

# Getting More Out of The Classroom

**H**ow should universities teach science, and what should undergraduates know when they leave? These questions loom large for the tens of millions of students around the world and their governments, which expect this talent pool to be sufficiently techno-savvy to propel their 21st century economies.

Although students enter the scientific pipeline at a young age, it's not until college that science majors wrestle with whether they have the right stuff. That's the point at which an encouraging word from a mentor, or the harsh judgment of a martinet, can make or break a career. For nonscience majors, an undergraduate course can lead to a lifelong interest or the fervent hope to avoid the subject forever upon graduation.

This special issue explores global trends in undergraduate science education. It's a vast topic, but one with some common themes—among them improving the introductory course (p. 1608), increasing diversity in the student population (p. 1611), and involving more students in research (p. 1614). In Europe, there is a movement to boost transferability of credits, programs, and degrees among dozens of independent national systems (p. 1613). And China's elite universities are testing the value of liberal arts training as part of a broader review of undergraduate education (p. 1615). Universities are also seeking better ways to mentor students at all levels (p. 1624).

Then there's the Internet. Ironically, a technology created largely to serve a global scientific community seems to be having a tough time making inroads into traditional education-delivery systems (p. 1617). The successful science curriculum of the United Kingdom's Open University, now in its fourth decade (p. 1621), must be contrasted with the almost complete absence of science and engineering courses from distance-learning universities in Asia (p. 1623).

To be sure, the slow growth of online scientific instruction may be due in part to the intrinsic conservatism of higher education. But the high cost of providing first-rate online training, from modern laboratories and facilities to knowledgeable instructors and mentors, is another formidable hurdle. The dreams of entrepreneurs to make a profit, and of philanthropists to put the world's greatest minds within reach of the entire populace, have so far proven equally hard to realize. Instead, the preferred approach appears to be broadening the horizons of those already enrolled in residential, degree-granting

programs. This special issue also offers a first-person account of studying science online (p. 1619).

However the reforms unfold, the responsibility for carrying them out will fall to the people at those institutions. Norman Fortenberry, head of the division for undergraduate education at the National Science Foundation, puts it bluntly: "The key lever for change is the faculty. They have to see a benefit."

Additional material on the undergraduate experience, including an interactive forum, can be found on *Science's* Next Wave ([nextwave.sciencemag.org](http://nextwave.sciencemag.org)). We are particularly interested in hearing about what's happening at your institution. After all, your actions will shape the future of undergraduate science education.

—JEFFREY MERVIS

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