

Assessments That Support Student Learning

Key points and factors from the review paper “Conditions Under Which Assessment Supports Student Learning,” by G. Gibbs and C. Simpson¹ (adapted from a summary produced by Carl Wieman).

Key points (extensive references to data supporting all these points are listed in the original article)

- What is tested or marked in a course dominates what students think is important and what they do.
- Much assessment fails to engage students with appropriate types of learning.
- Students who focus on picking up cues as to what will be on exams and study accordingly do much better than those who do not. Students often realize this form of studying is not the same as studying to master (i.e. understand and apply) the course material.
- Exam scores correlate very weakly with post graduate performance. Scores on marked assignments are better predictors than exams of long term learning retention.
- When assignments are a significant fraction of the course mark, the failure rates are 1/3 what they are when course mark is based solely on exam scores. Students also study and learn in more naïve ways when mark is based solely on exams.
- Students prefer courses with a significant marked assignment component, feeling that such courses provide them with more practice and feedback, and the assessment is fairer.
- Effective feedback is *the* most powerful single element for achieving learning. Feedback that is not attached to marks is often the most helpful.

Factors that make assessments contribute to learning (and which are frequently neglected)

1. Assigned and assessed tasks that:
 - are focused on the most important aspects of the course (tied to learning goals),
 - require extended time to complete,
 - are given frequently,
 - engage students in appropriate forms of study/effort.
2. Clear concept of the assigned task and of learning in the discipline. The criteria for setting the mark on the assignment needs to be explicit and understood by the student.

The single most important element of assessment supporting learning is the frequency and type of the feedback provided with the assessment.

Feedback that supports learning:

- is frequent and sufficiently timely to the task so that it still matters to the student
- focuses on student performance and learning, rather than student characteristics
- is quite specific and detailed, addresses small chunks of material, and provides guidance for future efforts
- matches the purpose of the assignment and encourages the student to improve
- is supported by mechanisms that require the student to attend to and act upon the feedback

Implementing good assessment and feedback without spending excessive time marking

It is particularly challenging to have frequent assignments and timely feedback in large-enrollment classes. Below are a few examples of ways to do this.

- Online, computer graded homework. There are numerous systems for this. (Instructor needs to generate or find sources of good multiple-choice questions, many systems provide these.)
- Problem-solving sessions associated with quizzes or homework. This could be informal (groups of students voluntarily get together to work on problems with or without TA or instructor present) or formal (tutorial, recitation, workshop with TA and/or instructor using Socratic approach).
- Peer Instruction:² during class pose questions, student discussions about which answer is correct, vote on answer, instructor does short lecture on which answer is correct and why. Works in large lecture halls (This moves the feedback part into the classroom and shares it between students and instructor. Some coverage of material is moved from lecture to assigned reading.)
- Just-In-Time Teaching:³ Web-based assignments due a short time before class, followed by discussion/lecture focusing on areas of student difficulty (requires quick adjustment of teaching based on responses, for large classes, instructors usually go through a subset of the responses). Can also be implemented as quiz at start of class with electronically collected responses. (Note: EOS had a recent brown bag discussion led by Roland Stull on his experiences with Just-In-Time-Teaching (JiTT). This event was video recorded; please contact an EOS STLF (contact information below) if you would like to view the video or speak with one of us about JiTT.)
- Have some long-answer or essay-type questions on assignments, but only grade some of these (important to be clear to students that they will get some credit on a problem for turning something in, and a subset of those problems will be graded for marks – students won't know in advance which questions will be graded, which motivates them to try hard on all problems or risk a lower mark)
- Have multistage assignments with feedback in the middle that students need to use to complete assignment (this is a way to get students to act on feedback)
- Peer assessment (important for instructor to provide good marking rubric). Imperfect feedback from a fellow student provided almost immediately can have much more impact than more perfect feedback from an expert many weeks later. Students learn a lot by *doing* peer assessments – particularly when done as a group activity.⁴
- Self assessment or reflection assignments (e.g. have students grade own work using a rubric created by instructor, or have students go over a problem from previous assignment that they got wrong and explain what they did and why it was not the correct approach.)
- Peerwise⁵ is an online tool that supports the construction, display and organization of student contributed assessment questions. The creator of Peerwise, Paul Denny, is currently a visiting researcher at UBC (through May 2009) in the Department of Computer Science and would welcome contact from interested parties.

The bottom line?

Teaching students to monitor their own performance should be the ultimate goal of feedback¹

¹ G. Gibbs and C. Simpson, "Conditions Under Which Assessment Supports Student Learning," *Learning and Teaching in Higher Education*, 1, pp. 3-31, (2004). Available at:

<http://resources.glos.ac.uk/shareddata/dms/2B70988BBCD42A03949CB4F3CB78A516.pdf>

² C. Crouch and E. Mazur, "Peer Instruction: Ten years of experience and results," *American Journal of Physics*, V. 69, pp 970-977 (2001).

³ See: <http://jittl.physics.iupui.edu/jitt/>

⁴ K Topping - Review of Educational Research, 1998, <http://rer.sagepub.com/cgi/content/abstract/68/3/249>

⁵ See: <http://peerwise.cs.auckland.ac.nz/>

Contact EOS-SEI: You are encouraged to talk about your course(s) or teaching and learning in general by dropping by EOS-South 361 or contacting Francis Jones (fjones@eos.ubc.ca), Brett Gilley (bgilley@eos.ubc.ca), Joshua Caulkins (jcaulkins@eos.ubc.ca), Erin Lane (elane@eos.ubc.ca) or Sara Harris (sharris@eos.ubc.ca).

For more faculty resources and information, see <http://www.eos.ubc.ca/research/cwsei/>.

Also, please watch for Brown Bag discussion sessions roughly once a month in the Tuesday 12:30-1:30 time slot.