ETS

POLICY NOTES

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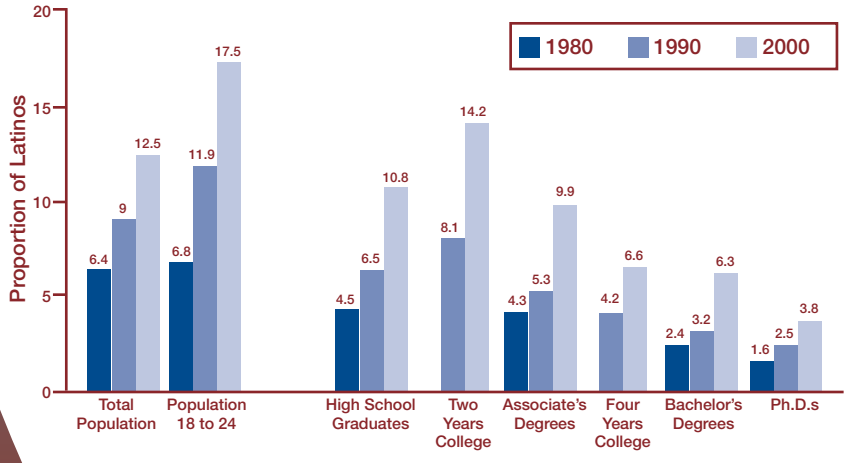
The Problematic Pipeline

Providing a context for the theme of the conference, Indiana University's Jorge Chapa, professor and Director of the Latino Studies program, spoke of "The Problematic Pipeline: Demographic Trends and Latino Participation in Graduate Science, Technology, Engineering, and Mathematics Programs." Chapa and Belinda De La Rosa, research analyst, coauthored the research, which posed the question: will Latino population growth translate into increased participation in higher education, and particularly in graduate science, technology, engineering, and mathematics (STEM) programs?

Chapa described a leaky pipeline, where graduate degree recipients from the nation's colleges and universities do not reflect the racial and ethnic diversity of the population. Demographic and educational trends confirm that the percentage of Latinos decreases at each higher education stage in the pipeline.

Figure 1: Latino Demographic and Education Trends



Source: U.S. Bureau of the Census and National Center for Education Statistics data as presented by Chapa and De La Rosa.

Note: Data for two years of college and four years of college are not available for 1980.

Listening. Learning. Leading.

This Issue — *Highlights from the ETS Symposium on Latino Achievement in the Sciences, Technology, Engineering, and Mathematics.*

For more than two decades, ETS, the College Board, and the Hispanic Research Center at Arizona State University have worked together to promote the success of Latino students. To that end, the organizations joined forces on November 20-22, 2005 in Princeton, NJ, to convene an invitational conference devoted to Latino Achievement in the Sciences, Technology, Engineering, and Mathematics (STEM). The conference had three major goals:

- explore the challenges, practices, policies, research, and advocacy at the national, state, and institutional levels required for: (1) improving preparation of Latino students for access to college; (2) enhancing the achievement, retention, and persistence of Latino college students; (3) improving preparation of Latino students for graduate and professional school STEM programs; and

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Dr. Alfredo G. de los Santos Jr., Research Professor at the Hispanic Research Center of Arizona State University, was a member of the Conference Planning Committee. He served as conference convener and master of ceremonies.

Latinos are a young population, Chapa noted. Many are still in their childbearing years and many come from backgrounds with factors generally thought to limit educational success. Population counts from the 2000 Census indicate that the Latino population grew by more than 57 percent between 1990 and 2000, compared to a 13 percent increase for the total population. It has continued this rapid growth since the 2000 Census: While the rate of growth for the U.S. population as a whole was 2.5 percent, the Latino population grew 9.8 percent. As has been true since 1980, about half of Latino growth was due to international migration, and the other half due to natural increase. By all projections, the Latino population will continue to grow at a much faster rate than the U.S. population for many more decades.

As the largest minority group in the United States, Latinos are fast becoming a majority population group in several states and many cities. They are moving to all regions of the United States, increasing their numbers in areas that previously had relatively few Latinos. The Latino populations of North Carolina, Arkansas, and Georgia, for example, all increased by more than 300 percent between 1990 and 2000. Despite this trend toward geographic dispersion, the major portion of the Latino population is concentrated in just a few states: California and Texas are home to half of the national Latino population.

Turning his attention from overall population trends, Chapa examined the educational pipeline, starting from K-12 and moving through doctoral study. He stated that only a relatively small proportion of all Latino high school graduates are undocumented, and that legal status in itself is not the most widespread reason that Latino high school graduates, in general, have difficulties entering higher education. Latinos are relatively

well represented at the community college level, where in 2000 they constituted 14.2 percent of all community college students and earned close to 10 percent of the Associate of Arts (A.A.) degrees granted. Accessing higher education through enrollment in community colleges is a path often chosen by first-generation college students, although transfer to four-year programs remains problematic for Latino students. Chapa noted that opportunities to continue beyond the A.A. degree are often missing because of miscommunication and misunderstandings regarding prerequisites for majors, degrees, and transfers. He suggested that efforts to increase Latino Ph.D. production could start with focusing attention and resources on community college students.

Although the increases in Latino postsecondary degree attainment have been most pronounced at the associate degree level, there has also been growth at the higher levels. Chapa focused further on science and engineering (S&E), from 1994 to 2001. He noted that a small group of institutions granted the most S&E bachelor's degrees to Latinos. He also commented that if only a few other institutions were to become similarly productive, the number of Latino S&E bachelor's degrees would increase sharply.

A 31.6 percent increase in the attainment of doctoral degrees by Latinos between 1994 and 2001 could be viewed as a cause for celebration, until we see that the number of S&E doctoral degrees awarded to Latinos is still only in the hundreds. Chapa stated that this pipeline might be better termed a "pipette," since its yield is so small. Added to this is the fact that Latino males are severely underrepresented in higher education, and all the more so at the doctoral level. Chapa cautioned, too, that among Latinos, 42 percent of S&E Ph.D.s granted in 2001 went to temporary visa holders, rather than to Latinos educated in the United States.

Chapa concluded that the extremely low numbers of Ph.D.s granted to Latinos compared to the very large number of Latinos enrolled in higher education (1,157 vs. 1.5 million) suggests that the number of future Latino Ph.D.s could increase greatly. However, this will depend more on the future we create than on any discernible trend. By addressing the pervasive achievement gap and high drop out rates for Latino students, we can make sure that they persist in schooling at the postsecondary level and graduate to join an educated labor force able to compete in a global economy.

Strengthening the Pipeline

Patricia Gándara, Professor of Education at the University of California, Davis, leads the Education Policy Studies program at that campus. Her research focuses on access to higher education for low-income and minority students, and on the education of English learners. Her paper, "Strengthening the Academic Pipeline Leading to Careers in Math, Science, and Technology for Latino Students," took a closer look at the achievement gap issues within the pipeline – their origins and their persistence – and offered some bold proposals to address the problems.

To strengthen the pipeline, she said, we must begin at the very beginning: focusing on broad academic skills, attending to language issues, and realizing that school reform efforts alone will not be sufficient to close the gaps. Latino children enter school significantly behind their White and Asian peers, in large part because of nonschool factors that affect achievement. Latino students are poor – 28 percent of them live in poverty – and Latino parents have the lowest overall education levels of any ethnic group in the United States. A strong sense of family, as well as linguistic and cultural traditions, combine to make many Latino parents reluctant to send their young children to preschool programs. As a result, they enroll their children in kindergarten at younger ages, placing them at a further disadvantage compared

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(4) increasing the supply of Latino prospects for STEM tenure-track faculty

- create a vision for comprehensive programs of research and policy initiatives to increase the number of Latino students pursuing STEM careers
- strengthen the partnership of the College Board, ETS, and the Hispanic Research Center of Arizona State University in focusing on expanding the success of Latino students

Representing a wide network of scholars and policy-makers who focus on Latino achievement issues, conference participants came from 18 states, 21 colleges and universities, 17 national and regional organizations, and 5 local and state governments. The conference was built around six commissioned papers by prominent scholars, including Jorge Chapa (Indiana University); Patricia Gándara (University of California – Davis); David A. Payne (ETS); Michael T. Nettles and Catherine M. Millett (ETS); Jamie P. Merisotis (Institute for Higher Education Policy); and Gary D. Keller and Antonio A. Garcia (Arizona State University). For each paper, two or three policy-makers or practitioners, knowledgeable about Latino educational issues, participated as reactors who offered their opinions and engaged the audience in full discussion of the ideas set forth in the research. See the box on page 5 for a list of the reactors.

The Conference Planning Committee was drawn from the three sponsoring organizations: the College Board, ETS, and the Hispanic Research Center at Arizona State University. Five of the research papers have appeared in the Journal of Hispanic Higher Education, Volume 5, Number 3 (July 2006). This issue of ETS *Policy Notes* presents an overview of the conference and summaries of its six papers for a broader audience.

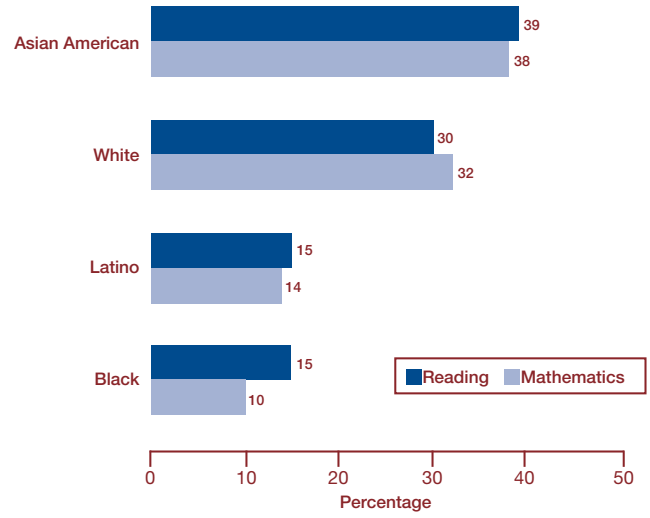
to children who have the benefit of preschool and more time to develop language and learning skills.

Gándara reviewed early intervention efforts, citing research conclusions that such programs can have a long-term effect on cognitive functioning and achievement levels, as well as intellectual, social, and developmental outcomes for children. Without these interventions, achievement gaps open early and remain or grow worse. Figure 2 shows data from the Early Childhood Longitudinal Survey that illustrate the achievement gap in reading and math at the beginning of kindergarten. Latino children are underrepresented among the top scorers. This gap persists into high school, where SAT data show that the average verbal and mathematics scores of the top Latino quintile are 598 and 646, respectively, compared to 663 and 729 for the top-scoring White quintile.

K-12 interventions, according to Gándara, are almost always directed at whole-school improvement. They focus on reforming schools that enroll large numbers of poor and ethnic minority students, rather than on raising the performance of particular groups of students. Whether or not these interventions are effective is difficult to say, however, since most studies of school reform do not study schools for a long enough time or employ adequate comparisons to be able to draw solid conclusions.

As a contrast to the school reform model, Gándara reviewed three intervention programs targeted at Latino students: High School Puente (a college-access program); ALAS (a middle

Figure 2: Percentage of Kindergartners in the Highest Reading and Mathematics Quartiles, by Racial/Ethnic Group, Fall 1998



Source: U.S. Department of Education, National Center for Education Statistics, *America's Kindergartners*, 2000.

The reactors included the Honorable Ruben Hinojosa, U.S. Congressman (TX-15); Brian L. Foster, Provost, University of Missouri – Columbia; Raymund A. Paredes, Commissioner of Higher Education, Texas Higher Education Coordinating Board; Amaury Nora, Professor and Director, National Center for Hispanic Student Success, University of Houston; Richard P. Duran, Professor, University of California, Santa Barbara; Antonio R. Flores, President, Hispanic Association of Colleges and Universities; Jeanett Castellanos, lecturer, Department of Social Sciences and Chicano/Latino Studies and Director, Social Science Academic Resource Center, School of Social Sciences, University of California – Irvine; Richard O. Hope, Vice President, The Woodrow Wilson National Fellowship Foundation; Raul Yzaguirre, Presidential Professor in Practice in Community Development and Civil Rights, Arizona State University; Richard Kazis, Vice President, Jobs for the Future; Roosevelt Y. Johnson, Director, Division of Human Resource Development, National Science Foundation; and Richard A. Tapia, University Professor, Department of Computational and Applied Mathematics, Rice University.

school intervention aimed at reducing drop out and truancy in a school serving almost all Latino students); and AVID (a college access program serving a variety of students, but where Latino effects could be disaggregated). Each of the programs had been able to prove empirically that outcomes for participants were significantly greater than for nonparticipants. Certain features were common among the three programs: (1) intensive monitoring of program participants by an adult; (2) an articulated program that reached across grade levels and extended over the secondary years; (3) consistent messages to raise aspirations; (4) building of group cohesion among peers and a sense of membership in the school and the program; and (5) in the case of the two college-access programs, access to a rigorous curriculum and scaffolded support to succeed in that curriculum.

Access to a rigorous curriculum continues to be a critical issue for Latino and other minority students. Gándara cited evidence that Latino and other underrepresented students are more likely to be assigned to low curriculum tracks independent of their test scores than are White students. This is especially true in the case of mathematics courses, where algebra continues to be the major gatekeeper for entry into the college-preparatory track. Certainly Latino students will not go on to STEM careers if they do not have rigorous preparation in math; but without such preparation they are not likely to go on to college at all. Thus, while school reform aimed at offering greater academic opportunities to Latino students must form part of the solution to the leaks in the pipeline to college and STEM careers, it will not be enough to close the considerable gaps in opportunity and outcomes for these students.

According to Gándara, one finding that recurs in many studies of specific interventions is that the longer a student is exposed to the "treatment," whether it is school reform or individualized enrichment, the better the outcomes appear to be. She suggested that rather than segmenting intervention efforts by level of schooling, such programs should reach across school sectors to provide continuous support for students, serving cohorts of students from 7th or 8th grade through high school graduation. Additionally, they should provide services that promote academic performance in core areas including math, information about the necessary costs to attend college, and professional development for teachers and community members in the program.

Strengthening the pipeline to college and beyond for Latino students will require far more than bringing in the cavalry during high school and offering special college-access programs to inspire, prepare, and guide them into college. And, moving them into the math/science pipeline will require a broad strategy that extends beyond those disciplines to preliteracy skills. Some researchers argue that neural patterns established in the highly sensitive early years of life may be impossible to modify with any of the interventions we have devised to date. Others are more optimistic about the plasticity of the human brain and argue that intensive intervention can change the course of development. No one, however,

argues seriously that such a thing can be accomplished without significant investment of resources.

What would it cost to really make a difference? Given the data we have on the costs of interventions, it is reasonable to assume that we would have to invest twice the national average of per-pupil expenditures the nation now invests in K-12 education, at least for the early formative years (from birth to age 3) where intensive intervention is necessary, and half of that (or 1.5 times our current K-12 investment) from age 3 to high school graduation. Such an investment would provide a seamless web of support and enrichment for those students whose families cannot provide the resources needed to even the playing field for them.

Developing an Assessment *of* and *for* Learning

David G. Payne, Executive Director of the Graduate Record Examinations® Program at ETS, discussed the paper he coauthored with Jacqueline Briel, John Hawthorn, and Karen Riedeburg: "A GRE® Test for the STEM Disciplines: Developing an Assessment OF and FOR Learning." To set the context, Payne reviewed the challenges facing the STEM fields on the institutional, national, and international levels, as well as the challenges for the GRE program.

Among the international challenges, he cited increased competition for international students, greater opportunities for STEM students and faculty in universities worldwide, and increased competition for STEM graduates in industry and the academy. He noted the growth in the United States of foreign-born science and engineering (S&E) doctorates, foreign and foreign-born tenured and tenure-track faculty, and the slow increase of the overall domestic student population in the STEM fields at both the undergraduate and graduate levels. Minority students, in particular, are not enrolling in numbers proportional to their presence in the overall population. From the business community and from the federal government there are calls for increasing the number of STEM graduates, and the academic community is calling for additional STEM faculty, especially minority faculty.

The GRE General Test is one of several measures used by graduate admissions committees to determine which students are most likely to be successful in their programs. It contains a Verbal Reasoning (VR) section and a Quantitative Reasoning (QR) section. While the VR does a respectable job in differentiating among applicants, the current QR measure, based on high school-level mathematics, does not differentiate among applicants that cluster at the top of the scale. Currently, 50 percent of international examinees score between 760 and 800 on the GRE Quantitative measure. For all applicants (i.e., domestic and international), the median score for the QR is well over 700 for students in engineering and the physical sciences. This means that for many STEM programs, the GRE Quantitative measure does not provide useful information to admissions committees. Because of this, there is a growing concern raised in the STEM disciplines about the relevancy of the GRE for admissions purposes. Other issues center around the achievement gaps recorded on the QR by underrepresented minorities, women, and first-generation college students. These pose a major challenge for members of those groups who wish to enter and complete graduate degree programs in the STEM disciplines. Thus, there are concerns both with the measurement at the top of the scale and the achievement gap for underrepresented minorities.

In response to these concerns, ETS is considering the development of a new GRE® STEM test. This effort would support the goal of broadening

participation in the STEM fields while, at the same time, providing admissions information to graduate programs that will promote improved student success. If ETS develops the GRE STEM test, it will be important to keep in mind that the new test may reveal a large achievement gap between minority and majority students, between first-generation students and those whose parents have college educations, and between male and female students. But ETS is proposing to link the assessment *of* learning with assessment *for* learning with this test. The combination of a new GRE STEM test and a well-articulated learning scaffolding that supports student progress toward mastering critical skills will represent an important contribution to graduate programs and to the faculty and staff working with undergraduate students.

Payne outlined earlier GRE efforts to develop a more demanding mathematical reasoning assessment, and the lessons learned from those previous attempts. He described current thinking and alternatives under consideration that would increase the level of presupposed mathematical knowledge and increase the complexity of the reasoning involved in answering the questions. Since the current Quantitative measure on the GRE test already presents a daunting challenge to candidates with a weak mathematical background, the remedy almost certainly requires offering a separate measure for STEM candidates and continuing to offer the current measure to others. Payne described the options under consideration for a new assessment and discussed the pros and cons of each alternative.

According to Payne, there are three major steps involved in developing a GRE STEM assessment that will aid admissions committees and help undergraduate students as they prepare for careers in the STEM fields:

- Identifying the specific skills that need to be assessed for admissions and student aid decisions in the STEM disciplines
- Developing the test and learning scaffolding
- Effectively utilizing the evidence-centered-design and scale-score anchoring procedures to improve student learning

Evidence-centered-design (ECD) seeks to clarify what is being measured by a test, support inferences made on the basis of evidence derived from the test, and develop claims about what the test taker knows and is able to do. It allows test developers to make explicit the claims about students' knowledge, skills, and abilities that would be useful in evaluating applicants across all of the STEM disciplines. The score scale anchoring process is used to confirm the validity of an operational assessment and strengthen its links to curriculum. The process involves selecting questions that anchor at given locations on the score scale.

It will be challenging to link the assessment specifically to undergraduate curriculum in the various disciplines, but this is something ETS has done frequently with other tests. Much more difficult, however, will be the next step: feeding this information about what it takes to succeed in graduate school back to the undergraduate curricula to strengthen STEM-discipline programs nationwide. To do this, ETS will partner with the higher education and graduate communities, working with faculty in STEM disciplines who are involved in graduate education and with faculty and staff involved in teaching, tutoring, and mentoring undergraduates in the STEM fields, particularly those who work with underrepresented minorities, first-generation students, and women. The idea is to see where the skills measured in the GRE STEM test are covered in the undergraduate curriculum and in tutoring programs. As experience and data from the STEM test are gathered, ETS staff will have a better understanding of what areas need strengthening, and these statements of skill areas can be used as the basic learning scaffolding to effect change in undergraduate programs and campus tutoring

services. The goal here is to feed back information on performance on the GRE STEM to help with improving learning at the undergraduate level.

Expanding and Cultivating the Hispanic Doctoral Workforce

From their extensive research on doctoral student experiences, Catherine M. Millett, ETS Research Scientist and Michael T. Nettles, ETS Senior Vice President and Edmund W. Gordon Chair for Policy Evaluation and Research, focused on funding, mentoring, publishing, and degree completion for Hispanic doctoral students. They also described some of the social and academic challenges that confront Hispanic students along the way to a doctoral degree.

Offering statistics supported by several of the conference speakers, Millett and Nettles noted that Hispanic individuals may have the potential to have the greatest effect upon changing the demographic makeup of the U.S. STEM workforce over the next 50 years. The estimated 41.3 million Hispanics in the United States now constitute one-seventh of the total population, and the Hispanic population is growing at a rate of 3.6 percent per year, compared to the overall population growth rate of 1 percent. The national imperative to diversify the doctoral-trained workforce in the STEM fields is also a policy priority for the U.S. Department of Education, as reflected in its designated areas of national need.

Doctoral degrees often lead to teaching positions, but the numbers for Hispanics are small. In the STEM fields, Hispanic faculty represented from 2 to 4 percent of all faculty. In 2003, Hispanic citizens earned just 1,270, or 3 percent, of the total doctoral degrees awarded in the United States. Within the STEM fields, the numbers are even smaller. In mathematics, for example, a total of 516 doctoral degrees were awarded, with Hispanics earning just 16.

Nettles and Millett identified four critical aspects of the doctoral student experience and then examined the Hispanic STEM experience through that prism. The four aspects are:

- Research assistantships
- Faculty mentors
- Research productivity and publication, and
- Doctoral degree completion

Research productivity and degree completion can be seen as outputs produced from the resources (funding and mentoring) invested in acquiring a doctoral education. Because funding and mentoring (inputs) influence research productivity and degree completion (outcomes), they are examined to determine what level of influence they each have on these outcomes. In other words, they function as both inputs and outcomes.

By focusing on these four critical experiences, the researchers hope to contribute to the national dialogue on how best to prepare entering doctoral students for their doctoral program experience, as well as to consider what elements are critical for all doctoral students.

Equitable access to these critical experiences is central to the process, so that all students — regardless of race/ethnicity, gender, and personal background — have the opportunity to participate. Nettles and Millett's recent book, *Three Magic Letters: Getting to Ph.D.*, is based on a survey of more than 9,000 doctoral students in five major fields of study (education, engineering, humanities, science, mathematics, and the social sciences) from 21 doctoral granting institutions. Two questions guided the analyses of the Hispanic STEM doctoral experience: (1) What are the differences between Hispanic and White doctoral students in having research assistantship opportunities, in faculty mentoring, in research productivity, and in degree completion? (2) What contributes to these differences? They also examined issues that various constituents of the graduate enterprise can address either

individually or as a community. While the four experiences listed above pertain to individual students, they can be influenced and shaped by the larger graduate community.

Research Assistantships. For many students, an enduring concern is financial. The prevalence of research assistantships varies by field of study, with students in engineering (82 percent) and science and mathematics (69 percent) having a greater opportunity for assistantships than students in the humanities (33 percent) or education (28 percent). When the researchers compared Hispanic students to White students across all fields, they found that Hispanic students were disadvantaged with respect to being research assistants (44 percent vs. 51 percent). However, in engineering and science and mathematics, Hispanic students are not disadvantaged compared to White students in receiving research assistantships over the course of their doctoral programs.

Having a Faculty Mentor. Overall, 70 percent of doctoral students report having a mentor. In the aggregate, when examining differences by race/ethnicity, Hispanic and White students were comparable (67 percent vs. 71 percent), and this pattern holds when comparing Hispanic with White students in the five fields of study.

Research Productivity and Publishing. Considering that one of the goals of graduate school is to train future researchers in industry, government, or the academy, Nettles and Millett examined the acquisition of skills and human capital during the training process. Their goal was to learn about students' exposure to the research enterprise and the opportunity they had to participate. Research productivity was broken into its component parts, and students were asked about their participation in more than 20 different types of scholarly activities. They received credit for sole-authored or joint-authored work. An aggregate measure of research productivity was also developed, taking into account whether a student had done at least one of four particular measures: presented a paper, published an article in a refereed journal, published a chapter in an edited book, or published a book. Half of the students had research productivity. More than a third had presented a paper at a conference, and slightly less than a third had published a refereed article. Publishing articles was more prevalent in engineering (47 percent) and sciences and mathematics (44 percent). Overall, Hispanic students reported lower publishing rates compared to White students (23 percent vs. 30 percent). Within field, however, Hispanic students had similar experiences of presenting a paper (either sole- or joint-authored) compared to their White peers.

Degree Completion. The sample included students who completed at least their first year of doctoral study, the assumption being that some of the initial disharmony between students' expectations and the reality of being a doctoral student would have been resolved. For the sample of doctoral students beyond the first year, 62 percent earned their doctoral degrees by 2001. Engineering and sciences and mathematics have the highest completion rates among the five fields of study (75 percent and 72 percent). Looking at the sample as a whole, Hispanic students have lower degree-completion rates than White students (50 percent vs. 61 percent), and by field, Hispanics were less successful than their White peers in engineering (56 percent vs. 79 percent). In further analyses by field to examine the predictors of degree completion, engineering was the only field in which race/ethnicity was associated with degree completion. In engineering, Hispanic, African American, and Asian American students were each less likely to complete their degrees compared to their White peers (6.7 times, 2.5 times, and 1.8 times, respectively).

In summary, the good news is that there appear to be relatively few differences in the experiences of Hispanic and White students in engineering

and sciences and mathematics. The one troubling exception, even when all appears to be equal, is that Hispanic students have a lower degree-completion rate in the field of engineering. But even if the experiences of Hispanic and White STEM doctoral students are similar, there still remains much to do to increase the number of Hispanic doctoral degree recipients in the STEM fields. Working with faculty and administration on doctoral campuses, education policy-makers can help reduce the obstacles that stand in the way of the growing population of Hispanic youth.

It's Not Rocket Science!

Providing details and personal insights into the 25-year collaboration between the College Board, ETS, and the Hispanic Research Center at Arizona State University (ASU), Gary Keller offered a three-part account of the collaboration. His paper was titled, "It's Not Rocket Science: 25 Years of Successful Latino Student Advancement … and the Prospects for 25 Years More." Keller, Regents' Professor and Director of the Center, authored the paper with his colleague, Antonio G. García, Associate Dean in ASU's College of Engineering and Associate Director of the Center.

Keller shaped his remarks to cover a historical overview, development of a national academic intervention project to recruit Latino students into STEM fields and retain them from secondary school through the Ph.D., and a call to action. According to Keller, the collaboration demonstrates that educational aptitude and achievement tests can be and have been used productively for the advancement of Latino students. This has been especially true for the battery of Advanced Placement® Program (AP) examinations and for the Graduate Record Examinations (GRE) program — all integral parts of the partnership programs.

Overview

The collaboration was forged in 1979, a time when the merits of standardized testing were being challenged. The Hispanic Higher Education Coalition (HHEC) and other groups representing Latinos were vocal on the efficacy of standardized tests and their appropriateness for use with linguistically diverse communities. The HHEC made several recommendations to the testing industry that led to the development of standards and practices for fairness in test development, administration, and scoring. For example, ETS led the industry in responding to the fairness issue by creating a procedure called differential item functioning (DIF). In 1982, the College Board responded positively to the HHEC recommendation that the distribution of scores by race and ethnicity be published. The HHEC concluded with an expression of support for the testing industry and for objective tests, including standardized tests, although at the same time it fully supported the movement toward more accountability in testing.

The responsiveness of both organizations to HHEC's recommendations resulted in positive changes in policy and disclosure, as well as a wide-ranging collaboration among the College Board, ETS, and the Hispanic professional community, the latter headquartered since 1986 at the Hispanic Research Center of Arizona State University (ASU).

The interactions were informal from 1979 to 1984, when the HHEC, College Board, and ETS agreed to establish a formal partnership. The HHEC polled its organizational members on the priority issues, and this helped establish an agenda for the three organizations for practical, interventionist projects and for research studies. At the same time, the College Board and ETS each set aside an annual budget for work with the Latino community. The three organizations have met periodically and completed projects since 1984.

Projects

From the beginning, the three organizations worked as operational partners, with joint

responsibility for conceptualization and execution of each project. Collectively, they identified what was needed to increase the access of U.S. Hispanic students to higher education, and they developed projects to address those needs. Some of the programs developed by the collaborating partners are described below.

- The *Algebridge* diagnostic and instructional program helps 7th-, 8th-, and 9th-grade minority students learn algebraic thinking through the context of the mathematics that they have already studied, and prepares them to take high school algebra.
- *TestSkills,* a one-semester course of test familiarization and academic review of English and mathematics for minority students, usually in the 10th grade, to help them prepare for the Preliminary Scholastic Achievement Test/National Merit Scholarship Qualifying Test and other admissions tests.
- *Sí Se Puede!* Information on Academic Planning and Obtaining Financial Aid provides appropriate academic and financial planning materials to both minority students and their parents, as well as to high school guidance counselors.
- *Project 1000*, a national program created to assist underrepresented students applying to graduate school, is one of the genuinely signal successes of the partnership. Using a single application, students may apply to up to seven of the more than 88 participating Project 1000 institutions.

Directly or indirectly, the collaboration has been responsible for supporting a host of scholarly conferences and publications. One of the most significant outcomes of the collaboration is the National Science Foundation-funded Western Alliance to Expand Student Opportunities (WAESO), run by the Hispanic Research Center. Intended to increase the number of degrees awarded to minorities in the STEM fields, the program has been very successful.

During planning for the celebration of the ETS - College Board - HRC collaboration, many suggestions were made about how the partnership could contribute to a seamless transition of Latino students from middle and secondary school through college graduation. The agencies committed to launching a series of activities that would begin with a regional focus and then move to a national level.

- The initial plan is to work in South Texas communities on a series of interventions that would include middle school through high school and college.
- Adopting a focus on increasing the number and variety of articulation agreements between community colleges and four-year institutions should yield positive results. Most Latino college students are in community colleges, and the pipeline is very constricted at the point of transition from the community college to the four-year college.
- The three collaborating agencies will develop a series of activities to promote college readiness. They will outline their proposal in a document entitled *College Now! In Texas*.

Sí Se Puede!

In spite of research attesting to the dire state of Hispanics and other minorities in higher education, programs to help these students succeed do exist, said Keller. An analysis of programs that work led Keller to the conclusion that helping Hispanic and other students is not an exercise in rocket science, nor a prospect that requires inordinate amounts of money, staff, equipment, and other material resources. Simplicity, sincerity, focus, and diligence are the keys. It's not about rocket science. It's about recognition. Or, as César Chávez or Jaime Escalante, a Bolivian mathematics teacher in East L.A. Garfield High School would say: ¡Sí se puede!

Keller and García's paper can be requested by contacting the Hispanic Research Center at Arizona State University: www.asu.edu/clas/hrc.

CONFERENCE AWARDS

Special awards were made to individuals who significantly improved the quality of education and the educational and career opportunities of Latino students. The awards, named for former ETS President Gregory R. Anrig; George H. Hanford, President Emeritus of the College Board; and Gary D. Keller, Regents' Professor and Director of the Hispanic Research Center at Arizona State University, went to:

- **Anrig Award:** To Faridodin Lajvardi and Allan Cameron, teachers who inspired and led the Falcon Robotics Team, a group of undocumented Hispanic high school students from West Phoenix, Arizona, to victory in the third annual Marine Advanced Technology Remotely Operated Vehicle competition (National Underwater BOT Championship).
- **Hanford Award:** To William Bowen, President of the Mellon Foundation, for his extraordinary efforts to open access to higher education to Latino and other students of color or limited economic means.
- **Keller Award:** To Richard Tapia, Professor of Engineering, Associate Director of Graduate Studies, and Director of the Center for Excellence and Equity in Education at Rice University, for his creative and highly successful programs that have helped the Rice University Computational and Applied Mathematics Department become a national leader in producing female, Latino, and other underrepresented Ph.D. recipients.

A donation of $10,000 will be made in the name of each recipient to an organization of his choice that supports the production of Latino students who pursue careers in STEM fields.

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