

IN THE OCEANOGRAPHY CLASSROOM

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HOW *DO* INSTRUCTORS CHANGE THE WAY THEY TEACH?

So you have heard that you should change the way you teach, but you aren't sure how to do it! You have been told *what* to change and *why* to change it: change the emphasis, they say, from faculty teaching to student learning, because research on how students learn strongly indicates that students learn better when they take an active part in their learning. All well and good, but, like many another instructor, you are not sure *how* to change the way you teach. Grappling with the *How* is a double challenge. First, you must overcome the fear of change. We instructors are loath to risk change in front of our students. We might look foolish, seem stupid, or outright fail. Taking a risk in our classroom can be especially daunting because we have traditionally seen ourselves there as the Expert Figure, now to be taken down from its pedestal of authority. We must just accept the fact: making any change, even in our research, entails a risk. The second challenge of *How* is getting started. So let me outline how you might go about taking a calculated risk and start changing the way you teach. Remember, the emphasis is now placed on student learning, not faculty teaching.

Know Your Students. If asked who the students in our class are, we typically answer, "They are first-year graduate students," or "They are seniors," or some such general, homogeneous designation that is true but incomplete. Let's say the class is introductory physical oceanography. Are all the students physical oceanography majors? Or are some on other curricular tracks? Is this the first physical oceanography course for all the students or the only course for some? Even if they are all physical oceanography majors, do they all have the same educational, experiential, and cultural backgrounds, all the same prospective research interest in physical oceanography? Can even the physics majors all demonstrate an understanding of the physics concepts behind the mathematical representations? Can all students apply mathematics to problem solving in a mode other than plug-and-chug? Whatever the class,

answers to questions like these reveal our students not to be a "homogeneous group" of any sort. Instead, they are individuals with diverse interests, expectations, abilities, and personal and educational backgrounds. Each of these characteristics affects how each student learns. We must know the expressions of these characteristics in our students if we are to help them learn better. (How well would *you* learn if, say, a technical manual were being taught to you as part of a "homogenous group" of instructional software users?)

Set Your Learning Outcomes. Beginning to know your students is as simple as asking them to fill out a form or write an essay on the first day of class. Setting learning outcomes, however, is difficult, for it requires you to state explicitly what you want the students to learn and be able to do with what they learn. All the students—in spite of their differences! To do this you must stop thinking of what you, the instructor, put into the course—information about topics—and begin thinking of what you want the students to take out of the course, particular critical knowledge and skills. It's not that they should *know about* (How vague!), say, beaches, estuaries, deltas, and tidal-flats in a marine geology course; it's that they should possess certain knowledge that they are able skillfully to transfer to novel situations and apply there to achieve understanding in those situations. You may decide, for instance, that you want the students to learn two or three "big ideas" or "general principles," the abstractions that we use to transfer learning, and the critical thinking and mathematical, observational, or experimental dexterity required for the successful transfer to novel situations. Your concentration on setting learning outcomes can be focused wonderfully if you contemplate what you would retain in your class if told that the number of credits for the class is to be cut in half. What is *essential* for these diverse students to learn in this class? Forget the rest of the information; the students would, anyway, sooner than you think.

Select Your Teaching Methods. Now that you know the variety of backgrounds, experiences, abilities, and interests that the students have brought into your class, which are the groundwork for their learning, and you have decided, at least as a first attempt, what you want all of them to learn and be able to do with that learning, it's time to select your teaching methods. You have never had this choice before. When the emphasis was on the information you were putting into the class—the topics—you could use a single method, the lecture, and use it effectively to present information on the topics. Now, however, the emphasis is on the students' learning—and their taking an active role in that learning. To be sure, there is still a place for lecturing, for example, to stress what is significant in what these novice learners have learned. For discovery, analysis or synthesis, however, the students need to take part in one or more of the active learning methods. To begin with, look at a section of your lecture notes. Find readings for that material that students could read, or data they could analyze, or an experiment they could run, in order to achieve the learning outcome you have set.

Your role now becomes that of facilitator, or coach. In this new role you have new responsibilities. For instance, you can eliminate a common obstacle to student learning—the presentation of information uniformly to all students. For the instructor, this is the old dilemma: “How can I teach this class when I have both oceanographers and engineers in the same class?” Now, by a coach's perceptive assignment of students with complementary backgrounds and previous knowledge to the same group, you can enable students to learn from one another. Also in active learning you come to expect the unexpected, such as questions you would never be asked in the highly structured setting of the typical lecture class. You are exhilarated by having to stay on your toes, adaptable, flexible. The students' learning has now become a partnership with you, their coach, and includes their self-determined inquiry and self-revelation as learners. You are still the Expert Figure, just not up on a pedestal anymore. You are down with your students, coaching them, on the playing fields of learning.

Assess Your Results. If setting the learning outcomes is the most difficult part intellectually and selecting the teaching methods the most challenging emotionally, then assessing the results is the most intimidating. We tend to think of assessment as testing ourselves for success or failure (past tense, terminal, end of lesson!), as we have learned to test students by examination. While that is still true to a certain extent, we'll now use assessment principally to tell us how the students are doing (present tense, present time, course correction if necessary!). For instance, if by listening to group discussions or reading students' anonymous

short notes on the “muddiest point” in what they have been discussing, you realize that they are not understanding the lesson, then you try another approach to learning by making an immediate change in teaching method, resources, or applications.

Assessment of the students' learning is a feedback mechanism from which, sooner or later, you will make a self-defining decision. The students will be having difficulty learning from information you know is significant. The decision is whether to leave them to learn this on their own so that you can cover more content in class, even though the assessment reveals serious lapses in their understanding, or to delay, and risk even omitting, later content so that you can be sure they learn what you think is significant. Your crisis decision to place greater value on enhancing student learning or covering content defines you as an instructor. Finally, by having set your learning outcomes, you know exactly what you want the students to learn and be able to do with what they learn. Until they can do it, you remain flexible, open to plan B, C, or D, as needed, to achieve the goal you set for them. When they can do it, you have succeeded.

If you want to change the way you teach, then change it. Don't wait. You won't have any more time for it next year. The change can excite you—and your students. You need not change everything at once. Begin by getting to know the students in your present course. The better you know your present students, the better you can predict what your future students will be like and begin contemplating your learning outcomes. Learning outcomes can be developed through iterations. Perhaps you will change teaching methods for only a part of the course at a time. The important thing is to begin the change.

Help is at hand. Two excellent reference books are B.G. Davis' *Tools for Teaching* (1993, Jossey-Bass) and W.J. McKeachie's *Teaching Tips* (11th ed., 2002, Houghton Mifflin). Many colleges and universities in Australia, Canada, New Zealand, and the U.K., as well as the U.S., have teaching/learning centers with staff consultants who are trained to assist faculty and graduate students in developing their teaching skills and in learning more about how students learn. Links to these centers can be found at the Web site for the University of Kansas, Center for Teaching Excellence: <http://www.ku.edu/~cte/resources/websites.html>.

You can begin turning that stack of lecture notes into readings, samples, and data for student activities. For the first time, you can see and hear students learning, all around you, during class time. And you will have changed—more than you think. ☑