

Boston University College of Engineering Newsletter

The College in the Community

"Me and fractions don't mix," shrugs teenager Andrew Goguen; Pat Phillips wears a T-shirt that reads, "So far, so good ... so what." Ordinarily, it would be a bad bet that either Chelsea High School student will study more math or science. The wide-spread short-circuiting of potential career paths the two represent is troubling to many at the College of Engineering—so troubling that student, faculty and staff participation in community outreach programs is suddenly burgeoning.

The programs, aimed at both high school and grammar school students, seek to spark excitement about science and math. "If we have one thrust," says Associate Professor of Engineering Theo A. de Winter, "it is motivation. We try to motivate these students to see what they can do if they only feel they can, and that [science] is something worth being interested in."

Knowledge in Their Hands

It was to this end that the American Society of Mechanical Engineers (ASME) invited Pat, Andy, and their classmates in Auto Restoration to the College. The restored '69 AMC Javelin they brought to campus with them had recently won first and third prizes at a professional show. "When they got the cars," says their teacher, Thomas Benvie, "There were no fenders, no hoods. Real junk." And on a steamy April day, as the boys ran their hands over the car, all appearance of apathy was shed.

The three ASME hosts, College of Engineering students Tom Nardone, Michael Hill, and Steve Niemi, knew well the obstacles facing the boys—and also that there are ways around the obstacles. "The three of us are from blue collar families ourselves," said Nardone. Hill told the group, "I used to have the knowledge in my hands; now I have it in my head." Nardone agreed: "You'd be surprised how much you already know that most students here don't. Half of them are surprised that wrenches come in different sizes."

Perhaps the biggest hit of the day on campus was lunch, where there was much reveling in the permissibility of returning to the cafeteria line at will. One typical tray held a sloppy joe, macaroni-and-cheese, cake, three doughnuts, and a cruller. "This is amazing," said one young man, "but are there any girls around here?"

Also absorbing to the high school students was the exploration of

the computer-aided-design system. Each visitor took a terminal, received some basic instruction, and then, well, played. Many made geometric designs, several drew cars, and Chem Kovy, a recent immigrant from Cambodia, drew a delicate house on stilts.

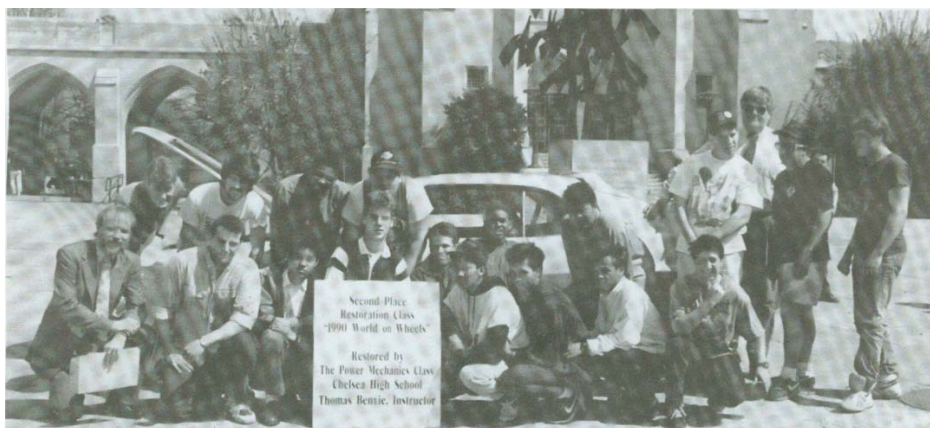
Rice Crispies and Scientific Principles

The Science with a Partner program (SWAP), sponsored by the American Institute of Aerospace and Aeronautic Engineering (AIAA), brings groups of fifth and sixth graders from the inner city to the College, where they experiment with computers, see the wind tunnel and its scale model of Boston, and, most important, view a demonstration of some simple scientific basics by College scientists. "These kids are sadly lacking in role models," says de Winter, who has worked with several of the outreach programs. "This is the kind of prodding and enthusiasm and motivation that most of them don't get at home."

During a SWAP visit last winter, Assistant Professor of Aerospace and Mechanical Engineering Thomas Bifano demonstrated basic scientific concepts, using equipment ranging from a simple robot to a box of Rice Crispies. "It turns out," explains Bifano, "that Rice Crispies are great at absorbing electrical charge. I created a story about a scientist who has a Van de Graaff generator but who knows nothing about electrostatic repulsion forces. This scientist comes down in the morning for breakfast. I poured a bowl of Rice Crispies and pretended I was at breakfast. When the Rice Crispies started absorbing charge, they began to fly away from one another at tremendous speed; they were flying away at ten or fifteen feet a shot. The kids loved it, and they got the idea that many scientific discoveries are accidental. You have to be a keen observer to see what is happening, why it is happening, and then figure it out and come up with new data."

How did Bifano come up with the Rice Crispies idea? "From a graduate student I was with when I was trying to decide what to say. The common experiment is to put your hands on the Van de Graaff generator: your hair stands on end. Well, I'm losing my hair. So when I was preparing for the demonstration and tried it, embarrassingly enough, not much hair stood on end."

In a more somber vein, "I asked them if they remembered the Challenger accident, asked them if they knew what the cause was. None of them remembered. I explained what an O-Ring was, how it was important that it be flexible, and did a demonstration like the one that Dr. [Richard] Feynman did at the congressional hearing. I took an O-Ring and dipped it into liquid nitrogen; Feynman used ice water. When I tried to bend it, it shattered. That's the excitement of science—you can find out things that other people may not be able to.



When the undergraduate American Society of Mechanical Engineers (ASME) invited the members of the Chelsea High School's Auto Restoration class to campus, they brought along the '69 AMC Javelin they had restored.

"Then I opened it up to questions, and got about ten asking me to put this or that thing into the liquid nitrogen. Whatever they asked me to put into the liquid nitrogen, I dutifully did. They said, 'What happens if you put Rice Crispies in there?' So I did that. We had a flower on the desk; I put it in and it broke. Then they wanted me to stick my hand in the liquid nitrogen...they're macabre little kids. But they enjoyed it."

That enjoyment, says de Winter, who performed tabletop experiments for another group of students, is integral to the development of genuine interest. "Many people don't [go into science] because they think it's difficult. But they've got to overcome that and find out that it's interesting. It's interesting, it's exciting, it's within their intellectual and working reach. If you're interested in it, you can do it. If you are confident that it's interesting and that you can do it, you will do it."

Exposure to Society for Future Engineers

Several Outreach Programs are student organized, according to Jean Nemenzik, staff member in charge of Special Services, and the advisor, funding conduit, and general filler-in-of-gaps for the outreach projects, among them the ASME Math Hotline for Brighton Junior High School. "Two or three afternoons a week last year, ASME members took turns manning phones in their office; they had copies of the textbooks from the junior high, and kids could call and ask for help on specific problems. ASME plans to reinstate the project this year.

"Not only that. Whereas last year the AIAA SWAP Program brought the kids in to see the College, this year we'd like our students to be able to go out and meet with the classes. We'll assign engineering students to different elementary school classes where they don't have a science curriculum, or where the teacher doesn't have any science training per se. The student will work with the teacher to put together a science program, and will go once or two or three times a month to work on science projects with the kids."

Community service, says Nemenzik, benefits the students as well as the community "It's of concern to many people in the College—faculty, administration, and students—that engineers have not traditionally been enough in tune with the society they are designing for. What a lot of the students are going to be doing is inventing things, implementing projects that will have significant impact on society; but beyond the basic social/ humanistic classes that they have to take, they don't get a lot of exposure to society."

Yet the students do not see the programs as an interruption of their education. The Outreach Programs, while funded and encouraged by the College, are initiated and run by students.

Much of the activity began last year, usually at the behest of student organizations. According to Nemenzik, "the student organizations have been here for a long time, but what they've done is put out resume books and had job fairs—very good projects that have benefited their membership and other College students, but have not reached out beyond the College." Nemenzik credits the rising interest in community service to "a gradual change in the make-up of student bodies on campuses everywhere. When I was in college, in the early and mid-eighties, social conscience was very passe. The main objective was to get a degree with which we could go out and start making a lot of money. You were being a sucker, you were gullible if you were concerned about anything else. I don't sense that about the present students at all."



Theo de Winter

Giving Something Back

Times have indeed changed. Mark Yurish ('90), who worked last year with the SWAP program, typifies the students' attitude:

"With the shape the country's in, with everybody else pulling ahead of us technologically, it's important to start giving people interest in technology a little bit earlier. But I also think it's important just to do something for the community, to give something back."

What is perhaps most telling is that the students don't regard their volunteer efforts as a special sacrifice isolated from the rest of their lives. Rather, they see the work as blending together with their normal pursuits. "You deal with so many specifics in class, so many details, that you can lose sight of the big picture," says Mr. Yurish. "When you explain to a fifth grader that rubbing your feet on a carpet creates an electric charge, you have to see it not in its hugely complicated physics and engineering context, but as something that happens every day. You force yourself to see it in a different way" Tom Nardone of ASME agrees: "Classes can get heavy—we forget that it's supposed to be fun."

"It's all tied together," says de Winter of teaching, his volunteer work, and his spirited if unsuccessful run for the U.S. Senate in the New Hampshire Republican primary this fall. "Many of the problems we face today—in the environment, in unemployment, in defense, in recapturing our manufacturing jobs that have gone abroad, in the automobile industry and electronics industry—many of those problems are basically high technology problems. To expect those problems to be solved by a huge mass of lawyers in Washington is a pipe dream. Without [people with] a quantitative and analytical background, I shudder to think whose advice lawyers are going to take, and how they know what is good advice when they hear it."

Whatever the motivation, the upsurge in community service is marked; only a small portion of the work being done is here described. And fortunately, it's likely to continue. As de Winter comments, "You've got to keep the interest in front of the student—you don't just say, 'I've done it, now I can walk away from it, it's done for all time.'" KA