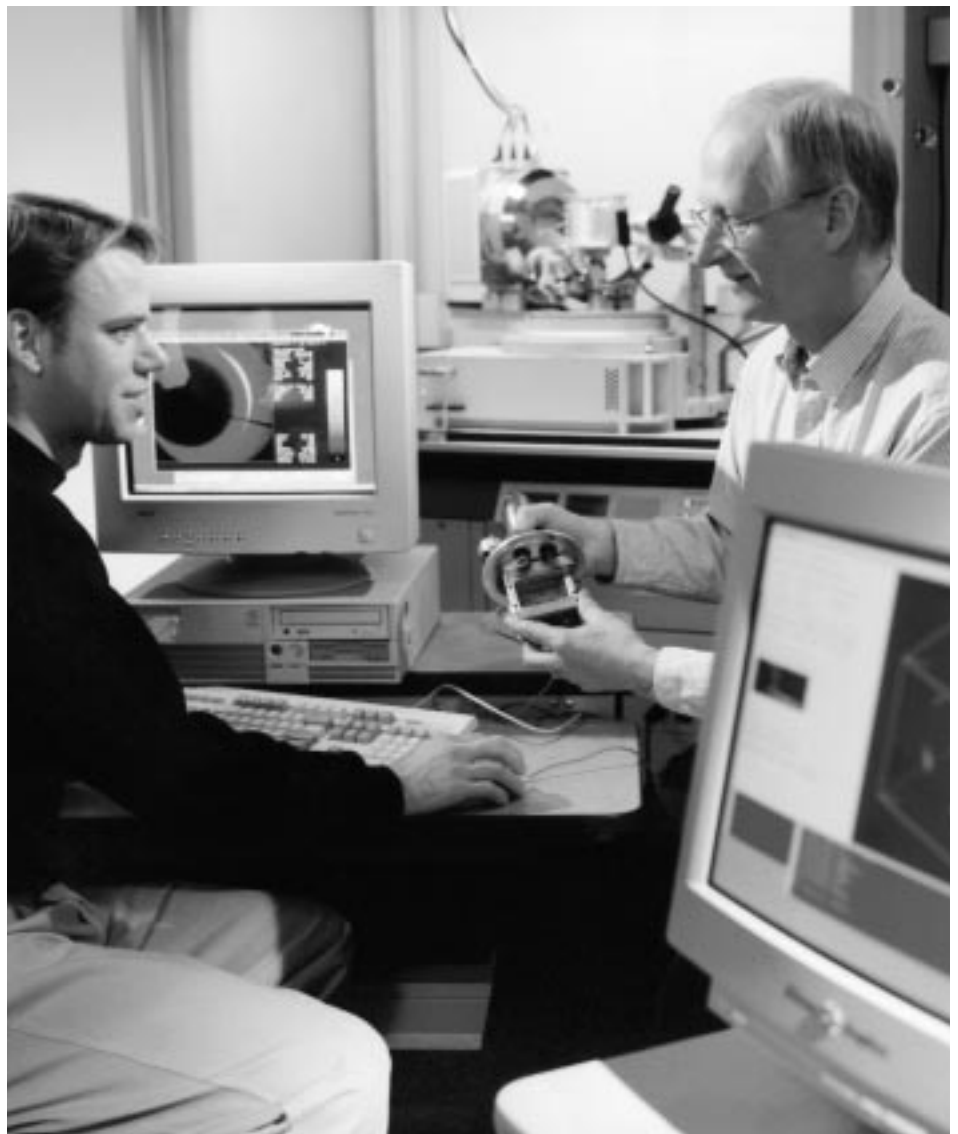


Liberal arts colleges lead the way in changing how we teach and learn science

BY RICHARD WARCH

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The Russian launch of Sputnik in 1957 provided something of a wake-up call in the United States regarding the country's scientific and technological standing. John Foster Dulles was one of many who reacted to the situation, saying that Sputnik provided "a salutary shock jolting Americans out of their complacency" about our presumed supremacy, a shock that prompted major federal investments in science

and technology teaching and research.

In 2001, the nation finds itself once again confronting a dire situation on the science front, though provoked more by internal assessments than external threats. A blue-ribbon panel on national security in the 21st century, chaired by former Senators Warren Rudman and Gary Hart, warned in February that if the United States does not halt and reverse the present downward spiral in science and math education and student performance, it

will be unable to maintain its position of global leadership.

Former astronaut and Senator John Glenn, who chairs another group, the National Commission on Mathematics and Science Teaching for the 21st Century, raised similar alarms in a recent speech at Harvard University. Glenn is concerned that there are too few math and science teachers at the K-12 level and that those who do teach the subjects are often unqualified for the job.

Nationally, more than one-quarter of math teachers and 56 percent of science teachers are teaching outside their field of expertise.

These observers, and others, have reached much the same conclusion: that we need to attract more students to the study of mathematics and science and reverse a growing shortage of high-quality teachers in these critical fields. For that objective to succeed, we must ask how well higher education is accomplishing these tasks and what the best practices are for achieving those ends.

While large research universities receive the lion's share of science funding and attention from science reporters, it may surprise many to learn that traditional liberal arts colleges are at the forefront of science education today, leading the way in establishing new approaches to teaching and learning science at the undergraduate level.

Though small in size, on a *per capita* basis these colleges produce nearly twice as many students who go on to earn a Ph.D. in science as other institutions. Liberal arts graduates also

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are disproportionately represented in the leadership of the scientific community. In a recent two-year period, nearly 20 percent of the scientists elected to membership in the prestigious National Academy of Sciences received their undergraduate education at liberal arts colleges.

What accounts for this success? What are liberal arts colleges doing right? In large part, the achievements of these colleges in undergraduate science education and the training of future scientists and science teachers stem from their emphasis on “hands on,” laboratory-rich science at even the most introductory levels. Students learn science by doing science, by

collaborating with their peers and instructors in independent research, not by sitting in large lecture halls and memorizing formulas and facts.

If there is hope for the future of science education in America, it lies in the recognition of the value of inquiry-based learning that prepares students not only to be scientifically literate but also to be better teachers and informed leaders and citizens.

Liberal arts colleges are playing their part and are pointing the way to a better science education for all students. One can only hope that greater recognition of their accomplishments will lead to greater support from the National Science Foundation, investments that surely will bolster and strengthen what the national government expressed as an aim six years ago: for the United States to produce the finest scientists and engineers of the 21st century and to attain a scientifically literate populace. Liberal arts colleges are pulling more than their weight in meeting those objectives. They deserve support for doing so. ◆