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# Creating a Community of Educators to Improve Undergraduate Biology Student Learning

SUSAN MUSANTE

**Biology faculty at research institutions** belong to a community of scientists. They communicate regularly with others in their discipline, sharing research problems, methods, and conclusions. But what happens when they have a teaching problem? Where do they turn when a new teaching strategy fails, when they encounter student resistance, or when they want to find a better way to measure student understanding?

Twenty teams of faculty from across the country came together last summer to participate in the week-long National Academies Summer Institute on Undergraduate Education in Biology (*www.academiessummerinstitute.org*), organized by a committee of the National Research Council, sponsored by the Howard Hughes Medical Institute (HHMI), and hosted by the University of Wisconsin–Madison. The purpose of the Summer Institute was to give faculty, trained as scientists, the opportunity to learn how to approach their teaching scientifically and apply the latest techniques in undergraduate biology education reform efforts.

Throughout the intense week, they shared teaching challenges, discussed learning objectives and explored ways to meet them, and developed strategies for measuring outcomes. In small working groups, they incorporated what they had learned into teaching units designed to address critical concepts in introductory biology, foster critical thinking skills, and assess student comprehension in innovative ways. As the Summer Institute's Web site puts it, the purpose of the units is to "encourage students to learn—as scientists do—through active problem solving and discussion." At the end of the week, faculty participants agreed to test the units in the ensuing academic year.

**National Academies Summer Institute on Undergraduate Education in Biology**

The next National Academies Summer Institute on Undergraduate Education in Biology will be held 31 July through 5 August 2005 at the University of Wisconsin–Madison; see *www.academiessummerinstitute.org.*

In early 2005, the Summer Institute teams reconvened to relate their experiences with the new units. Almost all of the faculty who taught in the fall 2004 term had already changed their teaching as a direct result of their participation in the Summer Institute. "Though we don't yet have quantitative data to show the impact on student understanding, the behavioral change revealed in the reports is certainly evidence of the Institute's success," reports Jo Handelsman, codirector of the 2004 institute and HHMI professor in the department of plant pathology at the University of Wisconsin–Madison.

"The institute completely changed my approach to teaching and assessing student learning," says Ingrid C. ("Indy") Burke, professor in the department of natural resources at Colorado State University in Fort Collins. The experience allowed Burke to see firsthand the value of peer learning and inspired her to try new approaches. As a result, Burke says she now truly designs learning experiences for her students rather than lecturing at them.

The opportunity to interact and work with one another was a key factor in the participants' willingness and ability to diverge from familiar lecture-based teaching toward a student-centered, active classroom. Diane O'Dowd, biology professor at the University of California at Irvine, admits that she would not have implemented the new techniques had it not been for the face-to-face format. "I had been exposed to many of the teaching practices discussed prior to the Institute," says O'Dowd, "but was only convinced that these could be effectively employed in a large classroom after talking with many different faculty who had experience at this level." Mike Hanna, associate professor at Rensselaer Polytechnic Institute, agrees that "nothing replaces sitting, eating, and working with individuals committed to the same goal."

In addition to the successes reported at the follow-up meeting, faculty also revealed that they had faced challenges when they introduced the new learning approach. "Taking a group of sophomores, juniors, and seniors and telling them that there's a better way to learn and you need to work in groups is just plain risky," states Burke. Teaching students who are resistant to new approaches was not easy, and support from Summer Institute colleagues proved to be invaluable. Burke reports: "I have a whole community of individuals that I can call up or e-mail to ask for help or personal support when students are a bit resistant."

Handelsman was "pleased and awed" by the group power witnessed during the follow-up meeting, she said. "We wanted the faculty to build connections through intellectual engagement so that they could turn to each other for support for the rest of their teaching careers." Indeed, those who attended the Summer Institute are now part of a community of educators, and they are well equipped to continue their scientific teaching experiments, thus transforming the way students learn biology.

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