

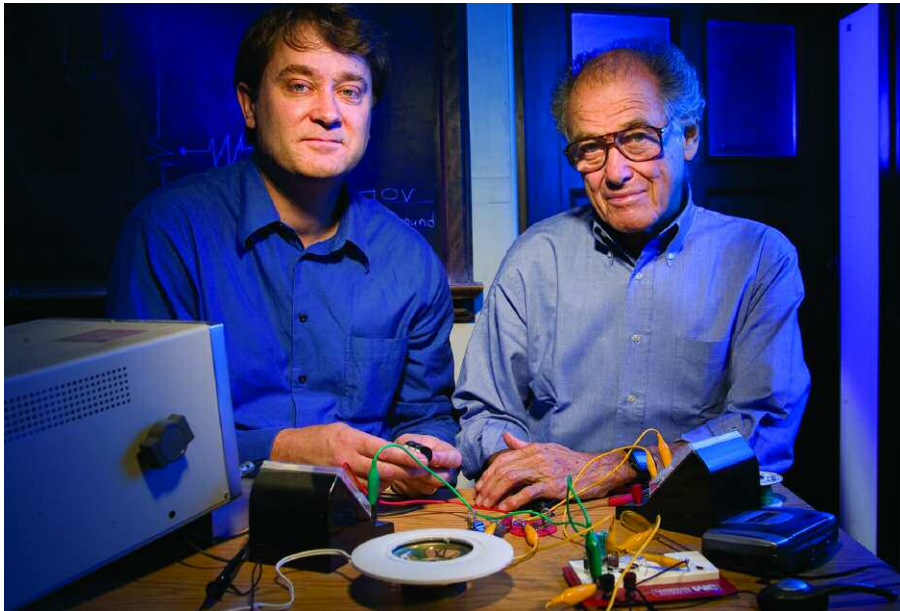
Bringing the Sizzle to Science in the Schools

This innovative program nurtures the natural scientist that's in all students.

A STATELY MANSION ON A TREE-LINED street in Pasadena is the unlikely nerve center of a national effort to transform the way science is taught to America's youngsters. While the once-grand house at the edge of the California Institute of Technology campus has seen better days, there's nothing dated about the program it houses. The Caltech Pre-college Science Initiative (CAPSI) aims to make science appealing to all students, not merely to those who plan to pursue science-related careers.

"Every student should have a quality science education—it shouldn't be just for the elite," says Wayne Snyder, project director at CAPSI. "Children are natural scientists. If they are nurtured, they will become scientifically literate citizens. But if science instruction is minimal or consists of being force-fed rote facts, kids get turned off."

Funded in part by grants from HHMI and the National Science Foundation, CAPSI is the brainchild of two Caltech professors, Jerry Pine and Jim Bower. CAPSI builds on Project SEED (Science for Early Educational Development), which Pine and Bower founded after noting with dismay the lack of decent science education programs in Pasadena's elementary schools. Starting in 1984, the pair worked in tandem with teachers and administrators in the



ABOVE_ SCOTT PHELPS, LEFT, A HIGH SCHOOL SCIENCE AND MATH TEACHER, COLLABORATES WITH JERRY PINE, DIRECTOR OF A CALTECH PROGRAM TO IMPROVE SCIENCE EDUCATION IN THE SCHOOLS.

school district to develop an innovative and successful science program for the city's youngest students (see sidebar).

But Pine, Bower, and colleagues noted that when SEED graduates moved on to junior high and high school, there wasn't a corresponding program for them in Pasadena. So they decided to create courses for grades 7 and 8. They expected not to have to reinvent any wheels. "Initially we thought we'd find a good secondary-school program somewhere else and use it as our model," says Snyder. But then, he says, they found that "there were no good programs."

Consequently, they had to start virtually from scratch. It took nearly 9 years to finish a project they originally thought would take 3. But this fall, CAPSI finally unveiled its first four units for secondary schools. The Matter and Forensic Chemistry module allows students to form a mini-CSI (crime-scene investigation) squad and do chemistry experiments to solve their cases. The Human Body Under Attack unit enables students to study bodily processes such as digestion, respiration, and circulation, as well as their delicate interplay. The

Microbia module focuses on the world of microorganisms, and the Forces & Rocketry unit looks at Newton's laws of motion in the real world. Each module gives students 6 to 8 weeks of intensive hands-on science investigations.

Early next year, three more modules should debut, focusing on areas such as vision and hearing, force and motion, and electrical circuits. "The trick is making something advanced enough for eighth graders," says Snyder, "but easy enough so that all levels can succeed."

CAPSI has also developed inquiry-based science courses for in-service and pre-service teacher education, and it has established a nationally known science-education research group (see www.capsi.caltech.edu).

CAPSI staff's concerns aren't merely academic. If the upcoming generation doesn't have an appreciation for or interest in science, they point out, there could be a shortage of scientists and engineers, with serious consequences for the nation's economy.

"Will we be farming out all our science and technology along with manufacturing?" asks Pamela Aschbacher, CAPSI's director of research. "As it stands now, we haven't brought along nearly enough of our own." CAPSI and other programs like it, she and her colleagues believe, may help turn things around. ■

-Linda Marsa-

BACK STORY

SEED, which includes units on biology, physics, and earth science, is an inquiry-based program, meaning that it emphasizes hands-on experimentation as a way of exposing children to the scientific method, and it brought in scientists and engineers from the community as collaborators. By 1994, the pilot program was so successful that all of Pasadena's elementary schools had adopted it; later, 12 other poor and predominantly minority districts throughout the state also adopted the program. The innovative curriculum has since become a widely copied model.