question. Interestingly, if students know in advance the types of questions they will be asked, it can affect their study habits. In studying for extended essay questions students pay more attention to themes and patterns but for short answer or objective questions they focus more on memorizing smaller, unrelated bits of knowledge (Svinicki & McKeachie, 2011).

Table 7. Comparison of Short and Extended Response Essay Questions.

Short Answer Question	Extended Response Question
What are the pros and cons of short answer objective questions?	What types of thinking do extended response essay questions promote? Illustrate, with examples, how those ways of thinking might apply to your future career.
What are the three steps in designing an assessment rubric?	How do assessment rubrics advance teaching and learning?

Short-answer essay formats can be effective for assessing knowledge and basic understanding, though objective items can often achieve similar purposes in an easier-to-score format. Extended response essay questions are typically best for measuring deep understanding and critical thinking (see Table 7).

When designing extended response essay questions you want to:

- Make sure the essay question is aligned with the learning target and assessment criteria, and that the question can elicit from students the desired information.
- Give enough detail in the essay question to minimize student misinterpretation. For example, rather than ask: "Were Gandhi's methods successful in India?" instead ask more specifically, "How successfully did India put into practice Gandhi's principles of Muslim-Hindu unity and the elimination of the 'untouchable' status?"
- Specify the amount of time available for working on the essay if it is an in-class test, or specify the length of essay for an out-of-class assignment.
- Develop a rubric for scoring the essay. Essays can be scored analytically with a separate score for each part or criterion (e.g., content, organization), or holistically with a single score for the overall performance.

TIP: Offering students several short essay questions—rather than fewer, longer questions—gives them the opportunity to display a broader range of their knowledge.

5. Student Portfolios

A student portfolio at its most basic is a collection of information about a student's knowledge, skills, and dispositions. The collection could include a variety of work samples such as projects and exams, as well as assorted other information such as self-assessments and a learning autobiography, along with items such as photos and software (see Table 8). While the possibilities are nearly endless, the purpose for including each item should be clear (Wolf & Sui-Runyon, 1996).

Table 8. Possible Portfolio Products.

<u>Written Work</u>	<u>Photos</u>	<u>Videos</u>	<u>Other</u>
Research studies	Scale models	Dances	Blueprints
Personal narratives	Sculptures	Dramatizations	Software
Journal entries	Installations	Speeches	Drawings

Nearly as important as the collection of information itself is how it is framed. It can be challenging at best or misleading at worst to try to interpret a student's portfolio contents without some information about the purposes and context for the work. A portfolio is more likely to be fully realized if it includes a student's explanation of the contents, including captions for each major work sample and the student's reflective commentaries on the meaning of the work.

A *caption* provides context for the work sample, and typically includes a title, the date the product was created, and a brief comment about the purpose of the product (see Table 9). *Reflective commentaries* can take many forms, again depending on the purpose for the portfolio. A student might explain how the contents illustrate his or her performance against a standard or address the assignment rubric. Or the student might explain how the body of work chronicles his or her journey as a learner. Again, the possibilities are many, depending upon the purposes for the body of work presented in the portfolio.

Table 9. Caption for Portfolio Product.

Author: Ellen Stevens   *Date Completed:* Sept. 30, 2011

Product Title: CD ROM of Digital Faculty Rubric Project

Explanation: In this project faculty members with expertise in assessment documented

their use of assessment rubrics through video interviews, classroom observations, and

written commentary (http://elixr.merlot.org/assessment-evaluation/assessment-

rubrics/assessment-rubrics4). This portfolio entry illustrates one of the many ways that I,

as a faculty developer, support faculty scholarship and promote faculty teaching skills.

Portfolios are increasingly becoming electronic, and these e-portfolios offer some significant advantages over the notebook variety. They can be stored on compact discs or on one of the many web-based applications (which make the contents available to anyone on the web, though access can be password protected). However, a caution: Too much content with unclear purposes can overwhelm the reader or reviewer and make the portfolio less coherent and not as valuable.

TIP: A portfolio's purpose should drive the selection of its contents and the focus of its evaluation.

6. Rubrics

A rubric is a multi-purpose scoring guide for assessing student products and performances. This tool, which usually takes the form of a matrix, works in a number of different ways to advance student learning and improve teaching as well as contribute to sound assessment (see Table 10).

Table 10. (Partial) Rubric for Public Speaking.

	Below Proficient	**Proficient**	**Above Proficient**
Delivery			
-Eye contact	Eye contact is sporadic.	Eye contact is made with all members of the audience.	Eye contact creates rapport with audience.
-Gestures	Gestures do not fit the speech.	Gestures compliment the presentation.	Gestures deepen the spoken message.
-Pacing	Pacing is uneven.	Pacing is appropriate to the content and purpose of the presentation.	Pacing engages audience.

There are three basic steps in designing an effective rubric (Wolf & Stevens, 2007).

Step 1. Identify the performance criteria. What do you want students to know and be able to do? What are the most important aspects of the performance that you want to emphasize and evaluate? For public speaking it might be: Voice, Delivery, and Content. It is then helpful to operationalize each criterion with several sub-points. "Delivery," for example, might be composed of "eye contact," "gestures," and "pacing."

Step 2. Set performance levels. How good is good enough? The most common continuum is a proficiency scale (below, proficient, above) but developmental scales (emerging, developing, mastery, accomplished) are appropriate as well. The number and type of lev-

els depend upon the purpose for the assessment and the students being assessed, along with the content and context of the performance. Two levels could be appropriate if the primary purpose is to determine pass or fail but three to four levels are a better choice if the goal is to give students informative and detailed feedback about their performances.

Step 3. Describe performances at each level. What does an outstanding performance look like? For each criterion at each level, what description best characterizes the performance? The descriptions are most coherent if they follow a similar pattern (as in the partial rubric above). The more specific the descriptions, the more useful they are in guiding students.

Finally, when using a rubric, consider analytic versus holistic scoring. With holistic scoring a student is given a single score for the overall performance, while with analytic scoring the student receives a score for each of the key features of the performance (such as voice, delivery, and content of a speech). Holistic scoring is a good approach when the instructor wants students to focus on the integration of the performance, while analytic scoring is useful when the instructor wants to assess students on specific features of their performance (Arter & McTighe, 2001).

TIP: Give students the rubric BEFORE they begin the task to better enable them to hit the learning target.

7. Formative Assessment

Formative assessments, or assessments *for* learning, aim to understand and support teaching and learning effectiveness rather than grade the performance or product *per se*. There are a number of different strategies that serve this feedback purpose (Angelo & Cross, 1993).

Knowledge Survey. Give students a list of the main topics at the beginning of the course and have them rate their level of knowledge for each of the 5-10 topics on a Likert-style scale (see Table 11). This information can help the instructor better customize the course content as well as alert students to what they know and don't know. This assessment can be repeated at the end of the course so that students can see how much growth they have made in their self-reported knowledge.

Concept Map. Give students a blank or partially completed concept map and ask them to fill it in for a selected topic. This information helps reinforce student understanding of the topic and can give the instructor an indication of whether students have understood the main concepts.

One-Minute Paper. Ask students to describe in writing in one minute the most important concept they learned that day. This information can give the instructor a good idea of whether students can identify and have understood the main concepts.

Pro/Con. Ask students to list the pros and cons of various approaches or topics as a way of reinforcing and extending understanding of the concepts under study. For example, students might list the pros and cons of interviewing subjects in a study versus giving the subjects a questionnaire to complete.

Categorizing. Ask students to take a list of terms and place them in two or more categories. For example, in a social science research course students might be given a list of terms (e.g., triangulation, subjects, foreshadowed problems) and be asked to identify them as qualitative or quantitative.

TIP: Formative assessment activities such as concept maps and categorizing can also serve as class activities or practice for an exam.

Table 11. Knowledge Survey.

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Knowledge Survey on Assessment Rubrics

Directions: Rate your level of knowledge or skills according to the scale below:

H = High (I have a solid understanding and can teach this concept to others.)

M = Moderate (I have some familiarity and experience with the concept.)

L = Low (I have limited or no familiarity or experience with the concept.)

___ 1. I can explain what an assessment rubric is.

___ 2. I can design an assessment rubric.

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8. Student Self-Assessment & Peer Feedback

Students can productively assess themselves on many different dimensions, such as academic performance, attitudes about learning, degrees of improvement, learning style, study habits, teamwork, ability to learn from feedback, and so on.

When students self-assess, they develop a deeper understanding of their own performances and what they need to do to improve. One of the hallmarks of a professional is the ability to critique one's own work, and that skill can be developed through guided self-assessment experiences. Self-assessment is often more successful when the instructor structures the activity. For example, giving students a checklist to review or criteria to

apply to their performance reduces the likelihood that their self-assessments will be ungrounded or unfounded. This scaffolding can gradually be reduced as students become more and more experienced with self-assessment and can independently apply their own strategies and structures.

Strategies for student self-assessment include the following:

Rubrics. For students to self-assess their academic performance with as much accuracy and insight as possible it is important for them to have a clear understanding of the learning criteria. As discussed in a previous section, good rubrics highlight the key features of a quality performance. Students can use an assessment rubric to rate themselves on their performance along the way and at the end.

Practice Test. Have students take a practice test in which they provide their answer as well as rate their confidence that the answer they provided is correct or fully realized. This kind of self-assessment can alert students to areas that deserve further study.

Study Habits. Students can keep a journal documenting their study habits and compare those habits with their performance on tests and assignments. Keeping track of when, how, and where they study and comparing it to their results might reveal more or less productive study habits.

Peer Feedback. Peer feedback can be very beneficial but also unproductive or even destructive when not designed carefully. Structuring the format of the peer response can help avoid these potential problems. For example, rather than having peers offer a general critique, they might be asked to provide a compliment about the work along with a specific action that their fellow student might take to strengthen his or her performance. Or peers can provide feedback through rubrics as well, though narrative notes rather than numerical ratings from peers are often more useful and less threatening.

Exemplars. High quality examples (e.g., research reports, essays, models) from previous students can sometimes help students reflect on their own performance, though beware the tyranny of the single example and aim to have several available.

TIP: Students may need assistance learning how to effectively use self-assessment tools.

9. Grading

While grading policies and systems are in place in most institutions, grading practices can vary so widely within an institution that a student might receive an "A" grade for an assignment or course from one instructor and an "F" grade from another for the same performance (Reeves, 2004)!

Hard to believe, but true. Suppose a student has three assignments for a course and receives two B's but does not complete the third assignment. The instructor who averages a B with a B with an F (for the missed assignment) would give the student a course grade

of "C." However, the instructor who averages a B with a B with a ZERO (for the missed assignment) would give the student a course grade of "F." Most measurement experts would argue that assigning zeros for missed assignments and averaging them with other grades is a misguided practice that misrepresents a student's overall performance.

A student's grade can also depend on the response to the following questions:

- Does the instructor grade on a curve?
- Does the instructor base the course grade more heavily on an end-of-course performance?
- Are students offered the opportunity to re-do or make up an assignment?
- Are grades based on factors other than performance?

Measurement experts recommend that instructors:

- Assign grades against a standard and not on a "curve" since a student's relative standing in a class may not reflect what the student actually learned;
- Consider basing the final grade on the final exam or project, if cumulative, rather than averaging all the scores in a grading period since the goal is mastery whenever it occurs;
- Avoid giving zeros for missed or late assignments since a zero rarely reflects what the student has actually learned, but instead give opportunities for making up or re-doing the work; and
- Base grades on academic performance only and not on hard-to-define-and-measure factors such as attitude or effort.

TIP: "The most effective grading practices provide accurate, specific, timely feedback designed to improve student performance" (Reeves, 2008, p. 85).

10. Assessment Technologies

The fundamental principles of assessment remain the same regardless of whether the practices are technology-based or not. The underlying measurement principles of validity, reliability, and fairness, for example, still pertain as do the purposes of formative and summative assessment. What is different is that technology can improve the efficiency of assessment as well as make forms of assessment possible that weren't possible beforehand.

Assessing Conceptual Understanding. One way to incorporate technology in support of assessment strategies is by using classroom response systems. Classroom response systems, such as iClickers, allow you to check students' conceptual understanding during lectures and other classroom activities. Using a classroom response system, you can strategically embed multiple-choice questions throughout a presentation (using PowerPoint, for example) and students use remote control-like devices to respond to the questions, with the results displaying on a screen. This provides immediate feedback for both you and the students, allowing for elaboration or remediation as needed. Similarly, Twitter, a

freely available social networking tool, can also be used to check students' understanding and display the results on screen for further discussion.

Similar to classroom response systems, there are easy-to-use (and often free) assessment data collection tools available via the internet, such as Zoomerang and Google Forms. With these tools you can create surveys, quizzes and tests. In addition, there are online polling tools, such as Poll Everywhere, which allow students to respond to polling questions via a web browser or mobile device. As well, more and more people are using Twitter to collect instantaneous feedback and assessment data from students. These online tools are great options because they can be used in an on-campus classroom as well as in online courses.

Throughout this article, several strategies for the assessment of conceptual understanding are recommended. The implementation of many of these strategies can be supported by technology. For example, there are many online tools for creating crossword puzzles, flash cards, concept maps, and Venn diagrams. There are also online tools for creating Jeopardy-like assessments and other assessments in popular game formats.

Quiz and Testing Tools. Although there are many online quiz- and test-creation tools available (as well as many preexisting quizzes and tests available online for a variety of subject areas), some of the easiest, most reliable, and most robust online quiz- and test-creation tools exist within learning management systems (LMS). If your institution is already using a LMS such as Blackboard, Pearson LearningStudio, or Desire2Learn, then you have access to a powerful online quiz- and test-creation tool that easily enables you to build true-false, multiple-choice, short-answer, and essay assessments that can provide students with instantaneous feedback and results if appropriate. In addition, the quizzes and tests created within the LMS are easily tied to the LMS's gradebook so that results are posted automatically. The benefit of automatic posting is that students can access their results and track their course progress, and it is very efficient for faculty.

Portfolios. Portfolios are a great way for students to organize and share their work for assessment purposes (see the Portfolios section above). Some popular tools that support online portfolio creation to varying degrees include Posterous, PBWiki, Weebly, and Google Sites. Students can also use blogging tools such as WordPress. Encouraging students to use online tools to create, share, and maintain a showcase of their work not only supports assessment activities within specific courses and across programs, but also allows students to share their portfolios with potential employers. This is something that is very challenging if technology is not used.

Maintaining Assessment Data. With the advent of LMSs such as Blackboard it is easy to maintain course-based online gradebooks. Online gradebooks are easily accessible to students (typically requiring a simple log in) so they can view grades and receive feedback on various assessment activities throughout the term, allowing them to assume responsibility for tracking their progress and overall course grade.

Online gradebooks also provide a way of making your assessment strategies more explicit so that students clearly see the connection between their effort and their course grade. More elaborate systems such as LiveText (which is an all-encompassing performance-based assessment management system) extend beyond a single course to help track students' performance across an academic program. Because these systems house student performance-based assessment data, they also ease university accreditation efforts by generating reports required by accreditation agencies.

TIP: When considering technology, to avoid feeling overwhelmed, start off slowly and only select those options that better and/or more efficiently achieve the assessment and learning goals of the course.

Conclusion

When given guided opportunities to self-assess at key intervals, for example, students will become more insightful about what they need to do to improve their performance. When instructors gather information about their students' progress through formative assessment techniques such as one-minute papers, for example, they are better able to adjust their instruction along the way. And when instructors are clear about the criteria for assessing performances through rubrics, for example, the assessment process is richer and more valid. While not pedagogical panaceas, the ten assessment strategies described in this article, when strategically applied, can greatly enhance teaching effectiveness and advance student learning.

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