

UNDERGRADUATE SCIENCE

Weed-Out Courses Hamper Diversity

cess from the current average of 350 days to 250, simplifying reimbursement for indirect costs, and using just two reimbursement rates for work done, for research and close-to-market development.

The commission's proposal marks the beginning of the lengthy debate that will by 2013 decide the shape and size of Horizon 2020. The commission has had its plans curtailed before, during better financial times: In 2005, it requested €73 billion for FP7 but ended up with about €50 billion.

Geoghegan-Quinn urges the scientific community to rally behind Horizon 2020. "Researchers and scientists are not by nature lobbyists," she says, but they should push to protect the commission's proposed budget. Smits is confident there is a convincing case for such a funding increase. "Our proposal is solid, based on consultation—it makes sense. We'll make the case and they have to make the decision."

—SARA REARDON

With reporting by Daniel Clery.

ing: It was severely hit by the financial crisis. But we're going in the right direction with the equity finance measures in Horizon 2020.

Q: As well as the launch of Horizon 2020 last week, the Council of Ministers and the European Parliament finally struck a deal on the €1.3 billion needed for the international ITER fusion project in 2012–13 (see p. 1328). A happy result?

R.J.S: I'm extremely relieved. This has been a headache for me ever since I started this job. This money is essential and would have had serious consequences for ITER and JET [the Joint European Torus] if it hadn't been found. It would be the end of fusion research in Europe and would mean the closure of JET. I admire their courageous decision in finding this money. Fusion is the sort of energy we cannot afford not to explore. We have to do this.

Q: Post-2013, however, the commission has recommended that ITER, along with the GMES environmental monitoring program, be directly funded by E.U. member states, not the general E.U. budget. Why?

R.J.S: We've learned the lesson that such large-scale projects, with their cost overruns, cannot be put in the regular budget. As soon as there is trouble, it threatens other programs. They need special treatment, to be ring-fenced, to have a dedicated budget line.

The time-honored practice of using introductory courses to weed out students seeking degrees in science and engineering hinders efforts to attract more women and minorities into those fields, say the chairs of science departments at U.S. universities. But the professors see no need to change their approach to teaching.

That contradiction appears in a survey by the Bayer Foundation, the 15th in its annual series on science education. More than 400 chairs from the top-200 research universities and from minority-serving institutions responded to a series of questions on their attitudes toward underrepresented minorities (African-Americans, Hispanics, and Native Americans) and women. It's a follow-up to last year's survey asking those students about the obstacles they face in pursuing STEM (science, technology, engineering, and mathematics) degrees.

The new survey (bayerus.com) found that 84% of the science chairs say broadening participation in STEM fields is important to their institution. And a plurality—46%—believe that weed-out courses "are generally harmful [to diversity] because they may drive significant numbers of potentially successful students away from STEM majors," compared with 29% who believe that the process is an efficient way to identify future scientists. Still, 57% of the chairs "see no need to significantly change their introductory courses to retain more STEM students, including women and minorities."

"This survey is eye-opening to us," says the foundation's executive director, Rebecca Lucore. "We were shocked last year when many of the students said that [college] was where they were discouraged from going on in science."

Although faculty members want their students to succeed, "many haven't found successful approaches," says Freeman Hrabowski, president of the University of Maryland, Baltimore County, and chair of a National Academies' panel that issued a report last year emphasizing the importance of a diverse STEM workforce (*Science*, 15 October 2010, p. 306). "They assume the students who fall short are simply not well-prepared."

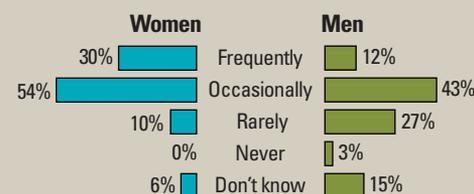
Hrabowski says that is true in some cases, but he thinks a bigger problem is the way the

courses are taught. There's a growing literature indicating that student collaborations, interactive technology, and hands-on learning are more effective in reaching students than are the traditional lecture and by-the-numbers lab sessions. But Hrabowski says many faculty members don't have the time, resources, or institutional support to try anything new.

Some faculty members also assume erroneously that they must lower the bar in order to have more students succeed. Their con-

Discouraging Words

Do you believe inappropriate discouragement of women and minorities still occurs?



Two perspectives. Most women chairs reported that women and minority students face roadblocks on their way to a STEM degree.

cerns about rigor "are based on the notion of a bell curve" that requires a significant percentage of their students to fail, says John Pratte, a survey respondent and chair of the physics and chemistry departments at Arkansas State University, Jonesboro, which has more than tripled the number of majors—a majority of whom are women—since revamping its introductory courses. If you think you can't reach more students, he says, "you're selling yourself and your discipline short."

Attracting and retaining underrepresented minorities also requires having a critical mass. A program funded by Bayer at Duquesne University, a private Catholic school in Pittsburgh, Pennsylvania, has struggled to fill the four slots in each class with qualified women and underrepresented minorities, admits David Seybert, a professor of chemistry and dean of the Bayer School of Natural & Environmental Sciences. But the 10 students in the first three classes "have formed a tight community," he says. And he believes that the combination of additional tutoring, faculty mentorship, summer research experiences, and internships at Bayer's Pittsburgh materials research center will prove to be a winning formula for producing a more diverse STEM workforce.

—JEFFREY MERVIS