

## Chronicle / *Science Education*

### From Insight to Action

*PULSE, a national network of science education leaders, is helping transform college-level science teaching and student learning.*

SOMETIMES THE BEST way to solve big, national problems is to start by talking to your neighbor just down the road. Take Jenny McFarland, for example, a biology faculty member at Edmonds Community College in Lynnwood, Washington. Many of her science students continue their studies at nearby four-year universities and colleges – but seldom do faculty members from the various schools interact with each other. Yet if professors don't coordinate their teaching of key concepts, like the structure of cells or the growth of organisms, that can hurt students who transfer.

Recently, McFarland joined faculty teams from 14 schools in the Northwest for a three-day workshop to think about how the institutions could learn from one another for the benefit of their students. “We wanted to look at our region as a system,” says McFarland. “How could we work together? What resources could we draw from each other?” For some institutions – even those just

a few miles apart – it was the first time their faculty members had talked to one another.

The workshop was part of a regional initiative conducted by the Partnership for Undergraduate Life Sciences Education (PULSE), a group formed after the 2011 publication of a report titled *Vision and Change in Undergraduate Biology Education: A Call to Action*. Produced by the American Association for the Advancement of Science, with support from the National Science Foundation (NSF), the report offered a number of recommendations to make higher-education science teaching more effective – including giving students more research experiences, urging faculty members to move beyond the traditional lecture format, and catalyzing departmental-level change. To help turn these ideas into concrete actions, officials at HHMI, the NSF, and the National Institute of General Medical Sciences worked together to found PULSE.

“We wanted to make sure that this report didn't just gather dust on everybody's shelves,” says HHMI's Cynthia Bauerle, assistant director of undergraduate and graduate programs (and a coauthor of *Vision and Change*).

The effort got under way in 2012 with the appointment of 40 PULSE Fellows; one of them was McFarland, and all were mid-career or senior life science faculty members at schools ranging from community colleges to large research universities. Since then, PULSE has made significant progress in identifying, measuring, and supporting schools' efforts to implement Vision and Change principles for exceptional life sciences education.

One of the group's first projects was developing robust regional networks. These networks focus on area-specific interests and opportunities. For example, in the Southeast, teams of campus leaders from community colleges, small private colleges, research institutions, and historically black colleges met last summer to discuss strategies that could help underrepresented minorities persevere and succeed in the sciences. Up until that meeting, interaction between the region's historically black colleges and predominantly white institutions had been relatively rare, says Bauerle.

A second key initiative is a program to recognize institutions that have done

exceptional work implementing Vision and Change recommendations. This process digs deep into schools' curricula and approaches: Are concepts such as evolution taught explicitly and implicitly throughout the curriculum? Are more than half of science students able to take advantage of mentored research opportunities? Are classrooms small and designed for real interaction between students and faculty members, as opposed to cavernous, theater-style lecture halls?

Group members recently completed a successful pilot study with eight schools to see if the criteria they'd developed accurately measured whether schools were achieving Vision and Change goals. The results, which will be shared on the PULSE website later this spring, were promising, says Kathy Miller, a PULSE Fellow and chair of the biology department at Washington University in St. Louis. The group will likely assess more schools in the near future, she adds.

The recognition program will both commend top-performing schools and help all schools understand smart next steps, says McFarland. “If people are assessing their departments with these rubrics, and they want to see ways that they can improve, they have a roadmap,” she says. People trying to make a case for investment in teaching, she continues, “aren't just saying, ‘I have an idea that I want to try in the classroom.’ They're making the case with rubrics that have been standardized, vetted, and validated.”

A third major initiative is the creation of Vision and Change Ambassadors – teams of

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—CYNTHIA BAUERLE



faculty trained to guide conversations about reform at other institutions. “The ambassadors meet faculty members on their own turf and try to kick-start departmental change,” explains McFarland, “whether that’s to get things started, help them change directions, or guide them in some way.”

As these various initiatives within PULSE take shape, a growing online community – now numbering some 1,500 members, at [pulsecommunity.org](http://pulsecommunity.org) – is actively sharing its successes, challenges, and teaching practices. It’s proving that a strong vision still allows for

varied, effective teaching approaches, says Jim Collins, an ecologist and evolutionary biologist at Arizona State University. “I’m seeing a lot of diversity in the way that individuals are moving away from the ‘sage on the stage’ model,” he says. “They might use clicker [technology] to gather information, they might try flipping the classroom with video-based lectures that students watch on their own time, they may work with smaller groups. There’s so much richness, and that’s great.”

As the members of PULSE look ahead, they hope to continue to foster close

connections among institutions, to scale up the recognition program, and to provide increased support to institutions and individuals who want to implement Vision and Change principles in their classrooms and departments, says Chuck Sullivan, a program director for the NSF’s Division of Biological Infrastructure. “PULSE is expanding its circle of influence, like the concentric rings you see after a stone is thrown in a pond,” he says. “More people are getting involved and reforming their courses. And that’s what we hoped would happen.” – Erin Peterson