



PRE-ENGINEERING Launches STAR Students

Time magazine once reported “the U.S., the world’s greatest technological civilization, is running short of engineers.” This shortage, the article stated, meant that “most engineering graduates have at least a half dozen offers, with an average starting salary of \$350 a month.” That’s not a bad income for April 1952, when the article was published.

The early 1950s was a time when fewer students were entering science, engineering and math careers. The government also was under-funding science and technology. Scientists and educators alike tried to emphasize that this trend would result in a loss of the dominant technological status the country had maintained since the industrial age.

That era ended on Oct. 4, 1957, when the Soviet Union launched Sputnik, the first artificial satellite, into orbit. U.S. students began to pour into engineering and science programs. In response to Sputnik, President Eisenhower formed the Science Advisory Committee, the Science Advisor position and the Advanced Research

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PROGRAM

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Projects Agency (ARPA). Soon after, President Kennedy announced the goal of sending men to the moon. These and other programs led to significant investments in technology, research and development.

But, once again, fewer U.S. students are graduating with math, science and engineering degrees, yet technology is far more important today than it was 50 years ago. The United States graduates 84,000 engineers a year, far behind other countries such as China, which boasts more than 300,000 engineers per year.

The U.S. Department of Labor's Bureau of Labor Statistics calculated fewer engineering graduates, coupled with increased retirement and greater demand, recently led to almost 1.3 million job vacancies.

How can the construction industry reignite interest in the discipline?

PROJECT LEAD THE WAY

In the 1990s, an upstate New York school district developed a small program to increase the quantity and quality of students in engineering fields. In 1997, it became known as Project Lead the Way (PLTW).

Richard Blais, chairman of the school district's technology department, hoped to expand the program to 20 schools and generate student interest in college engineering and technology programs by offering pre-engineering classes combined with math and science coursework for middle school and high school students. Gary Adelson, the director of research and evaluation for PLTW, explained in an interview with the *Central New York Business Journal* that the mission of the program is "to provide the engineers this country needs for the next 50 years."

Today, high school students around the country strive to be placed in the PLTW program. Currently, PLTW is active in more than 2,200 schools, with more than 200,000 students enrolled in PLTW classes and 7,000 teachers and 5,000 counselors trained in the program.

As a not-for-profit organization, PLTW forms partnerships with public schools, higher education institutions and the private sector to help achieve its goals.

Richard Kissane, technology director for Albany High School in New York, attributes the program's success to its

hands-on building and design curriculum in which students see the actual product functioning at the end of their work.

Education Week reported that at Wheaton High School in Montgomery County, Md., "members of the academy's 26-student class of 2007—its first graduating class—went on to study in mechanical, electrical, nuclear and other engineering fields at universities such as the Massachusetts Institute of Technology and Cornell University, claiming more than \$1.6 million in scholarships." Of Wheaton's 1,325 students, 89 percent are racial or ethnic minorities.

Statistics, however, show minorities are underrepresented in the engineering professions. The Commission on Professionals in Science and Technology reports that the total U.S. labor force is 82.7 percent white, 10.9 percent Asian, and 6.4 percent underrepresented minorities. In comparison, the population is 69.1 percent white, 3.6 percent Asian, and 25.4 percent underrepresented minorities.

Historically, PLTW has closely mirrored the U.S. population, with slightly higher Hispanic and slightly lower African-American enrollment. Successes

in recruiting and retaining minority students, like Wheaton's, occur across the country.

In 2006, the East End Chamber of Commerce's Education Task Force studied education challenges in Houston. In the low-income, largely Hispanic area around the newly opened Chavez High School, the task force found a dropout rate of more than 50 percent and limited parental involvement. In March of that year, the group discovered PLTW and began to investigate its success in other Houston-area schools.

Faculty and administrators at Chavez High School, already familiar with PLTW, partnered with the chamber to notify incoming ninth graders and their parents about the program. "Through the enrollment period, we had a great turnout of students, but we were surprised by the even greater turnout of parents and siblings," says Diane Lipton, president of the East End Chamber of Commerce. "There was a lot of enthusiasm for the promise that the program held. Younger siblings saw the support and commitment that the school

district and the community were giving and wanted to know how they could get into it, too."

Chavez Principal Dan DeLeon tells potential students the only prerequisite is the desire to learn, not necessarily previous knowledge, experience or expertise. The first year's course, Introduction to Engineering Design, filled 100 seats long before the school year started. The chamber and its members worked closely with the high school to ensure it had enough computers, software and supplies in place before the school year started.

After completing the first year in 2006, 96 of the 100 students returned for the second year. (Four moved outside the district.)

At an exhibit of students' work, one company president was so impressed with the project completed by one student, he remarked, "I have engineers who can't do that." He hired the student for the summer, and then for two hours a day after school.

Deborah Jaques, PLTW academy director for Chavez, describes the parent involvement as astronomical. "The parent/student dinner for the second year not only ran out of food, but every student returned the application, filling the program immediately," she says. "We also have had a lot of students who didn't sign up for the program last year asking how they can get in. We are looking to see if we can make some accommodations.

"Their peers don't see engineering as nerdy, as some people have labeled it. Through PLTW, they see it as cool and creative."

The program excites students not only about engineering, but education overall. In fact, most students improve their grades in other classes. The University of Houston notes, "studies of PLTW's curriculum prove participating students become the kind of prepared, competent, high-tech employees U.S. industry needs to stay competitive in the global market."

PLTW not only encourages students to reach for the stars, but also provides the tools to get them there.

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