

Mentoring models to move minorities to majorities in STEM

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Evidence of a shift in U.S. demographics and importance of minorities took center stage during the Presidential election, but how do those growing toward majority acquire representation in our educational and technological communities?

Accelerating programs that mentor and move minorities forward to majorities in science, technology, engineering and math (STEM) is one method that is gaining traction, said Castillo-Chavez, one of a trio of Presidential Award for Excellence in Science, Engineering and Mathematics (PAESMEM) Mentors speaking at the American Association for the Advancement of Science (AAAS) annual meeting in Boston.

Castillo-Chavez, whose own path to professorship is remarkable, will share concrete strategies to increase interest and engagement in STEM, along with co-presenters Chrysanthe Demetry, Worcester Polytechnic Institute, and Jean T. MacCormack, University of California.

While there is an overriding belief that promoting underrepresented groups cannot be addressed without long-term changes in the K-12 school system, according to Castillo-Chavez there are successful models being used now which show that mentoring changes lives – particularly when undertaken at a scale offered by one of the largest [public universities](#) in the nation.

"Scientists have the responsibility to see that the American Dream is not

just a theoretical construct but an achievable goal," said Castillo-Chavez. "We can't continue to waste immense talent because their limited access to higher education. This panel does not argue on the need of change, but on how we can achieve it, university by university."

Chavez-Castillo is the executive director of the award-winning Mathematical and Theoretical Biology Institute (MTBI) and The Institute for Strengthening the Understanding of Mathematics and Science or SUMS, research units in the College of Liberal Arts and Sciences.

The MTBI is one example of how colleges and universities can create change in representation of underrepresented groups in STEM that has national impact. The institute hosts a summer undergraduate research experience program (REU), and has developed integrative degrees in applied mathematics for the life and social sciences (AMLSS) for undergraduate and doctoral students. According to the National Center for Education Statistics, in 2010-2011, ASU was the leading producer of Hispanic PhDs in the mathematical sciences and fifth in the nation for all minority groups combined. The institute's programs have contributed to the production of more than 89 PhDs, 59 U.S. underrepresented minorities, since 2005.

Castillo-Chavez is also the co-director of a national program to promote students from underrepresented groups in the mathematical sciences, the National Alliance for Doctoral Studies in Mathematical Sciences. Supported by the National Science Foundation, the alliance offers conferences, grants, mentoring and summer training programs, including the Field of Dreams conference, which introduces minority undergraduate students in STEM fields to possibilities and opportunities in post-baccalaureate education in math and science, hosted at ASU in 2011 and 2012.

Castillo-Chavez, has also spearheaded a programs to attract a diverse population of students to STEM at the high school level. The Joaquin Bustoz Math-Science Honors Program advances high school students in university mathematics and sciences before graduation from high school. The intensive summer program has supported more than 2,500 students from 140 Arizona schools, including students from the Navajo Nation.

"The success of this type of intervention is not in question. We have seen remarkable outcomes at Arizona State University and Cornell University, because of MTBI and other late stage mentoring interventions," said Chavez-Castillo, who is also the director of the Mathematical, Computational and Modeling Sciences Center.

At AAAS, Castillo-Chavez will speak about the modeling institute, ways to enhance student engagement, and specifically how to move students from college into careers in science, and effective strategies for increasing diversity at all levels in STEM.

Castillo-Chavez received the 2007 AAAS Mentor Award and others honors for his research in mathematics, modeling of epidemics and his investments in mentoring. He has been selected as a Fellow by the American Mathematical Society and named a Martin Luther King Jr. (MLK) Visiting Professor with the Massachusetts Institute of Technology (MIT) in 2012.

Provided by Arizona State University

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