Experiment Seeks to Create Interdisciplinary Curricula

Most people associate experiments in science with test tubes and beakers. However, HHMI is trying a new type of science experiment—one that involves education. The Institute has brought together an expert in student evaluation with faculty members from four universities with one goal in mind: to create interdisciplinary science courses easily implemented in any undergraduate classroom.

The four-year, $1.8 million National Experiment in Undergraduate Science Education, or NEXUS, involves Purdue University, the University of Maryland, Baltimore County; the University of Maryland, College Park; and the University of Miami. Each is focusing on a specific topic, with the aim of creating undergraduate educational modules that integrate biology with physics, math, and chemistry (see box). The teams are piloting launching their modules this fall and hope to have them ready to share with other institutions in a few years.

“We really believe in the word ‘experiment,’ and here is an experiment that is being run on a larger scale than one discipline or one institution,” says Sean B. Carroll, HHMI’s vice president for science education.

The four schools are working together to ensure that the modules meet common goals and that the courses are designed and measured in a unified way. They are developing assessments that move beyond just testing students on factual knowledge to assess their ability to demonstrate scientific competencies and apply their knowledge to complex problems.

HHMI has hired David Hanauer, an evaluation specialist at Indiana University of Pennsylvania, to help coordinate the teams’ assessment work and develop their capacity to tackle competency-based assessment approaches. This past summer, Hanauer led a two-day workshop, with representatives from the four institutions in attendance, to discuss strategy for assessment development.

The Institute has appointed a steering committee and an interdisciplinary advisory board of leaders in education reform. In the coming months, many steering committee members will present the NEXUS project at various educational conferences to expand its visibility and to solicit feedback.

“There are many conversations heading in the same direction, addressing how young people should be trained to participate in biomedical and medical practice in the future,” says Cynthia Bauerle, who oversees the NEXUS project and is a senior program officer in HHMI’s precollege and undergraduate program. “The hope is that NEXUS will be a hub for that broader national conversation.”

HHMI Offers International Student Research Fellowships

When Amanda Valeta came to the United States, she had trouble finding financial support for graduate school. “There are very limited sources of funding for non-U.S. citizens to train in the United States,” says the Zimbabwe native. “This greatly limits the ability of foreign students like myself to bring back the education and expertise that are needed to address the complex health problems facing our native countries.”

To encourage universities to take a chance on the best international graduate students, HHMI established a fellowship program to support science and engineering students during their third, fourth, and fifth years of graduate school.

Recently, the Institute selected Valeta and 47 other graduate students from 22 countries to be the inaugural recipients of the $43,000 a year International Student Research Fellowships. The support will allow them to devote their full attention to research at a critical time during their professional development.

“For my research project on cancer and the immune system, I need to carry out some very expensive studies,” says Valeta, a graduate student at the New York University School of Medicine. Now, with her salary covered by the HHMI fellowship, she has more money for those experiments.

HHMI originally planned to give 35 fellowships in this pilot year but increased the number to 48 because the quality of the applicants was so high. “The applicant pool was spectacular,” says Sean B. Carroll, HHMI’s vice president for science education. “We hope, through these fellowships, to identify future scientific leaders.”

Sixty research institutions with established relationships with HHMI were eligible to nominate between one and 10 graduate students for the fellowships, depending on the size of their graduate programs. A panel of top scientists and graduate educators reviewed applications from 385 students.

Institute leaders were particularly pleased with the broad distribution of countries represented by the awardees. Students from China and Canada received the most awards, but Turkey, Israel, Slovenia, and Colombia also are represented. The new fellows come from a wide variety of disciplines, including physics, chemistry, and engineering, in addition to the biomedical fields that HHMI has traditionally supported.

HHMI has committed to continue funding the program; planning for next year’s competition is already under way.

The Nexus Team

Purdue University is revising its introductory chemistry curriculum to include more biological chemistry, with a focus on active learning approaches.

The University of Maryland, Baltimore County, is infusing mathematical modeling into its introductory biology course, including quantitative reasoning skills and mathematical approaches to understand biological processes and living systems.

The University of Maryland, College Park, is revising its introductory physics course for biology majors to present physics concepts in a biological context.

The University of Miami is developing biomedical case studies that will challenge students to use scientific inquiry to analyze the biology, physics, chemistry, and math involved in human health and disease.

Learn more about this initiative at www.hhmi.org/news/nexus20110608.html.