

Sowing seeds of reform

By Mae C. Jemison, M.D.

A splendid opportunity exists today for scientists who want to share the excitement and joy of science and, at the same time, profoundly improve the quality of science education: So say U.S. elementary and secondary science teachers.

As a scientist, I've long been aware of the value of scientist-volunteers in the classroom. It seems science teachers concur. In a new survey commissioned by the Bayer Corporation and the National Science Teachers Association, K-12 science teachers say they are looking to scientists to help strengthen science education.

Innovation: In a way, science teachers are on the front line of discovery and innovation. As scientists triumphantly find ways to slow the speed of light, identify planets orbiting distant stars, and produce bioengineered therapies for all manner of diseases, science teachers are preparing students for a world where such discoveries will be implemented. But ironically, as the rate of worldwide scientific advancement increases, U.S. students, particularly at the middle and high school levels, are faltering in science and math. As the recent Third International Math and Science Study (TIMSS) revealed, our 8th and 12th graders fall short in these subjects when compared with students from countries we consider our economic peers.

It's a situation not lost on science teachers. In fact, in "The Bayer Facts of Science Education V: Science Teachers Speak" they called students' poor performance on TIMSS an accurate reflection of how students perform every day in the classroom. Many science teachers went even further out on a limb, risking their own reputations, to say they lack confidence in the quality of science education today and its ability to adequately prepare young people for the future.

Priority: For many Americans, including me, this is unacceptable. People are fond of saying "We put someone on the moon, why can't we teach science?" The answer is we can teach science. We know what works. But we must make reform of science education a priority.

Why is reforming science education so important? Because the old textbook memorization approach isn't working now and never really did. With information and technology advancing exponentially, students must be able to adapt to change. They can do this by learning science experientially through the scientific process of asking questions, experimenting, analyzing, and testing assumptions. In doing so they not only enhance their scientific literacy but develop important



Teachers believe that bringing scientists into the classroom offers substantial benefits to both them and their students.

lifelong skills in critical thinking, problem-solving, and teamwork.

Science teachers agree. They believe the reforms outlined in the National Science Education Standards, which emphasize inquiry-based, hands-on learning, can significantly strengthen science education and student performance. And they were quick to point out that it will take the whole "village" for reforms to be successfully implemented. In fact, three-quarters of teachers "strongly agree" that reform efforts will fail or fall short without the active support not

only of teachers but of administrators, school boards, parents, citizens, business, industry, and, yes, the scientific community.

Scientists have a particularly important role to play in science education reform. Teachers believe that bringing scientists into the classroom offers substantial benefits to both them and their students. It helps students better understand science, piques their interest, acquaints them with scientists as role models, and provides solid information on science as a career.

Role models: All these goals are important, but I feel particularly strongly about the importance of scientists as role models. Popular culture barrages students mainly with images of entertainment and sports figures as career role models. Very few children grow up to become pro athletes or singers, but many will have jobs that demand scientific and technological literacy. In fact, science literacy will affect virtually all citizens, regardless of their career choice. So it's time we give students opportunities to interact with scientists who can help them understand the relevance of science to their lives. Programs that pair scientists with teachers are also important. Teachers say this enhances their teaching, aids curriculum development, bolsters their motivation and enthusiasm, and helps them better understand the content of their subject.

Some scientists say they don't have the time in their busy day to devote to school volunteer efforts, but I think they're wrong. Some of the country's most innovative and successful companies support science education—Pfizer, Hewlett-Packard, Merck, and Bayer among them. And it's not just scientists employed by these companies who want to help strengthen science education. In last year's "Bayer Facts IV" survey, the nation's Ph.D. scientists said they are ready, willing, and able to help in the nation's classrooms, if only they are asked.

So there you have it. The village has spoken. Science teachers want to work with scientists. Scientists want to be involved in the classroom. Now we must take the next step—to help achieve science literacy for all students. Our very future depends on it. ■

Jemison, a professor of environmental studies at Dartmouth College, is a physician, a chemical engineer, America's first African-American woman astronaut, and the founder of an international science camp for teens. This essay is reprinted with permission from the September 13, 1999, issue of The Scientist (© 1999, The Scientist).