Science Teaching Roundup

HIGHER EDUCATION, NOT ONLY IN THE UNITED STATES BUT IN MANY OTHER NATIONS as well, has come in for recent criticism about the way it prepares undergraduate students for Life Afterward. For our readers, there’s a two-way concern about science education. First, we are losing too many from the cohort of exceptionally able people who might go on to do graduate work and forge distinguished research careers. The second concern is about how well we instill in the others enough curiosity and basic understanding to qualify them as useful citizens of the modern world.

For the past year and a half, Science and our collaborators at the Howard Hughes Medical Institute (HHMI) have been giving some attention to programs and experiments in (mostly) undergraduate education, in a monthly Education Forum. In an announcement on this page (Science, 16 December 2005, p. 1741), HHMI President Tom Cech and I asked, rhetorically, why we couldn’t do more for Kate, a mythic high school graduate who was excited about science in her high school but lost interest after the first overcrowded university lecture course in science. Of course, we hope that the Education Forum initiative, as it continues, will sow some seeds productive enough to keep the next generation of Kates engaged and excited.

Now, for the second time in a month, the News section of Science focuses on teaching and how to do it better. In the 1 June 2007 issue (p. 1270), Science’s News Focus described how three U.S. universities have taken special steps to do something for their best science-oriented undergraduates. Their purpose is not, as one might expect, to turn them into pre-Ph.D. researchers. Instead, Brigham Young University, the University of Texas, and the University of Colorado aim to make these students better prospects to fill the notoriously small pool of good high-school science teachers in the United States. A depressing joke, told in more than one state, goes: “What’s the first name of our average high-school physics teacher?” The answer is “Coach.” These institutions hope to change that.

In this week’s issue, we go abroad to probe the situation internationally (p. 63): A stunningly imaginative teacher in Brazil who doubles as director of a science center; an 82-year-old woman in Beijing who has taught for six decades and survived the Cultural Revolution is developing course materials for a bilingual physics course—in text and CD-ROM—that will fill a gap to train engineers and physicists; an American woman who teaches Earth Science at the University of Akron, an urban comprehensive institution, where she knows she can make a difference. Every story has some encouragement about ways in which the quality of science education can be raised.

In the United States, there is a shrinking pool of potential science graduate students, so we need to look at the pool’s input to see what happens in different kinds of institutions. Here’s a look at colleges and universities of similar cost and selectivity, from a study begun at HHMI. For the decade 1986 through 1995, baccalaureate-only colleges were compared with research universities by measuring bachelor’s degrees awarded in the previous decade with the number of Ph.D.’s produced later. Four of the top five institutions in proportional rank were liberal arts colleges. The top two, Reed and Swarthmore, nearly doubled the productivity of Harvard and Yale. Even the absolute numbers contain some surprises: Carleton graduates over this period earned more Ph.D.’s in chemistry than did those of Harvard, Yale, Stanford, or Princeton.

Had the research universities done as well as the liberal arts colleges, it would enlarge that pool of high-level scientists about which we worry so much. Why don’t they? Maybe it’s the intimacy of the college setting. An unpleasant possibility, though, is that undergraduates in research universities, following the exhortation to get into a lab and do “real research,” sense the anxiety of graduate students and hear job-market horror stories from postdocs. Or they may observe the increasingly pressured work schedules of their faculty mentors, and the narrowed scope left for family life, and conclude that law or business school look like better alternatives. We better ask them.

– Donald Kennedy

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