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CORNELL ENGINEERING MAGAZINE

Tech City

By Deirdre Martin

Ask the average kid what an engineer does, and chances are he or she will tell you, "They drive trains" or "They fix things." While both answers are technically correct, many children simply don't know what engineers really do or how they do it, nor are they aware of the role engineering plays in their everyday lives. Two Cornell engineering professors are working on a way to change that.

Charlie Trautmann is an adjunct associate professor of civil and environmental engineering and the executive director of Ithaca's nationally known children's museum, the Sciencenter. Tony Ingraffea is Cornell's Dwight C. Baum Professor of Civil and Environmental Engineering. Together, the two applied for - and received - a National Science Foundation grant for $639,543 to develop, under the auspices of the Sciencenter, an interactive traveling exhibition on engineering called Tech City.

Its goal? "We want to get children excited about engineering and to plant the seed that engineering has career potential," explains Trautmann. They hope to appeal particularly to children from minority groups that are underrepresented in engineering, such as African-Ameri-cans, Latinos, and Native Americans, and to girls, since women currently make up less than a quarter of the engineering student population nationwide.

To achieve these far-reaching objectives, the project will use a three-pronged approach, coordinating complementary activities among individual science museums, schools, and the community at large.

Tech City will visit science museums across the country with an array of 12 activity

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centers, each presenting an engineering design task. Civil engineering, for instance, is explored in an exhibit where children will design, build, and test a bridge. Mechanical engineering will be introduced in an activity center that challenges visitors to design an entrance ramp to a building to provide access for people with disabilities. Agricultural engineering will be the basis for a project to design a compost facility. The activities will employ computers and videos as appropriate for the nature of the individual exhibit. All exhibits share one trait: they relate to real-world problems that need to be solved in the hypothetical urban setting of Tech City.

"We decided to use an urban setting as the thematic umbrella for all of the exhibits since many of the kids we're trying to reach probably live in cities," explains Ingraffea.

To help foster the connection in children's minds between the fun they're having with the exhibits and the possibility of engineering as a career, the museum component of Tech City will also feature a career kiosk, a poster gallery of famous engineers, and a fast-paced video showing young engineers of both sexes and various ethnicities talking about the rewards and challenges of their chosen field. "It's crucial," says Ingraffea, "that kids see engineering isn't just for white males."

To help reinforce their museum experience, elementary school students will take part in activities at school related to the 12 engineering exhibits both before and after visiting their local science museum. An information kiosk relating to Tech City will be displayed in school lobbies, and there will be a speaker's bureau set up to provide appropriate speakers to middle schools that request them.

The most important element of the school branch of Tech City, however, will be in-service training workshops for elementary school teachers, showing them how to teach engineering and technology concepts to their classes. "It's not enough for teachers to show kids how to build a bridge out of pins and straws," says Trautmann. "It needs to be taken to the next level - to relate to the kids that there's a design process involved.

"Most teachers are uncomfortable with the concept of teaching about technology and engineering, particularly as a process, because it's never been explained to them," explains Trautmann. "But we know from previous experience in schools that if you capture the interest of a teacher, then you've got an edge when it comes to reaching the kids."

Tech City's third component offers training to volunteers and museum staff to run what's called "Engineering Day at the Mall." Sponsored in Ithaca for the past four years by the Sciencenter and Cornell, the event has met with enthusiasm and success. The idea is to bring exhibits and demonstrations from engineering students and local technology and engineering firms to the public by setting up displays at a local mall. Participating museums will also be encouraged to host "Family Technology Night," a program designed to allow parents and children to experience first-hand that science projects and problem solving can be exciting as well as interesting.

If all goes as planned, Tech City should be ready to roll in 2001. It is expected to tour nationally for three years and reach nearly a million people.

The idea for the project came about in the spring of 1996, when both Trautmann and Ingraffea were working with Greg Fries, an undergrad in mechanical engineering, on an independent study topic connected to the Sciencenter. "For a long time I'd had the idea

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for a build-it-yourself bridge that would involve not only construction, but testing to see how good it was," explains Trautmann. "The student liked the project, and I sent him to Tony, who has had a long association with me and the museum. We decided to work together with him on it.

"One day, we were at the Sciencenter helping this student finish up the project when the light bulb suddenly went on in our heads. We thought, 'Hey, why not try to come up with a project like this for other areas of engineering and see if we can reach a wider audience.'"

As executive director of the Sciencenter, Trautmann is acutely aware of the need to get children interested in science and technology at an early age. "If you wait until high school to talk to kids about engineering as a career, in most cases it's too late," he notes. "That's why this exhibit is so important: it's hands on, it's comprehensive, and it grabs them early."

If grabbing them early is key, so is correcting perceptions, adds Ingraffea. "Thanks to advertising and the media, misconceptions and ignorance abound when it comes to engineers and engineering. Engineers, when they're portrayed at all, are depicted as either boring nerds with pocket protectors or psychos with pent-up rage a la Michael Douglas in Falling Down. Kids need to know that the bridge they think is so cool didn't just appear: someone designed it, and that someone was an engineer."

The do-it-yourself approach typically used in hands-on displays for children's museums is an essential element of the Tech City activities. But Trautmann and Ingraffea are also paying special attention to techniques of presentation that have proven to appeal to their target groups, focusing on teamwork and cooperation rather than individual or competitive tasks. Exhibits also feature women and minority engineers as role models.