

# High Stakes, High Attrition: The STEM Civic Shortfall

ADAM, MY YOUNGEST, has now finished college, but readers of *Liberal Education* can be sure that, while there, he was frequently quizzed about every one of AAC&U's high-priority topics—including the subject of this issue, college-level learning in science.

"Why do you suppose your college made you take two semesters of science as part of your graduation requirements?" I asked Adam one day over dinner.

"Well," he said, all too used to this odd line of conversation, and kindly giving the question a moment's thought, "I think they wanted me to try it one more time before I finally decided against it."

"Well, possibly," I parried, "but I think there was more to it than that. Most colleges, and

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certainly yours, also think that, whatever you major in, you need some level of sci-

entific literacy as a citizen—the knowledge and judgment to evaluate policy choices where scientific analysis is part of the question."

Adam was polite but firm. "I don't think that can possibly be the case," he said. "At least, that's not the way they taught it."

When AAC&U commissioned student focus groups on college learning as part of our LEAP initiative, it turned out that Adam was perfectly in tune with the views of his peers—though they were far less tolerant of faculty requirements than he has learned to be. The focus group participants were given a forced-choice exercise in which each was asked to circle his or her top personal priorities for college learning from a list of options, and also to circle the least important personal priorities. In the final two focus groups, informed by faculty discussion of the results from earlier groups, we added "expanded understanding of science" to the list of possible college outcomes. And in both groups—one of high school seniors, and one of college juniors—students unhesitatingly identified "expanded understanding of science" as their least important goal for college learning.

"Why rank science so low?" the focus group leader pressed the students, after the results were tallied.

"We already took science in high school," the students responded with considerable indignation. "We've already decided against it. So why do they make us take it again? What a waste!"

As I read these findings, I thought again about Adam's observation that a citizen's understanding of science was surely not the goal of his science courses. "At least that's not the way they taught it." I also thought about the mounting national concern that Americans are losing ground when it comes to comparative international achievement in science, technology, engineering, and mathematics, the so-called STEM fields.

“Our platform is burning,” one business leader on the LEAP National Leadership Council has said repeatedly, referring to STEM literacy. Employers generally agree. In AAC&U’s 2006 LEAP employer survey, 82 percent recommended that colleges and universities place more emphasis on science and technology learning. In marked contrast to the students, the employers in this national survey ranked science and technology as the most important goal for improved college-level achievement. (The complete survey, and a second employer study conducted in 2007, can be found online at [www.aacu.org/leap](http://www.aacu.org/leap).)

As careful readers may already be thinking, two different agendas need to be sorted out in the national debate about STEM learning. The first concerns how to encourage many more students to choose STEM majors and, eventually, STEM careers. Employers do want to see a dramatic increase in the total number of college students who major in STEM fields. The United States ranks very low internationally in the total number of its graduates who do so, and that shortfall certainly puts us at risk as countries with high STEM emphases raise their overall college graduation levels. This ought indeed to be a top policy priority.

The second question, however, concerns how to help every American student, STEM major or not, discover the value and significance of scientific literacy to the lives they hope to lead. A high-priority goal in its own right, emphasizing the societal significance of science may also prove to be a catalyst for reversing the shortfall in STEM majors and career choices.

As citizens, college graduates will face choices that are framed in scientific, technological, and quantitative terms. What we surely need, at both the high school and college levels, is a fresh look at the goals for STEM learning within this civic and global context. If the goal is for students to recognize the importance of scientific inquiry, how should STEM fields be taught in high school? How can systematic scientific investigation and discovery be connected to the larger contexts in which scientific findings actually change lives? How do we help students discover the wonder of science so that the words “waste of time” cannot possibly apply?

That’s not the context in which I learned science (and turned away from it), and apparently it’s not the context in which my son much more recently took a combined five years of science courses in high school and college. But as we work to reverse the STEM shortfall, it is surely the case that we need to help all students grasp that larger civic and global context in which STEM literacy has become essential rather than optional.

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Through two ongoing AAC&U projects, Shared Futures: General Education for Global Learning and The Educated Citizen and Public Health, faculty members are collaborating across disciplines and divisions to find common curricular ground. They’re creating, and often team-teaching, courses on such topics as global climate change, epidemics, food and hunger, and energy and war. These courses do not simply bring in science to bolster arguments about civic issues; rather, they frame “big questions” from social and scientific perspectives simultaneously. And in doing so, they enable students to see the point, as well as the power, of STEM learning.—CAROL GEARY SCHNEIDER