The EOS-SEI Times
June 2011 Vol. 4 No. 6
Raising the standards in undergraduate education
http://www.eos.ubc.ca/research/cwsei/eossei-times.html

What do students know before starting your course?

~

"Didn't you already learn this?" We all have expectations of students when they arrive in our classes. We define the level of our courses based on assumptions about what students can/should already be able to do. Sometimes they can, sometimes they can't. Do we know which is which?

Diagnostic tests, administered at the start of term, can inform both instructors and students about their incoming capabilities and/or attitudes. Results can then guide students to do remedial work, and help instructors focus activities on needed concepts or skills, or to avoid repeating what's already known.

In EOS, various types of diagnostic tests have been used in at least 12 courses spanning all levels. There are many ways of using diagnostics, but four applications in EOS courses are to:

1. Help focus what the instructor does (not necessarily show results to students);
2. Refer to specific results during the course to remind students they CAN do this;
3. Show students their results and point them to resources for catching up;
4. Inform instructor about range of abilities, experience, AND/OR attitudes about aspects of the course, e.g. confidence with graphs or maps. This could include demographics.

Here are some specific examples of how your colleagues have used diagnostic test results to help their students and themselves.

1. Focus what the instructor does (not necessarily show results to students)

In EOSC 340 (an upper level science elective), students are expected to be able to use some basic chemical mixing concepts. The following question showed instructors that 73% of the 113 incoming students had trouble with this kind of task.

Imagine you mix together: (1) 3 liters of water with 30 ppt NaCl, and (2) 2 liters of water with 10 ppt NaCl. What is the concentration of NaCl in your mixture? A) 15 ppt NaCl B) 18 ppt NaCl C) 20 ppt NaCl D) 22 ppt NaCl E) 25 ppt NaCl	This result (73% could not do it) helped instructors anticipate problems students would have on homework where this skill was needed, and to include some specific guidance either with some comments in lecture or by pointing to notes, readings or online resources.

2. Refer to specific results during the course to remind students they CAN do this.

Students need to use some simple math in EOSC 112. Instructors have learned from the following diagnostic question that most students (95%) can deal with inverse relationships.

For the equation **y = 1/x**, what happens to **y** when **x** gets bigger ? A) **y** gets bigger B) **y** gets smaller C) **y** stays the same	During class, when they encounter $\lambda = w/T$, instructors remind students that nearly all of them already showed that they can deal with inverses. So there's no need to freak out about the λ, w, and T.

3. Show students results and point them to resources for catching up

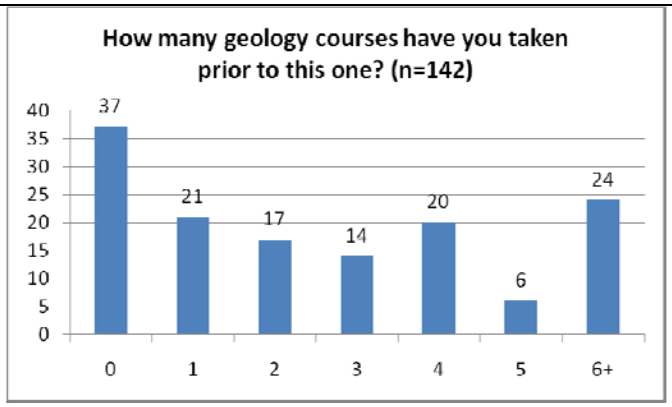
In EOSC 372 (intro. oceanography), instructors provide students with a list of required knowledge and resources for review. For example, from PHYS 101 (a prerequisite), students should be able to *"contrast velocity and acceleration; contrast force, work and energy"*. Instructors provide the following guidance:

"If you are unsure you should review your physics textbook or notes or find an appropriate book in the library. Find more help at http://www.ugrad.math.ubc.ca/coursedoc/math101/notes/applications/velocity.html"

Students review the information, then take an on-line quiz, including the question to the right. Later, they are allowed to re-take the diagnostic quiz until they master all the questions.	If you integrate velocity (v) through time (t), $\int v\,dt$, the result is: A) acceleration B) distance C) minimum velocity D) average velocity E) maximum velocity

4. Inform instructor about range of abilities, experience, AND/OR attitudes about aspects of the course, e.g. confidence with graphs or maps. This could include demographics.

Some information can be summarized from the class-list (e.g. distribution of majors), while other useful information is more easily obtained as part of a diagnostic test. EOSC 329 (Hydrogeology) is required of engineers, desired by many EOS & ENVR students, and available as an option for science students. What is the range of experience in the class? How will this impact how/what the instructor teaches?



Geology background for EOSC 329:

These data show that the range of student backgrounds is huge. Specifically, more than a quarter of the students have taken NO prior geology courses, while quite a few have several geology courses under their belts. This information can help instructors anticipate potential problems some students will have, and make plans for how to effectively and appropriately challenge all the students in the class.

For further examples, and/or help preparing or analyzing a diagnostic test for your course please contact the EOS-SEI folks via information below. Of course it takes a little time to prepare suitable questions, fine tune, then post to Vista or print, so please don't leave this to the last minute!

Have a great summer – the EOS-SEI team.

Contact EOS-SEI: To talk about your course(s) or teaching and learning in general, visit EOS-South 361, or contact Francis Jones (fjones@eos.ubc.ca) or Sara Harris (sharris@eos.ubc.ca). See also http://www.eos.ubc.ca/research/cwsei/.