Drive to succeed. Richard Tapia used his Chevelle show car to lure Josef Sifuentes (*left*) into mathematics.

Minority voice

Richard Tapia has prepared generations of minority students for academic jobs, but he says they still aren't welcome

By **Jeffrey Mervis**

Richard Tapia's passion for teaching and mentoring was obvious to Margaret Wright from the moment the two young applied mathematicians met at Stanford University in 1976. Wright was a newly minted Ph.D. in the operations research department, and Tapia, only 5 years older but already a tenured professor at Rice University in Houston, Texas, was teaching a course in the department.

"They gave you an 8 a.m. class?" Wright recalls asking Tapia. "That's terrible. They are the worst."

But the timing didn't seem to bother Tapia. And by the end of the semester, she says, he had transformed a group of somnolent students into excited learners. "The class received the highest ratings of any course in the history of the department," says Wright, now a professor of computer sciences at the Courant Institute of Mathematical Sciences at New York University in New York City. "It was all because of Richard."

Wright's admiration for Tapia grew over the years, fueled in part by their shared commitment to helping groups underrepresented in science—in particular, women, African-Americans, Latinos, and Native Americans. After spending a year at Stanford, Tapia returned to Rice and created what is arguably the most successful university-based program in the nation for training minorities in mathematics and computer science. The Richard Tapia Center for Excellence and Equity has helped 89 minority students earn Ph.D.s in those fields over the past dozen years, a record unmatched by any other university, much less a single professor. "Richard is amazing. He's a force of nature," Wright says.

Tapia doesn't force himself to choose between his passions: advocacy for minorities and the pursuit of a branch of mathemat-

PHOTO: JOHN EVERETT PHOTOGRAPHY

ics called optimization algorithm research, which Tapia describes as "finding the best choices within a given class of options." "When I visit a campus," Tapia says, "I give an outreach talk on the first day, and the next day I give a math talk." That approach has lifted him to the top of his profession—election to the National Academy of Engineering in 1992, recipient of the National Medal of Science in 2011, and, just last month, winner of the highest honor bestowed by the National Science Foundation (NSF) for a lifetime of public service, the Vannevar Bush Award.

Despite these impressive accomplishments, the memory of the year Tapia spent at Stanford so long ago still rankles.

It was actually a job audition, an effort to realize a childhood dream nurtured by his parents, who came from Mexico as children with little formal education themselves but who instilled in Tapia a burning desire to succeed. "When I was growing up, anybody who wanted to be an academic, at least in California, said there are three places I want to go in my life: Stanford, [University of California,] Berkeley, or heaven," he quips.

By the end of the academic year, his chances of getting a Stanford post seemed pretty good. Along with an active research program, he says, "I had perfect teaching evaluations in three classes, and I served as faculty adviser to all Hispanic student groups."

But the department saw things differently. Although Tapia was a tenured full professor at Rice, Stanford offered him an untenured position as an associate professor. "It was a substandard offer, and I had to reject it," he says. "My extra dimensions were of negative value to them," he adds. "They made it clear that they didn't want me to be doing all these other things."

Tapia, a first-generation Mexican-American, believes that his experience at Stanford nearly 40 years ago reflected institutional racism—and that this problem, if anything, has gotten worse over the years. When he came to NSF on 6 May to accept his prize, he warned that the nation is at risk because top-tier mathematics departments don't think minority scientists have the right stuff.

Tapia's 15-minute speech to the National Science Board, NSF's presidentially appointed oversight body, was an abbreviated version of a hard-hitting and irreverent presentation he's been making at universities around the country titled "Racism in Mathematics: A Direct Factor in Underrepresentation." He chose the title in part for its shock value.

"Calling this racism is a bit hard," Tapia acknowledged in a recent e-mail to Michael Wolf, a Rice colleague who had heard the talk and objected to both its tone and its application to mathematics. "But it does get people's attention."

THE PAUCITY OF minority science faculty members at top-tier U.S. universities should be enough to get people's attention, Tapia believes. In a country whose population is 30% black and Hispanic, those two groups make up just 3.9% of the math faculty and 2.9% of the computer science faculty at the top 50 U.S. departments (see graph). Asians are the notable exception: Although making up only 5% of the U.S. population, they hold 17% of the faculty slots in mathematics and 27% in computer science at the top-tier programs.

To be sure, the pool of eligible minority candidates outside the Asian community is tiny. In 2012, some 307 mathematics departments produced 33 Latino Ph.D.s and 28 African-American Ph.D.s who were U.S. citizens. In applied mathematics, the 2012 numbers were vanishingly small—two African-Americans and seven Latinos. Those numbers represent both an injustice and a serious waste of talent, Tapia argues.

For his Vannevar Bush Award talk, Tapia bowed to his more august surroundings, changing the title to "Crisis in Higher Education: The Need for New Understanding and Leadership." But he didn't water down his message. The overt racism of the Jim Crow era may be gone, he says. But its latest incarnation—lower expectations for underrepresented minorities as both students and faculty members—is nearly as pernicious.

Those lower expectations, according to Tapia, begin when minority undergraduates planning to major in science are told that poor preparation in high school could prevent them from earning a degree from an elite school such as Rice. To make matters worse, he says, some faculty members have already discounted their students' abilities based on skin color.

To illustrate his point, Tapia tells a story from a decade ago about six talented undergraduates whom he had handpicked to take a class in functional analysis from another professor. The students were assigned no homework and made no presentations, so the professor had no work on which to grade them. Nevertheless, at the end of the term, the five white students received A's and the sole minority student—a Tapia protégé named Josef Sifuentes, a Mexican-American—got a C.

Furious, Tapia sought out the professor. "I try to discourage those who do not belong in math," his colleague told him. Tapia translated the professor's answer for the science board: "So just by looking at the student, he was saying, 'You don't belong.' "

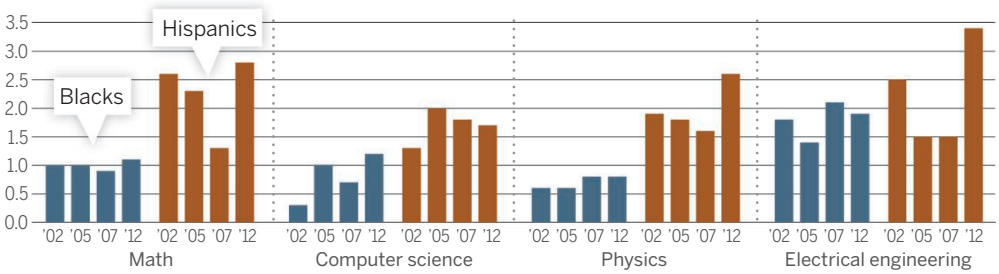
In graduate school, Tapia says, minority students often are expected to be less productive than their majority peers. And those lower expectations can hurt them once they earn their Ph.D. and enter the academic job market. The top candidates at most top-tier math departments have published as many as eight or 10 papers, Tapia says. Such precocious productivity is often reinforced by a letter from an eminent mentor touting them as capable of winning a Fields Medal, the discipline's equivalent of a Nobel Prize.

Research prowess is certainly important, Tapia says. But he believes the current hiring standard sets the bar higher than necessary by overemphasizing a candidate's potential to be a research superstar and discounting the rest of their job description. "I couldn't get hired today" by a top-tier research university, he claims.

The first in his family to go to college, Tapia says he was an average student as a teenager. But by the time he received

Sparse representation

Low numbers of black and Hispanic faculty in math-intensive disciplines show little sign of improvement (percent, top 50 departments).



Source: Nelson Diversity Surveys; Art: K. Engman/*Science*

his mathematics Ph.D. from the University of California, Los Angeles, in 1967, he had put himself on the academic fast track. He says a postdoc at the University of Wisconsin, Madison, allowed him "to run with the big dogs" at the school's Army Mathematics Research Center. Only 2 years after arriving at Rice as an assistant professor, he was granted tenure and was on the way to becoming a big dog himself.

A founding member of the Society for Advancement of Hispanics/Chicanos and Native Americans in Science (SACNAS) in 1973, he noticed during one early gathering that only two of the 68 faculty members in the room were tenured. That statistic reinforced a pledge he had once made to himself "to start to help people after I get tenure." And once he achieved that, he began looking for ways to mentor minority students, involve them in research opportunities, and oversee their professional development.

For years it was a solo effort, something added to his other responsibilities. In 1989, the university acknowledged his mentoring work by naming him director of education and outreach programs for the NSF-funded Center for Research on Parallel Computation at Rice and giving him a $200,000 annual budget. A decade later, he snared one of the first grants in an NSF program designed to increase the number of underrepresented minorities earning STEM (science, technology, engineering, and mathematics) Ph.D.s. The program gave him contacts at other like-minded universities around the country, and in 2007 he won NSF funding to create a similar alliance to serve undergraduates.

The programs target students who are good enough academically to get into schools like Rice—a student body in which the top quarter has SAT scores of 1500 or higher (out of 1600)—but who may lack the confidence, social networks, and knowledge of higher education possessed by their wealthier peers and their college-educated parents. Sifuentes was one of those students when he arrived at Rice in 2000, and Tapia took a typically hands-on approach with him.

A high-achieving student from a Mexican-American family of modest means, Sifuentes tested into an elite high school program in Houston in which he was the only minority. At Rice, he planned to major in mechanical engineering. "Like a lot of minority students, I looked at the list of majors and said, 'Now what sounds like a good job?' " he explains.

Sifuentes was completing a summer research project that included teams from both the engineering and computational sciences when Tapia, who led the latter group, made Sifuentes an offer that changed his life.

PHOTO: JOHN EVERETT PHOTOGRAPHY

"Calling this racism is a bit hard. But it does get people's attention."

Richard Tapia, Rice University

Tapia has a passion for fast cars. As a teenager, he and his twin brother competed in drag car races in southern California and Tapia briefly held a world record. Although he abandoned the track long ago, his enthusiasm for muscle cars has never waned.

"I have a 1970 Chevelle, full custom, that I'm still working on," Tapia told Sifuentes. "I want a music video that showcases the car, which is called Heavy Metal. And I want the special effects to be based in real mathematics. You're an artist, you know how to do that, right?"

"No, I can't do that," replied Sifuentes, who was pursuing a minor in art. "I have no idea what you're talking about."

"Well, we can pay you," Tapia said.

"Sure, I can do that," Sifuentes replied.

Tapia used the video that Sifuentes created over the next 18 months to win the grand prize at the 2005 Pomona Super Chevy Show. It also made Sifuentes a minor celebrity in the applied mathematics community. Wright was so impressed by Sifuentes's talk on the video at a conference that she offered him a postdoc at Courant on the spot—only to learn that he had just begun his Ph.D. program.

TAPIA UNDERSTANDS that having a Ph.D. is no guarantee an elite department will hire you. But he says minorities face greater obstacles than simply a tight job market. One reason it's so important that Rice and other top-tier schools produce more minority graduates, he says, is that where students train is a huge factor in their careers. "Pedigree is alive and well," Tapia asserts. "So if minority students earn their degrees at minority-serving institutions, they won't get hired by Stanford."

Tapia works with graduating senior Ariel Nixon at his Rice University center.

But even a degree from a top school isn't enough to create a level playing field, Tapia adds. Minorities must also overcome an old-boy network that often excludes them from serious consideration. One science board member who heard Tapia's talk and agrees with his assessment says her institution is trying to ensure that departments cast a wider net during faculty searches.

"The idea of finding someone who is 'a good fit' is code for hiring somebody like themselves," says Deborah Ball, a mathematics educator and dean of the School of Education at the University of Michigan, Ann Arbor. "And that's no longer acceptable." Although senior university officers at Michigan don't tell departments whom to hire, she says, they have stopped searches that were insufficiently inclusive. A more diverse pool of applicants invariably leads to more minority hires, she adds.

Wolf, a former chair of the Rice mathematics department, has participated in many such searches. And although he says that Tapia has "done profound work for this country in advocating for underrepresented minorities," Wolf maintains that he exaggerates how much weight math departments place on an applicant's research history.

"If the overall record of a candidate leaves you pretty sure the person will never manage to produce research at the level of the top disciplinary journals, then the candidate does not meet your standard," Wolf says. "But my experience nationally suggests that, once a standard is met, then hiring decisions certainly take into account the other ways that a candidate would contribute, for example, in helping to mentor a diverse student population."

Wolf fears that some people will interpret his defense of high standards as prejudice. In fact, his actions demonstrate a strong commitment to diversity: Three years ago, he convinced senior university officials to fund a summer program he runs that helps a subset of the entering class—many of them minorities—acclimate to the rigors of a Rice education.

Tapia himself doesn't lay all blame for the status quo on the academic establishment. "In the 1960s you couldn't say that culture played a role because everything was about the 'system,' " he explains. "But today African-Americans and Mexican-Americans have to question certain parts of our culture. Why is the culture of Jewish-Americans or Asian-Americans so positive in terms of pursuing an academic career? And how can we enhance our culture to include some of those values?"

Sifuentes is wrestling with those issues as he hunts for a tenure-track job. Wright had stayed in touch with him after hearing his Heavy Metal talk, and in 2010 Sifuentes and his wife arrived in New York City so that he could take up a postdoctoral position at Courant.

But the high cost of living put a serious strain on their finances, he says, and the arrival of a baby meant additional responsibilities. Both he and his wife also missed their families in Texas. So in 2012 Sifuentes left Courant ahead of schedule to become a visiting assistant professor at Texas A&M University, College Station, where he was assigned undergraduate teaching duties along with his research.

In making the move to what is essentially a second postdoc, Sifuentes lost the chance to concentrate on churning out papers—in his case, on iterative methods to solve large linear systems of equations. The desire to live near their relatives led to another fateful decision, namely, to restrict his search for a faculty position to Texas. "I would like to see you rise to the top because you're so talented," Wright says she told him at one point. "And that probably means somewhere not in Texas."

In hindsight, Sifuentes admits she was right. But he doesn't think all of his wounds are self-inflicted. At one university that invited him to apply for an opening, he says, several faculty members expressed an interest in working with him and the job interview itself seemed to go well. "But then I learned they said I came across as very cocky," he says.

"Richard had told me that I'm going to hear that sort of comment a lot," Sifuentes says. " 'A white man is confident,' he would say, 'but a Mexican-American is cocky.' "

Anecdotes like that persuade Tapia that the fight against discrimination is far from over. Finding a worthy successor to a charismatic founder of an organization is never easy, however, and it may be especially hard in Tapia's case. "Richard has clout on campus. He's a fighter, and he has the respect of both the faculty and the university administration," says a former longtime colleague at the Tapia Center, Cynthia Lanius.

A Houston math teacher who left the classroom to help Tapia ramp up his center, Lanius successfully wrung money out of NSF, the Alfred P. Sloan Foundation, and other funding organizations. But last year she retired, and this year the center's current budget of $250,000—from donations and "a tiny bit from Rice," Tapia says—is half what it had been a few years ago. "We need a big hit," he admits.

It's not clear what will happen if he doesn't succeed. "Yes, I'm 75. But I don't have any plans to retire," he says. "I have tried to educate people about what I've done. And I hope that a young person will come out of the wilderness to say that they want to go forward."

Bryant York has a simple solution. Two decades ago, NSF's computer science directorate asked York, a computer scientist at Portland State University in Oregon and a national leader in efforts to broaden participation in science, what it could do to attract more minorities into the field. York worked on the project for a year. But he summed up his findings in one sentence: "If you want to solve the underrepresentation problem, clone Richard Tapia." ■