Oceanographers are Talented—Eventually

BY SIMON BOXALL

In a climate where criticism is leveled at the quality of students coming out of schools and universities across the world, I'd like to stand up for the oceanography graduate—I think they are among the best. At Southampton, I lecture from first through to fourth (final) year and see the output we produce, and in the main, it is pretty good. Yes, we all get the occasional student who would serve oceanography well as the anchorman for a deep-sea mooring, but compared to other science students, the average oceanographer often excels—I know, as my classes often include students from other disciplines.

In the last edition of *Oceanography*, Tom Garrison despaired of the critical-thinking skills of students coming through the system, and I would reluctantly agree with him. Ask a group of our first-year students to define the units of density, and I will guarantee that half won't know, and that several will propose a value for water of 1 kg/m^3. The first answer is pure ignorance, and the second lacks any critical reasoning at all. At that stage, getting students to contemplate interconnections of Arctic ice melt and the Atlantic conveyer system just doesn't bear thinking about.

If the issue is ignorance, then it is down to us as educators to inform—Tom pointed out in an earlier article (March 2005) that the simple things that are intuitive to us are not to a freshman, even something as basic as density. But, we do need to inform in a way that also develops critical-thinking skills in our future oceanographers. The fact that half our students did not get the density concept implies that when they were taught about it at school (and I assume they were), it was done so in an abstract way. At a recent meeting on education at the Royal Society in London, a senior physics teacher stood up and argued that (1) physics is hard, (2) students should be given all of the facts and equations before they can apply any science, and (3) anything else is just "edutainment." Fortunately, today that type of educator is more likely to be found in the paleontology laboratory than the classroom (as a specimen, not a scientist, I hasten to add, before Prof. Angry of Paleoceanography writes in).

So, what changes occur between the first and final year to transform our charges to budding oceanographers and marine biologists? I would argue that it is a legacy of the subject: good staff-to-student ratios (not the returns to faculty but rather the actual quality time students get with staff at all levels) as well as our own enthusiasm for a fantastic subject and our sense that it is a privilege to be working in it. In the June 2005 issue, my predecessor in these pages, Matthias Tomczak, tackled the issues of teaching large versus small classes and how in the modern world we are being driven to bigger classes and more remote learning. In my undergraduate days at Liverpool in the United Kingdom, we had a small group of oceanography students—four. Forget staff-to-student ratios of 10:1 or 20:1, we had 1:1 at faculty level. This individual attention was fantastic and would be the envy of my current classes, where I have up to 200 in a lecture. Yes, we now make more use of remote learning. Yes, we make better use of technology and of learning psychology. And, no, I don't know the name of every student sitting in front of me.

So, what is different about oceanography versus other subject areas? Over time, we develop a relationship with our students. This rapport occurs through fieldwork, in carrying out research projects, and with everyday contact. Most of us still have an almost childlike enthusiasm for our subject, which is infectious. The fact that students are opting

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Figure 1. Students doing basic sea-survival training—useful, should they turn up late for a practical.

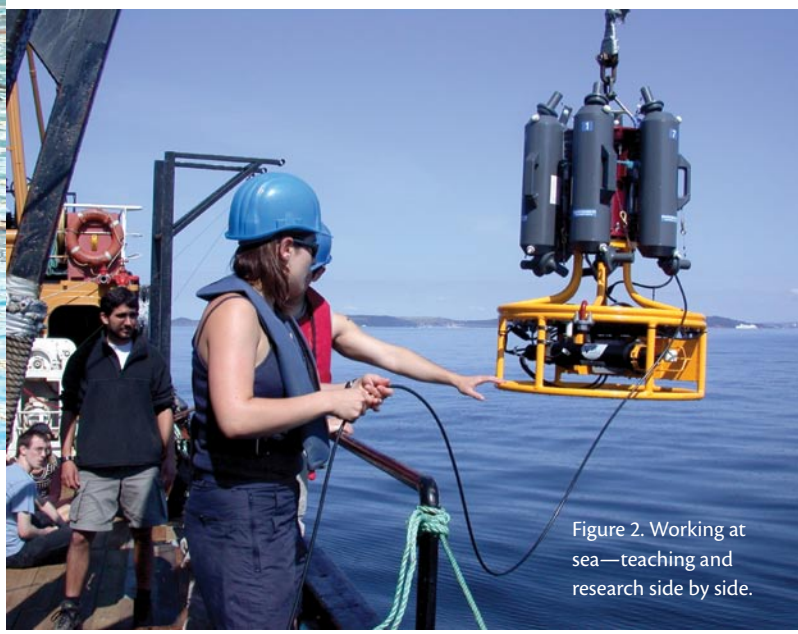
Figure 2. Working at sea—teaching and research side by side.

for an unusual subject makes them more receptive to exciting, new ideas and to developing their critical thinking. Other subjects undertake fieldwork, often with low staff-to-student ratios, while our general field course at Southampton has 100 students and 30 staff for two weeks. But we work 24/7 with the students in what are often hostile offshore conditions. Ask our graduates at what point they started to understand and enjoy their subject, and they will say, without fail, during the field course at the end of their second year—the point at which we could at last provide intensive input.

For a number of years, I coordinated student exchange with other countries for my department, and there is an interesting pattern. Initially, we had students from single-subject science departments from Germany, the United States, and France, and they all commented on the approachability of UK staff and how different the learning experience was. At this point, my national pride was inflated. But in successive years, we have had students from *oceanography* departments in these same countries, and they saw little difference—so it was not UK universities, it was our profession.

This arm waving is all very good, but this is a scientific publication—how about some hard scientific evidence? Further proof that it is the subject that makes the difference is evident in a course I teach at final level to a cross section of students at the university. It involves students developing their communication and understanding skills by working in local schools, taking science to the 10- to 18-year-olds in their classrooms. (More of that in the future—I don't want to blow both ideas for an article in one hit.) I had an uphill struggle to persuade schools initially that an oceanography student was as capable of working in a chemistry class, say, as was a chemist or a biologist. After the first year of running the unit, I was inundated with requests for more oceanographers. The teachers commented that they had a better understanding of all of the science disciplines, could interrelate subjects, could communicate, were more reliable (they learn in the first year that turning up for an oceanography practical five minutes late is not an option unless they can walk on water), and, get this, showed evidence of critical-thinking skills. The results showed in the schools' results—those with oceanographers saw more than a 25% increase in pass rates when their pupils took public exams.

So, in contempt of the statement that students are not what they used to be—they are very much so in our world. It is our subject, the people already in our subject (researchers and professors alike), and the personal nature of our subject that makes it so. That it is a hands-on subject and that many areas are still undefined make it all the more conducive to critical thinking. I hate to use the old aphorism "tell me and I forget, show me and I remember, let me do and I understand," but in oceanography we let them do—often with less than 100% success, but they come out at the end with the seeds of understanding—planted by us, the rather gnarled old oak trees.