

IN THE OCEANOGRAPHY CLASSROOM

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Those of us who teach general oceanography can scarcely believe our good luck. The marine sciences are at the threshold of a new age. The recent revolutions in biology and geology are being assimilated, and the road ahead seems clearer. Advances in the design of sampling devices, robot submersible vehicles, and data display have brought new vigor to oceanography. Satellite-borne sensors can provide data in an instant that would have taken years to collect using surface ships. Shipboard technology has become so sophisticated that Wyville Thomson or Fridtjof Nansen would hardly recognize our sensors or sampling devices. Our institutions offer us the opportunity to discuss the nature and process of science, and we use the story of Earth's largest and most important feature to accomplish the task. Our students are bringing to class an unprecedented enthusiasm for things oceanic. We professors find ourselves cheerfully in the middle between a burgeoning body of knowledge and a growing number of citizens eager to know about it. It is the best of times.

We have a story to tell, and a strong drive to tell it. Studying the ocean reinstalls in us the sense of wonder we all felt as children when we first encountered the natural world. There is much to say. The story of the ocean is a story of change and chance; its history is written in the rocks, the water, and the genes of the millions of organisms that have evolved here.

How should this story unfold? Because all matter on Earth—except hydrogen and some helium—was generated in stars, our story of the ocean must start with the lives of stars and our place in the universe. Have planets with oceans evolved elsewhere? We may continue with a brief look at the history of marine science. The theories of Earth structure and plate tectonics would be presented next as a base on which to build the explanation of bottom features that follows. A survey of ocean physics and chemistry will set the stage for discussions of atmospheric circulation, classical physical oceanography, and coastal processes. A look at marine biology begins with an overview of the problems and benefits of living in seawater, could continue with a discussion of the production and consumption

of food, and end with taxonomic and ecological surveys of marine organisms. A last depressing coda treats marine resources and environmental concerns.

Whatever route you take, *you will forever influence the students who travel with you.* You are the topic for them, and your background and preparation, your choice of topics and depth of coverage, and the daily transmission of your own enthusiasm will serve you well.

Teaching

Nearly all of us in marine science can trace our interest to one or two exceptional teachers in our past. You may remember quite clearly the day that *first* piqued your involvement in oceanography—the day a great teacher led you to the door, opened it, and showed you the subject of your lifelong study. No matter what followed, that day, spent with your teacher and fellow students, will remain unique in memory.

Can we still learn anything from that distant experience? Of course. Many years after he set me on my course, one of my great teachers shared with me his thoughts on teaching. At the top of his list of ideas was the idea that a teacher teaches with what he or she is. One is only as good as a teacher as one is—or is becoming—as a person. With that in mind, he compiled a list of characteristics shared by great teachers:¹

- Authenticity: a freedom from phoniness or pretense, an approach of genuineness and utter sincerity.
- Enthusiasm: an ardent belief in the significance of one's work, and the energy to put life into it.
- Directness and nearness to reality: an open relationship to ideas and people.
- Perspective in length and breadth of view: a sense of humor, patience, and freedom from the demands of perfectionism.
- Freedom of mind, especially freedom of imagination: a trait that encourages ideas to flow freely, an eagerness to consider many alternatives.
- Breadth of interest and sensitivity to the whole spectrum of life manifested in wide reading, travel, and curiosity about the world.

¹Adapted from Pullias, Earl V. and Aileene Lockhart, 1963. *Toward Excellence in College Teaching*. W. C. Brown, Dubuque, Iowa.

- An abiding concern for the individual learner: an ability to feel and communicate the notion that the individual student is significant, that he or she has potential of great worth and that it can be realized.

All very idealistic, you say? Yes, certainly—but do you recall those rare times as a student when time fell away and your vision narrowed to include only your teacher and a developing idea? When the topic being presented was of such interest that you could hardly wait to learn more about it? When you first researched a concept *strictly for yourself*, and not for an assignment? When you shared your new ideas with your family at the dinner table? When you looked at the ocean with a newfound understanding, but with more questions than answers? When “why” became more important to you than “so what”? Those times were facilitated by teachers who were genuinely interested in their topic, and in transmitting their excitement to you. The learning was yours, not theirs; they understood the Zen of the situation: We shape the clay into a pot, but it is the emptiness inside that holds whatever we want.

Connections

It is important that *connections* between disciplines be emphasized in any oceanography course. In no other field of science do so many ideas interweave to form so rich a tapestry. Knowledge of individual facts doesn't make good science or good students. Meaningful connections between bits of information must be made by critical thought, but critical thinking can be a dicey proposition for the 29% of Americans age 18 through 24 to whom the location of the Pacific Ocean is a mystery.² It is currently fashionable in educational circles to denigrate lecture presentations, in part because they seem to favor passive behavior on the part of students, and in part because they don't encourage critical thinking. I disagree. Even the most indifferent student will perk up when presented with stories of encounters with huge waves, photos of giant squids, tales of exploration under the best and worst of circumstances, evidence that vast chunks of the Earth's surface slowly move, news of Earth's past battering by asteroids, micrographs of glistening diatoms, and data showing the growing economic importance of seafood and marine transport. Critical thinking cannot begin until a student is interested. A very well presented lecture by an enthusiastic and committed ocean scientist

can certainly generate interest! If pure spectacle is required to generate an initial attraction to the study of science, oceanography wins hands down.

In the end, however, it is subtlety that triumphs. True learning occurs in reflective silence. A student may grasp the Coriolis effect for a moment while you flail your arms at the front of the lecture hall, but he won't truly understand it until a quiet review of notes and written material triggers the final “aha!” Then he has it forever. Add Ekman spiral, geostrophic flow, heat transmission by currents, and palm-like trees in Ireland at just the right time, and I'll bet somebody will hear about it at the dinner table!

Marine Scientists as Teachers

Today's marine scientists are like all the men and women who have gone before: *We want to know about the ocean*. We eagerly search our mailboxes and e-mail the latest research news, watch television listings for any new ocean shows, inspect new samples with the enthusiasm of little kids, and share our insights with anyone at the drop of a hat. Those of us who enjoy an oceanographic background look at the Earth with greater understanding than we did before we began. The whole concept of an ocean world appeals to us, gives us profound pleasure, and sobers us with a deep sense of responsibility. These traits can help make us effective teachers.

Does understanding and enthusiasm guarantee the ability to transmit that understanding (and the excitement of knowing about it) in a lecture hall or laboratory setting? Not at first. Like any other skill, success in teaching comes about from observation and practice. Don't be afraid to request course outlines from professors at other institutions, or sit in on lectures by colleagues, or ask a textbook publisher for help. Again—remember back to your own beginnings, and see what can be done to stimulate your students as you were stimulated.

In a future column I'll list a few specific ideas that may be of interest to the beginning general instructor. For now, remember that lifelong learning is the truest joy, a pleasure that does not diminish with age, a source of wisdom and calm. Our students can learn much about patience, hope, and optimism from the ocean. We can learn much about the world—and about ourselves—by looking for the oceanic connections among things. There is much good in the world. Go and add to it. ☑

²National Geographic Society—Roper Organization Global Literacy Survey, 2002.