Access to Engineering: New Project for Students and Faculty with Disabilities

The polio that struck Don Malzahn when he was 4 years old left him in leg braces and with little use of his arms.

But by the fifth grade, Malzahn was motoring off to school in an electric scooter made by his dad, an engineer. A homemade swivel chair swung him in and out of the shower. At the three-story high school in his small Oklahoma town, two football players carried him between floors in a handmade seat with handles.

"Dad's philosophy was that the environment is plastic," says Malzahn, now an industrial engineering professor at Wichita State University in Kansas. "If I needed something, we made it."

But when he entered Oklahoma State University in the early 1960s, says Malzahn, "I lost that leverage."

Getting to class was an ordeal, he says. "I'd have to go a block out of my way to find someplace to get up over the curb. It took me so long, I'd have to schedule four periods between each class.

"I had a lot of depression, a lot of doubts," says Malzahn. "But I'm persistent. I can hang on longer than anybody."

Still, sheer endurance shouldn't be the deciding factor in whether someone who is disabled makes it through engineering school. That's the idea, at least, behind a new 5-year project at the American Association for the Advancement of Science (AAAS) on the recruitment and retention of students and faculty at the nation's engineering schools.

Funded by the National Science Foundation (NSF) and with assistance from the Engineering Manpower Commission (EMC) of the American Association of Engineering Societies, the AAAS Access to Engineering project aims both to gather data on those with disabilities at engineering schools and to create model programs at six schools that vary by location, demography, and other qualities.

"We want to get people with disabilities into engineering," says Virginia Stern, director of the AAAS Science, Technology, and Disability project, under which the new project falls. "They're a big, underused pool of talent. Engineering is basically an intellectual occupation," and no physical disability should by itself keep anyone out, she says.

How many such students and faculty are there? No one really knows, says Stern.

"That's one of the goals of the project," she says. Finding out, however, is not as easy as it may seem.

"Who should we count? We can get the number of people who identify themselves as disabled," says EMC's Richard Ellis, who's on the project's advisory board. "But what about those who don't identify as disabled, but might be? And do we count learning disabilites?"

A recent NSF task force report put the percentage of scientists and engineers with disabilities at anywhere from 2 to 16% of all scientists—"not quite a satisfyingly exact figure," notes Stern.

"We have some information about the number of students with disabilities who enter engineering school, but no information on the number who exit with degrees," says Stern. "And that's the bottom line."

Along with gathering this kind of data, says Stern, "we want to find out where kids are getting stopped in the pipeline" on the way to an engineering career.

"There are a lot of gatekeepers along the way who can discourage people with disabilities—parents, teachers, counselors," she says. Malzahn agrees.

"Engineering coursework is difficult," he says, "and some say, 'life's already hard; why make it harder?'" There's another, more subtle force at work as well, he says.

"What's lacking for many students with disabilities is the vision that they can be technically oriented individuals," says Malzahn. "Society's approach to the disabled is 'you can get things done with the help of others.'

"Naturally, this leads you to focus on your social skills. It's counter to the idea of taking direct action on your environment, which is what engineering is all about."

Physical access to classrooms and labs is not the problem it was 15 years ago, says Stern, when AAAS's annual meeting in Boston became the first scientific gathering in the world to accommodate those with disabilities.

Since then, a succession of federal legislation, culminating in the recently enacted Americans With Disabilities Act, has required public buildings and facilities to address the needs of people with disabilities. Usually this includes ramps, wider doors, and larger bathroom stalls with handrails.

But even these changes may not be enough, says Malzahn.

"There's an appearance that physical barriers are coming down," he says. "But in any given building, there may be only one doorway I can enter, one bathroom I can use.

"Why have steps at all? Round door knobs—they don't make any sense, but they can lock me out of a room."

Problems with dexterity can present obstacles, as well. During his undergraduate lab classes, says Malzahn, "I'd pick out the smartest guy and hook up with him. I took notes and he did double duty with the experiments."

Thanks to his father, who modified workshop tools for his use, Malzahn came to engineering school with some mechanical skills.

"But most students with disabilities don't," he says. "Without that hands-on experience, it's hard to gain an intuitive sense for which way threads turn, for instance."

The Access to Engineering project will address these kinds of barriers, says Stern, and search for solutions.

The project's advisory board, of which Malzahn is a member, will meet for the first time next week (26–27 February). Visits to selected engineering schools begin this fall.

For more information about the project, contact Virginia Stern at AAAS, 1333 H St., NW, Washington, DC 20005. ❖

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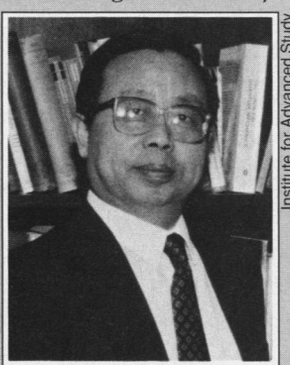
Interview with Fang Lizhi: China, Science, and Human Rights

On Monday, astrophysicist Fang Lizhi and his wife, solid-state physicist Li Shuxian, presided over an unusual forum held during the AAAS annual meeting in Washington, D.C. The topic: China and human rights. Since fleeing China in 1990, the two renowned activists have lived in the West, coming this year as researchers to the U.S.—Fang to the Institute of Advanced Study in Princeton, New Jersey, and Li to Princeton University.

In the following interview, Fang speaks of the connection between science and human rights.



Institute for Advanced Study

Fang Lizhi: "There is a chance for non-violent change."

Q: Why hold a human rights forum at the AAAS meeting? What do you want from the members?

A: To concern [themselves] with their counterparts in China. We have a list of scientists who are suffering, and [members can help] by writing letters. (*See sidebar.*)

Q: How effective is that with Chinese authorities?

A: To one letter, they never respond. But if you have many, that kind of pressure works. When we stayed in the U.S. embassy [Fang and Li spent a year under U.S. protection following the Tiananmen Square massacre], so many scientists and academic organizations voiced their support that I know the authorities felt pressure. [It helped] that these were not politicians, but scientists speaking out.

Q: What's it like for scientists in China today?

A: Some still travel, some are in prison. There is no free communication. For instance, China has facilities for E-Mail, but the authorities cut off the national network.

Q: Should AAAS link up with any one organization in China now?

A: I think it is better to wait. In name, some organizations are independent. But in principle, all are part of the government.

Q: Does Marxist ideology continue to interfere with scientific theory?

A: Any science, such as cosmology, that comes close to philosophy has trouble. [And] there is no real social science in China; it is all Marxism.

Q: As a physicist, why do you concern yourself with politics?

A: Physicists look for the basic, fundamental, universal things. We try to find that and push that. From that point of view, we must also ask which are the universal needs of human beings. I think human rights is a universal human need.

Q: Can scientists work within China today for democracy?

A: I think so. Scientific education asks students to have independent thoughts. We never ask students to believe in physics. Authorities just say, believe Marxism, don't ask questions.

Q: What are you working on these days in physics?

A: The topology of the universe. The cold dark matter theory has many troubles these days, but even this has contributed. You see, in Chinese politics, if somebody's wrong, they're down [gestures sharply down with his thumb]. But in science, if somebody's wrong, they've still contributed because it's very important to raise questions. ❖

AAAS Writes for Life

Since 1976, AAAS has written letters on behalf of hundreds of scientists persecuted by their governments, according to Kari Hannibal of AAAS's Science and Human Rights program.

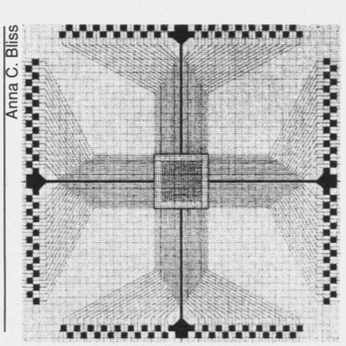
In 1989 and 1990, the AAAS campaign included Fang Lizhi and Li Shuxian, the Chinese physicists and human rights adovcates, as well as other scientists and students arrested after the Tiananmen Square massacre.

"We helped get U.S. scientific groups involved in writing letters asking that [Fang and Li] be permitted to leave China," says Hannibal. "Sometimes governments respond to the pressure. Other times, as with Syria, they seem to ignore us."

Syrian health professionals and engineers who were arrested in 1980 after a 1-day general strike make up half of the 300 cases AAAS responded to in 1990. The rest stemmed from Africa (44), China (44), Latin America (15), Asia (13), the Soviet Union (2), and other Middle Eastern countries. ❖

Art That Computes

As part of AAAS's on-going commitment to exploring the relationship between science and art, *Windows*, a mural by Anna Campbell Bliss, will be on view in the first-floor gallery at AAAS headquarters in Washington, D.C., through 28 March.



Anna C. Bliss

A detail from the mural, which will hang in the Utah State Capitol building.

According to Jeannette Murray, art advisor for the AAAS Art of Science and Technology program, the 8-by-30-foot mural "explores ways of seeing central to human experience" and extends "that range to the macro and micro worlds aided by computer technology."

To develop the concept, Bliss programmed certain textures and patterns with mathematical bases and plotted the designs for photographic transfer to serigraph screens.

For more information about the art program, contact Virginia Stern, AAAS, 1333 H St., NW, Washington, DC 20005. ❖