

## Connectivity: Linking institutions and students to teach science and engineering

By John Yochelson  
January 31, 2007

It takes more than a \$160,000 education in mathematics and computer science to open the right doors. That's what Jesus, a 2006 graduate of the Massachusetts Institute of Technology, learned when he was suddenly called back to his border community near San Diego at the end of his senior year to become sole breadwinner for his mother and three younger siblings. Lacking experience and connections, he floundered for months in a low-wage job to make ends meet.

Before giving up, Jesus turned to the founder of the AVID college prep program that had put him on track for the full scholarship he received at MIT. In no time, a small team of volunteers, including the chairman of AVID's board, agreed to draw upon their high-level contacts at San Diego's leading high-tech companies. Still, it took four months of concerted effort to line up the interviews that led to a solid job offer.

The happy ending for Jesus underscores a larger, more sobering point. Hard work and academic merit alone are rarely enough to pave the way for talented, low-income minorities into science and engineering careers. Beating the odds also hinges on intervention almost every step of the way.

Our system for developing technical talent cannot be left on autopilot without losing large segments of the U.S. population, even though their potential must be tapped to maintain America's competitive edge. One of every five Americans will be Hispanic by 2020, yet Hispanics represent a scant 4 percent of the nation's scientists and engineers. African-Americans are comparably underrepresented. Our failure to expand the base for developing homegrown talent does more than limit individual opportunities. It also increases heavy U.S. reliance on foreign-born professionals, who now comprise a stunning 22 percent of the work force in technical fields.

The factors that leave minority students out are widely recognized. Research shows that they have less-qualified teachers, less support at home, lower expectations, fewer role models and telling economic disadvantages. That's why it takes something extra to level the playing field – not once but continuously from preschool through graduate school and beyond.

The good news is we know how to offset the factors limiting minority achievement and interest in math, science and engineering. Skilled teachers, engaged parents and committed mentors are indispensable. So are college prep programs, enrichment outside the classroom, scholarships and peer support. Exemplary work is being done in each of these areas, but the whole package doesn't reach sufficient numbers of minority students.

We must tie opportunities together to do better. It takes 20 years to create awareness, build foundational skills, acquire specialized knowledge, and land a job in a science or engineering field. What's often missing, especially for students from historically underrepresented groups, is connectivity between the links in this chain. Without a series of mutually reinforcing experiences, it's easy to fall through the cracks.

San Diego should be a national leader in providing connectivity. This community broke new ground in the 1980s by linking entrepreneurs and researchers through the CONNECT initiative at the University of California San Diego. Now the same principle needs to be adapted to linking students with educational and career opportunities in science and technology.

The way to take action is through compacts between K-12 school districts, institutions of higher education and employers. By joining forces instead of acting in isolation, these key players can reach students early and sustain their engagement as they move up the educational ladder and into the workplace. For example, San Diego State's Compact for Success with the Sweetwater School District, guaranteeing admission and financial aid to qualified students, could be extended to include employers ready to offer internships, work-study opportunities and jobs in technical fields.

**Building capacity in science and engineering isn't just about making individual programs more effective. Jesus needed connectivity, and it will work for all students.**

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