

SPECTRUM



A report on underrepresented minorities in astronomy

DIVERSITY AND THE PH.D.: A Review of Efforts to Broaden Race and Ethnicity in U.S. Doctoral Education

by the Woodrow Wilson Fellowship Foundation, excerpted with permission

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An expertise gap besets the United States. The Ph.D. cohort, source of the nation's college and university faculty, is not changing quickly enough to reflect the diversity of the nation. The next generation of college students will include dramatically more students of color, but their teachers will remain overwhelmingly white, because a white student is three times as likely as a student of color to earn the doctorate.

This expertise gap extends beyond the professoriate. It is also diminishing our national leadership in any number of professional endeavors, from determining economic policy to designing museums to inventing new pharmaceuticals. The Ph.D.s who lead the way in the world of thought and discovery are far more monochromatic than the population. In all, if diversity matters, it matters greatly at the doctoral level.

As this report indicates, higher education has demonstrated a real intent to diversify the American doctorate, and several major philanthropic foundations and government agencies have made mighty efforts to assist. Yet, while there has been real progress, these organizations confront powerful forces of history, as well as wide inequities in economic and social status. The fact remains that doctoral programs have made significantly less progress in diversifying than have business and government, or for that matter other levels of the educational system. Even as we acknowledge the prodigious efforts and incremental progress made thus far, the nation and the academy must look frankly at the job ahead.

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Einstein and Racism in America

by Fred Jerome, reprinted with permission from Physics Today, © 2005, American Institute of Physics

"The more I feel an American, the more this situation pains me. I can escape the feeling of complicity in it only by speaking out."

— Albert Einstein (1946)

In September 1946, Albert Einstein called racism America's "worst disease." Earlier that year, he told students and faculty at Lincoln University in Pennsylvania, the oldest black

college in the Western world, that racial segregation was "not a disease of colored people, but a disease of white people," adding, "I will not remain silent about it."¹

That was then

Disease? A skeptical reader may wonder if Einstein was overstating the case. To appreciate this word

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HIGHLIGHTS:

- *Learn about Einstein's little-known involvement in, and outspoken support for, civil rights.*
- *Read about two recent national reports on the importance of producing more minority PhD scientists and engineers.*
- *Learn about NASA's efforts to enhance space science research and education at minority institutions.*
- *Find maps useful for locating minority institutions around the country.*

Diversity and the Ph.D. (cont'd)

(Continued from page 1)

The dimensions of the challenge are startling. In 2003, one in four Americans was African American or Hispanic—in fact, nearly one in three, in the usual age group for doctoral recipients—but only one in nine Ph.D.s conferred on U.S. citizens that year was awarded to an African American or Hispanic student. When the full context of U.S. doctorates that same year is considered, including the one in three Ph.D.s that went to foreign students in 2003, fewer than one in fourteen of the *total* Ph.D.s awarded in U.S. universities that same year went to an African American or Hispanic U.S. citizen.

Why be concerned with doctoral diversity? The reasons are practical, ethical, and intellectual. At the most pragmatic level, the nation must strengthen domestic doctoral enrollments to capitalize fully on the nation's intellectual resources. The failure to do so is dramatized by a research dependence on foreign students, who received more than 35 percent of all U.S. doctoral degrees in 2003, and as many as one-half to two-thirds of Ph.D.s in engineering and the bench sciences. While U.S. doctoral institutions have boasted justly of serving as classrooms to the world, these circumstances render the nation vulnerable to changes in geopolitics and education that could leave the academic workforce vastly underpopulated. Indeed, recent studies suggest that overseas enrollment in American graduate schools is declining, a development perhaps predictable after 9/11, but troubling nonetheless for the academic market. For this reason alone, the United States needs to enroll a broader base of American citizens in its graduate programs.

While a strong presence of international students constitutes one desirable form of academic diversity, it must not substitute for the form of diversity we are discussing here. In 2003, nearly five times as many citizens of other nations (some 14,300) earned U.S. doctorates as did U.S. citizens who are African American and Hispanic (roughly 3,000). The fact that so many more U.S. doctorates go to foreign students than to U.S. minority students raises another aspect of the issue: Educating the world's students while neglecting significant

groups of the national population is a vast inequality at the highest academic level. This situation diminishes the value of American citizenship for too many of our citizens, and runs counter to the founding principles of the United States.

However one might address practicalities and argue ethics, there is a fundamental academic reason to grapple with these issues. The diversification of the Ph.D. is in fact the diversification of the American mind, a way of ensuring the hybrid vigor of the national intellect. While the manner in which an individual thinks has any number of complex causes, cultural identity certainly plays a part. Academic disciplines also have their own cultures—habits of thought. The mingling of cultural and disciplinary habits guarantees the range and fullness of intellectual discovery that earns the epithet “cosmopolitan.”

The diversification of the American mind is therefore not a politically correct platitude, but a first scholarly and pedagogical principle. ***Diversity and the Ph.D.***, sponsored by grants from the Atlantic Philanthropies and the Andrew W. Mellon Foundation, is an integral part of the Responsive Ph.D. initiative at the Woodrow Wilson National Fellowship Foundation. In this initiative,

“Doctoral programs have made less progress in diversifying than business, government, and other levels of education.”

19 leading doctoral institutions have explored innovations in the arts and sciences Ph.D.: ways to promote more adventurous scholarship; provide better teaching preparation; forge stronger connections between graduate institutions and the social sectors they serve—including business, government, cultural and nonprofit organizations, the public schools, and undergraduate education in a variety of institutions; and increase diversity among doctoral students. The presence of more faculty from underrepresented minorities, the Woodrow Wilson Foundation believes, can position universities to achieve greater successes in every one of these areas. Two meetings held in 2001 with leaders in doctoral education, including representatives from a number of the organizations described in this report, underlined and reinforced both that sentiment and the urgency of the need to focus on minority doctoral recruitment and retention.

Diversity and the Ph.D. surveys selected na-

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Einstein and Racism in America (cont'd)

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choice requires examining specific symptoms of the segregation sickness so widespread in America some fourscore years after the abolition of slavery. Black soldiers—a million of whom took part in the war to defeat Nazism—when allowed into combat at all, fought only in segregated units under white officers.

Racial segregation was the rule in most of 1946 America, with separate and decidedly unequal

public and private facilities, from housing and schools to buses and beaches, throughout the South and many other parts of the country, including Einstein's adopted hometown of Princeton, New Jersey. Some textbooks and documentary films have since depicted the separate waiting rooms in Southern bus and train stations and separate drinking fountains marked "colored" and "white." But the disease went deeper.

Even the blood donated to save lives was given only at racially segregated blood banks (when blacks were allowed to give blood at all), with "white" and "colored" blood kept in separately labeled storage units. In 1942, in the midst of a world war, the American Red Cross met in Washington and concluded that while there was no difference in the blood of the races, "most men of the white race objected to blood of Negroes injected into their veins." The policy of racially segregating blood continued in some parts of this country well into the 1960s!²

Einstein's pledge not to remain silent about racism has an ironic echo today: Virtually all traces of his passionate commitment to civil rights, including his friendship with and support for African American thinkers Paul Robeson and W. E. B. DuBois, have been erased from his image—the grandfatherly, absent-minded genius too preoccupied with abstract equations to think about the day-to-day cares that consume most mortals. Indeed, Einstein's speech at Lincoln is nowhere to be found—nor even quoted—in the scientist's archives or in the plethora of his biographies and anthologies. Were it not for its wide coverage by the black press at the time, we would have no inkling of what he had said. Yet the great scientist was far from silent, speaking out and joining numerous campaigns for social justice. Just a few months after his talk at Lincoln, he co-chaired the American Crusade to End Lynching with Robeson. In the year following the end of World War II and the defeat of Nazism, a wave of lynching hit the US (mostly but not only in the Southern states), primarily targeting returning black GIs who many white southerners felt had to be reeducated as to their proper place.

This is Now

For physicists concerned about racism today, the

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SPECTRUM

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The Talent Imperative: Meeting America's Challenge in Science and Engineering

by BEST: Building Engineering and Science Talent, excerpted with permission

BEST—Building Engineering & Science Talent—was formed in 2001, before 9/11, with funding from the National Science Foundation, Department of Defense, NASA, Department of Energy, National Institutes of Health, Department of Agriculture and the Department of Commerce to address the challenge of developing more science and engineering talent in the United States.

Even before the formation of BEST, framing America's problem pointed quickly to the source of America's solution: Americans. The traditional and disproportionate source of America's engineering and science talent—white males—is a decreasing percentage of the workforce.

Despite decades of effort to broaden its base, the U.S. science and engineering workforce remains about 75 percent male and 80 percent white.

Women, African Americans, Hispanics, Native Americans and persons with disabilities—the “under-represented majority” that makes up two-thirds of the entire U.S. workforce—account for only 25 percent of the technical workforce.

Our greatest untapped resource: America's under-represented majority.

Consider women, for example. They have emerged as the most educated segment of our society over the past quarter century, but large numbers still view technical fields as off-limits. Imagine the infusion of knowledge and creativity if they were to choose science or engineering at the same rate that they have opted for business, law or medicine?

Or take our burgeoning Hispanic population. Half of California's current kindergartners are Hispanic, yet the state's Science and Technology Council reports that only 5% of Hispanics who entered ninth grade in 1996 completed high school in 2000 fully ready to start college. What if that figure were multiplied 10-fold over the next decade? What could those kids, along with their African American and Native American classmates, bring

to our innovation enterprise in 2025 and beyond?

It is easy to see why we have been slow to act on the Talent Imperative. Our economy has not felt the pinch. The best and brightest from around the world have streamed to our universities and laboratories. The aging of our current science and engineering workforce has not really hit home. Meanwhile, warning signals keep flashing. Our dependence on international talent is increasing, even as U.S. firms locate growing numbers of state-of-the-art facilities in countries like China and India that

have improved massively in science and engineering education. These trading partners and others recognize that human capital is their greatest strategic asset, and they are only beginning to leverage it.

The message is clear. Today's relentless search for global talent will reduce our national capacity to innovate unless we develop a science and engineer-

ing workforce that is second to none. Meeting the Talent Imperative is not just a matter of equity, but a compelling national interest.

Higher Education

As the institutions that award advanced degrees, research universities are the strategic bridge between pre-K-12 education and the workplace. The most important test facing these crown jewels of U.S. education over the next decade—along with minority-serving institutions, women's colleges and community colleges—is whether they can meet our need for world-class technical innovation by developing a talent pool that looks so different from decades past. By 2010 women will earn more degrees than men at every level of higher education from associate degrees to doctorates. By 2015 the nation's undergraduate population will expand by more than 2.6 million students, 2 million of whom will be students of color.

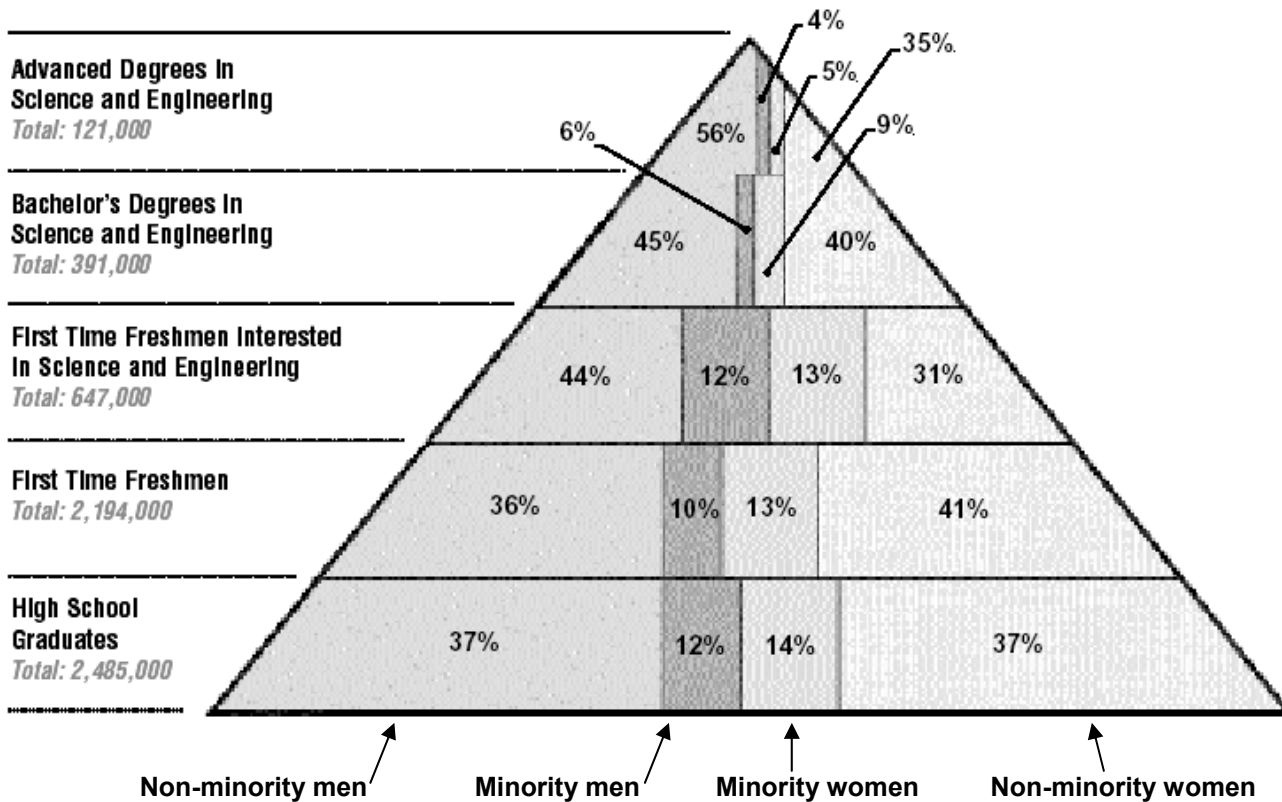
The record to date shows how profound a change will be necessary. Lack of money, limited

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*“Bridging to the next level:
Successful programs build
institutional relationships to
enable students to progress
through the educational
system.”*

Lost Talent in Higher Education

(Rounded numbers)



Minority = Black/African American, Hispanic, and American Indian.

Source: Joan Burrelli, NSF, based on 1999 Common Core of Data, U.S. Department of Education, National Center for Education Statistics (NCES); NCES, 1998 IPEDS Fall Enrollment Survey; UCLA Higher Education Research Institute, 1998 American Freshman Survey (estimate); and NCES, 1998 IPEDS Completions Survey.

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faculty commitment to teaching, social bias and other factors have taken a disproportionate toll on under-represented groups. African American, Hispanic, and Native American undergraduates leave technical majors in large numbers and are scarce at the graduate level. While women are doing better, their numbers have declined in such high-potential fields as computer science. At the same time, the huge diverse pool of talent in the nation's community colleges has scarcely been tapped to expand four-year and advanced degree production in technical fields.

Still, there are encouraging signs of headway. To pinpoint them, the BEST Panel on Higher Education reviewed the literature and developed criteria for judging the effectiveness of university-led programs. Program ratings hinged on the answers to eight questions:

- Was the goal spelled out before the program was launched?
- Were the results the product of the program itself. Did it increase the success of women or minority students?
- Did it add value to the experience of the target population, helping these students move to the next competitive level?
- Can it be adapted elsewhere, used at other sites?
- Was it effective with a population different than the one originally targeted?
- Has the program been in place long enough to have had more than one leader, i.e. is leadership self-sustaining?
- Were there positive unexpected consequences?

BEST identified 124 candidate programs by reviewing federal research program evaluations, the

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Obliterating Myths About Minority Institutions

by Philip J. Sakimoto and Jeffrey D. Rosendhal, reprinted with permission from *Physics Today*, © 2005, American Institute of Physics

A multiyear NASA initiative for developing research partnerships in space science demonstrates that such programs can have great success in attracting minorities to science.

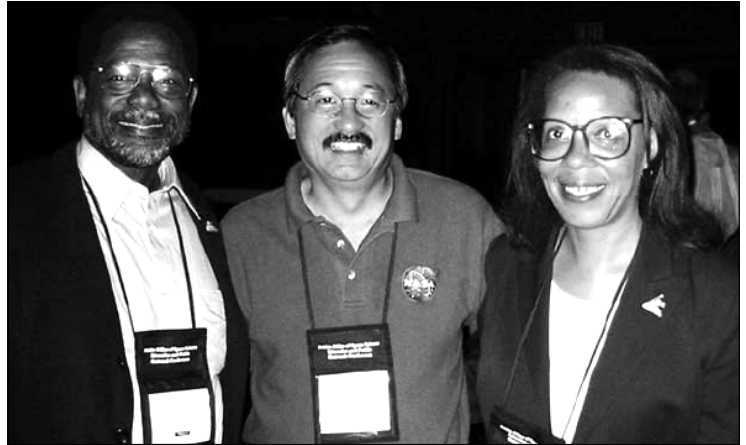
The shelves are full of public and private reports¹⁻³ that deal with the importance, in the US, of attracting more minorities to science and that propose a wide variety of solutions for achieving that goal. Countless conferences have been held and speeches made. But rhetoric and reality are vastly different, and despite substantial investments by a number of federal agencies, shockingly little progress has been made. For example, an analysis conducted at our request by the American Institute of Physics showed that in the 31 academic years from 1973 to 2003, only 21 African Americans, 56 Hispanic Americans, and 11 Native Americans earned doctoral degrees in astronomy.

We believe the lack of significant progress to date arises at least in part from common myths that appear to underlie discussions about why certain racial and ethnic groups are underrepresented in the sciences. Although nobody likes to admit it, everyone has heard some of these myths: “They” are not interested, not qualified, not ready—perhaps even not capable of succeeding—in the sciences. Some people say that because federal agencies have spent many years (and a considerable amount of money) trying and failing to make any significant progress, nothing can be done. Others say that because they see a few minority faces here and there, the problem has already been solved. We say that all of these myths are wrong.

The evidence behind our position comes from nearly eight years of work that we led as officials at NASA headquarters under the auspices of the former NASA office of space science. We feel that the approach we took and the results we achieved are broadly applicable and should be more widely known and discussed.

Separate and unequal

As professional scientists and science managers, we believed that existing NASA programs aimed at bringing minority universities into NASA science were generally misguided. On the surface, the pro-



Philip Sakimoto (center) is pictured with Leon Johnson (left) and Shermane Austin (right), faculty members at CUNY's Medgar Evers College. With a doctoral degree in relativistic astrophysics and a dedication to serving the Harlem community in which he grew up, Johnson dreamed of bringing the world of space science to his students in Brooklyn's multiethnic community. NASA's Minority University and College Education and Research Partnership Initiative (MUCERPI) offered him the opportunity to do so.

grams seemed to do the right things. They matched minority institution faculty members with scientific mentors, and they funded projects that seemed to fall within NASA's scientific purview. However, on closer inspection, it became readily apparent there were many flaws. The mentors were often involved only superficially, and the projects frequently were set-aside projects managed by equal-opportunity personnel who were well meaning but essentially disconnected from the mainstream of the agency's science programs and from the universities themselves. Research institutes were set up that had little connection to the host university's academic program. Technology programs were established for NASA missions that had been canceled. And laboratories at minority institutions often did “piecemeal” for NASA centers.

We decided to do something fundamentally different. Working from inside the NASA office of space science, we made a commitment to devise a program that would break down barriers and bring minority institutions into the heart of the NASA space-science program. To develop our approach,

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we consulted extensively with administrators, faculty, and students at a wide variety of minority colleges and universities. The first thing we asked was whether they were even interested in having space-science programs at their institutions. Up to that point, we had been told another myth—that minority institutions were just not interested in something as esoteric as space science. Much to our surprise, the response to our question was a uniformly resounding and enthusiastic “yes.” When we then asked why such programs didn’t exist, the response was even more surprising. “No one,” they said, “has ever invited us.”

Invited? We usually do not think of space science as something into which one must be invited. But as in most sciences, entry into space science is controlled by what is essentially an apprenticeship system. Entry requires going to a “recognized” graduate school and having an adviser who is a “recognized” expert in the field. Minority universities are usually not “recognized” within this unofficial but highly influential “guild” system. As a result, their students have no obvious pathways into space science, and their administrators and faculty members have no obvious ways to develop such pathways.

We next asked, “What would it take to develop a successful space-science program at your institution?” The responses boiled down to three basic recommendations that went beyond just supplying money: Develop credibility with the institutions by issuing a serious invitation from NASA and the space-science community; establish the mechanisms for building real partnerships with major players in space-science research; and provide the flexibility to build programs that make sense for each individual institution.

The discussions that led to these recommendations were revealing. We learned that science faculty and administrators at minority institutions were quietly aware of the failings of existing federal programs. A number of the individuals we consulted—many having doctoral degrees from “recognized” institutions—were, in fact, insulted by the treatment they had received. They were weary of being placed in nonproductive partnerships, of being steered into projects that did not lead to forefront

science, and of dealing with programs that were prescriptive to the point of being stifling. Most significant, they were weary of being patronized and being regarded merely as sources of highly sought-after minority students while not being recognized as professional scientists in their own right. In short, they were tired of being placed in situations that made them both separate and unequal.

A new approach

We took the comments of faculty and administrators to heart. By combining their recommendations with the methods we normally used to solicit and fund NASA *research* programs, we developed a new approach to minority-institution involvement in space-science education and research, and launched the program that has subsequently come

to be known as the NASA Minority University and College Education and Research Partnership Initiative (MUCERPI) in Space Science.

Establishing genuine partnerships was a critical element of our approach. At our request, the NASA associate administrator for space science sent a personal message to all NASA-funded

space-science researchers asking them to actively participate as partners with minority institutions. It is a credit to the space-science community that investigators at major research institutions across the country responded to that request by serving as partners on proposed projects. In our opinion, they did so because the NASA office of space science was clearly serious about addressing the issue, and because the investigators sensed a genuine opportunity to do something new and meaningful.

From the minority institutions’ point of view, MUCERPI offered exactly what they had wanted. It came as a direct invitation from a science organization within NASA rather than from a niche organization that was not directly involved in the mainstream of NASA’s activities. It required genuine partnerships, and it provided pathways for securing them. It offered the flexibility to tailor projects according to individual institutional situations: Proposals could contain any combination of research capability development, academic program development, and public outreach program development. The only major restriction was that the proposals be

“We had been told another myth—that minority institutions are just not interested in something as esoteric as space science.”

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The Talent Imperative (cont'd)

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reports of high-level commissions, and national awards for achievement in such fields as mentoring and minority degree production. BEST rated 10 programs as either exemplary or promising, based on its evaluation criteria. A sampling of the most highly rated programs appear in this overview.

Consider these as essential ingredients for producing diverse talent for science and engineering:

1. **Institutional leadership:** Leadership matters. Although passionate commitment to diversity may exist at any level on a campus, only commitment by campus administration and senior faculty ensures that the values, goals and paths toward increased participation are essential to everyone's success.
2. **Targeted recruitment:** Attracting the best available students and faculty from under-represented groups is critical, but so is establishing and sustaining a feeder system from pre-K-12, undergraduate and graduate schools.
3. **Engaged faculty:** The traditional markers of academic accomplishment, such as research productivity, do not replace ongoing commitment to diversifying successful student talent. Student outcomes are a critical measure of faculty performance.
4. **Personal attention:** Students' need for personal attention does not end in high school. In the higher education classroom and often the academic residential setting, the value of personal attention remains high in meeting individual needs.
5. **Peer support:** Model programs enable students of all backgrounds to interact routinely and intensively with one another, as well as with students at other levels, post-docs and junior faculty. Developing an ethic of "family responsibility" fosters loyalty to institution, discipline and profession, and creates a new generation of mentors and leaders.
6. **Enriched research opportunities:** Extending research opportunities beyond the classroom, (for example, internships) connects students' experiences to the world of work, establishes mentors and presents career options.
7. **Bridging to the next level:** The path from grade school through university may be uneven for even the most privileged students. Successful

programs to promote diverse student success build both the institutional relationships and the students' skills to enable them to progress through the educational system and envision career achievements.

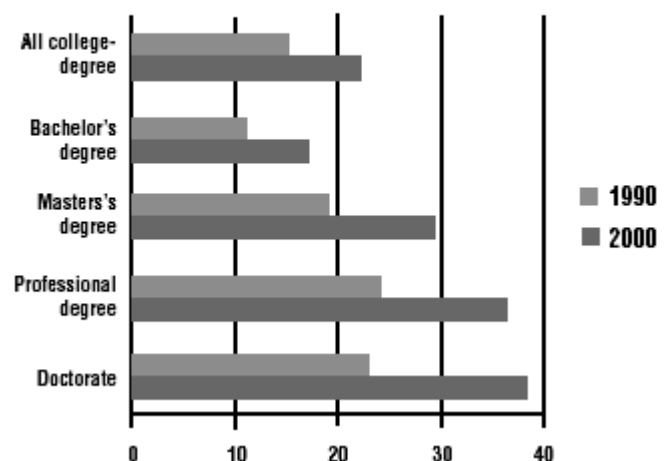
8. **Continuous evaluation:** Effective programs never stop asking basic questions about processes and outcomes: Are we doing the job?

A ninth ingredient that cannot be readily designed into a program, but is often vital to success: comprehensive financial assistance. Successful programs work diligently to construct packages that make academics the student's top priority.

These design principles are not ends in themselves. Instead, they are tools that can be used in many different contexts to expand our technical talent pool. They comprise a package rather than an a la carte menu from which to pick and choose. Their impact hinges on quality of execution as well as a clear-eyed understanding of the specific setting in which they are being applied.

Such insights parallel what BEST found to be effective in pre-K-12 education. In both settings, success does not come on the cheap. But it also takes more than money: Strong leadership, clear objectives, high expectations, personal support, and a link to the next level are fundamentals that apply from pre-school through graduate school.

The Growth of U.S. Reliance on International Talent
SHARE OF FOREIGN-BORN SCIENTISTS AND ENGINEERS IN U.S. S&E
OCCUPATIONS, BY DEGREE LEVEL: 1990 AND 2000



Source: National Science Board (2003).

What Works: Exemplary Undergraduate Programs

The **University of Maryland Baltimore County (UMBC) Meyerhoff Scholars Program** prepares African American students for careers in science, engineering and medicine. Meyerhoff scholars have higher GPAs, are twice as likely to graduate college with a technical degree, and have attained graduate school admission at three times the rate of their counterparts outside the program. This multi-part program reflects every success factor needed to develop the talent of under-represented groups.

Since 1993, first year undergraduate women in science, math, and engineering undergraduate majors at the University of Michigan have had the option to reside in a living-learning community designed to provide academic and personal support. After an initial federal grant, the **University of Michigan Women in Science and Engineering Residence Program (WISE-RP)** is now a campus institution—75 percent of whose grads earn technical degrees compared to less than half of their counterparts on the campus at large.

Innovation in curriculum is one of the hallmarks of the **Gateway Engineering Education Coalition**, begun at Drexel University in 1988 and now encompassing eight additional institutions. Gateway schools seek to create engineering professionals proficient in content, but also well rounded as individuals and citizens. The program mainstreams women and minorities from the day of their admission, providing support programs that contribute to retention and graduation rates significantly above national averages.

Four Historically Black Colleges and Universities and the University of North Carolina at Chapel Hill began the **Partnership for Minority Advancement in Biomolecular Sciences (PMABS)** to introduce this discipline into high school and college programs. The partnership has since expanded into a statewide discipline-focused initiative whose scope includes graduate and post-doctoral programs as well as broadened outreach to under-served high schools. More than 6,000 students have benefited from the program since its establishment in 1990.

What Works: Exemplary Graduate and Faculty Programs

Name a leading technology-based company or notable engineering school and chances are good that it will be a member of the **National Consortium for Graduate Degrees for Minorities in Science and Engineering (GEM)** program, dedicated to increasing the participation of African Americans, Hispanics and Native Americans at the masters and doctoral level. More than 450 GEM Fellows receive financial support and internship opportunities on 89 campuses, helping to produce more than 2200 engineers and 120 Ph.D.s to date.

The Compact for Faculty Diversity, sponsored by regional educational bodies from New England, the South and the West, seeks to develop a faculty pool which reflects the demographic profile of the current wave of students. Six hundred doctoral scholars receive mentoring, financial assistance, professional development and networking opportunities. Two hundred have completed a Ph.D., three-quarters in science, engineering, or mathematics.

The American Association for Higher Education and the Council of Graduate Schools developed a new model for developing a diverse pool of future faculty in the early 1990s. Preparing Future Faculty uses “clusters” anchored by a Ph.D.-granting institution, exposure to faculty roles and responsibilities and multiple mentors. Today PFF has 295 participating institutions whose shared objective is to communicate to prospective faculty what it means to be a professional scholar.

Native American Physicist Pursues Career at Caltech

by Ernie Tretkoff, *APS News August/September 2005 issue, reprinted with permission*

Former APS Corporate Minority Scholar J. Sequoyah Aldridge, a member of the Cherokee tribe, recently received his PhD and is now a physicist at Caltech, making him one of a small number of Native American physicists.

Aldridge, a 1/8 Cherokee, is the great grandson of Sequoyah Trottingwolf, after whom he is named.

Aldridge grew up in Escondido, California, a suburb of San Diego. As a child he demonstrated an aptitude for math and science. "At a young age, to keep myself occupied, I took math classes at a community college," he said. He says he became interested in physics at about the same time. At age 11, he started taking classes at Palomar College. At age 13 he took calculus, and obtained the highest grade in the class. Aldridge attended San Pasqual High School, but after two years he had taken all the science and math classes the school offered, and was looking for more advanced coursework. So he decided to enter college early, and in 1991, at age 15, he enrolled at Caltech.

He applied for and received the APS Corporate Minority Scholarship, which he says was valuable to him. "Everything helps," says Aldridge.

The young Aldridge found Caltech very challenging academically. He remembers no particular role model or mentor, and never knew any other Native American physicists, but says that did not deter him from pursuing a career in physics. He did

not find any particular challenge in being a minority in physics, he says.

Aldridge spent three years at Caltech as a physics major, and then transferred to the University of California, San Diego, where he completed his BS in 1997. He obtained his PhD in December 2004 from UC Santa Barbara, working on microelectromechanical systems and nanoelectromechanical systems (NEMS), with advisor Andrew Cleland.

Recently, Aldridge accepted a position as a research engineer in condensed matter physics at Caltech. "It's weird to be back at Caltech" as a scientist rather than as a student, he says. His work involves applying NEMS devices as mass sensors.

He is also now happily married, and has a 1-year old daughter, who will also become a member of the Cherokee tribe.

Aldridge says he never doubted his choice of physics as a career, and he advises other young minority students to pursue science if they are interested in it, and not give up. "They should go ahead and go for it if they are really interested," he says.



J. Sequoyah Aldridge, a member of the Cherokee tribe, is a research engineer at Caltech.

APS Committee Selects Twenty-Seven Undergraduate Minority Scholars

From APS News August/September Issue, reprinted with permission

The American Physical Society Committee on Minorities (COM) has selected 27 students to receive its Scholarship for Minority Undergraduate Physics Majors for 2005-2006. This year's recipients include 16 new scholars and 11 renewals. The scholarship is awarded to African-American, Latino, or Native American US citizens and permanent residents majoring in physics. Eligibility is limited to students who are high school seniors, college freshmen, or college sophomores.

This scholarship carries a \$2000 award for new recipients, or a \$3000 award for one-time renewal recipients. Physics depart hosts receive \$500

to support programs that encourage enrollment and retention of minority undergraduates. The scholarship may be applied toward tuition, room and board, or educational materials. Furthermore, scholars are paired with two mentors, one at their home institution and one among the members of COM.

Since its inception in 1980, over 300 students have received the scholarship, many of whom have received PhDs in physics. Many recipients have become university faculty or hold successful positions at national laboratories and corporations. Some have become high school physics teachers.

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Diversity and the PhD (cont'd)

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tional programs that aim to improve the numbers of doctoral candidates of color. Not every program is included; rather, this is a large representative sample. Further, the report looks at national programs, not university-based programs designed to recruit and retain students of color; the latter constitute one area among many others related to doctoral diversity that require further research. Many other quality programs not covered in this report have also sought to help diversify the American Ph.D.

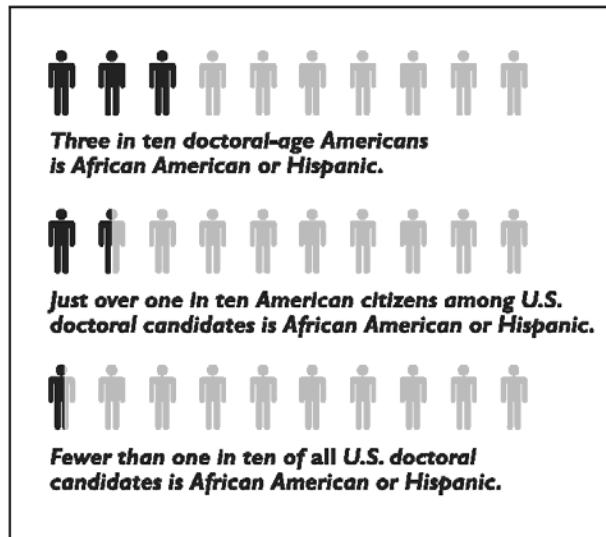
In its analysis, *Diversity and the Ph.D.* is not liberal or conservative but impatient. In developing findings and recommendations, we have set a course that should not divide those supporting or opposed to affirmative action programs, so long as they accept the premise that a representative Ph.D. cohort would benefit both the academy and the nation as a whole. Moreover, the report deliberately limits its number of recommendations, to make their realization possible.

This document is intended not simply to report on the past, but to create an agenda for present action and future change. The past, in this case, is our enemy. The present is our challenge.

METHOD

This study sought to survey existing national programs that recruit and retain doctoral students of color, to find out what was known about their effectiveness, and to see how well they fit together as a system. To accomplish this task, Woodrow Wilson staff carried out lengthy written and oral interviews with the managers of 13 programs. Interviews sought managers' descriptions of their program goals and of how their programs sought to meet those goals; elicited their sense of the strengths and weaknesses of their programs; and asked how they assessed the relative success of their own efforts.

In general, current efforts to support minority doctoral students range from those that focus primarily on educating disadvantaged and minority populations, providing no particular direction on



final career choice, to those with specific career courses as their objectives. Some programs are explicitly designed to recruit new teachers of color, whether at the public school, college, or graduate level, while others concentrate specifically on minority college faculty, including those already in place. The conferences that gave rise to this small study were centered on graduate education and the preparation of college and university faculty, and for that reason programs that seek diversity in the professoriate have a special place in this discussion.

Taken as a group, the 13 programs selected for examination fit these criteria:

1. They are—or were initially—national in scope. (At least one has scaled back.)
2. They provide a sample across arts and science.
3. They focus on doctoral education.
4. They represent a broad range of program types.

The Woodrow Wilson National Fellowship Foundation believes

that this sample of 13 initiatives represents a sufficiently broad and deep range of programs to demonstrate key points.

CONCLUSIONS AND RECOMMENDATIONS

In efforts to increase the presence of scholars of color in doctoral education, political controversies have

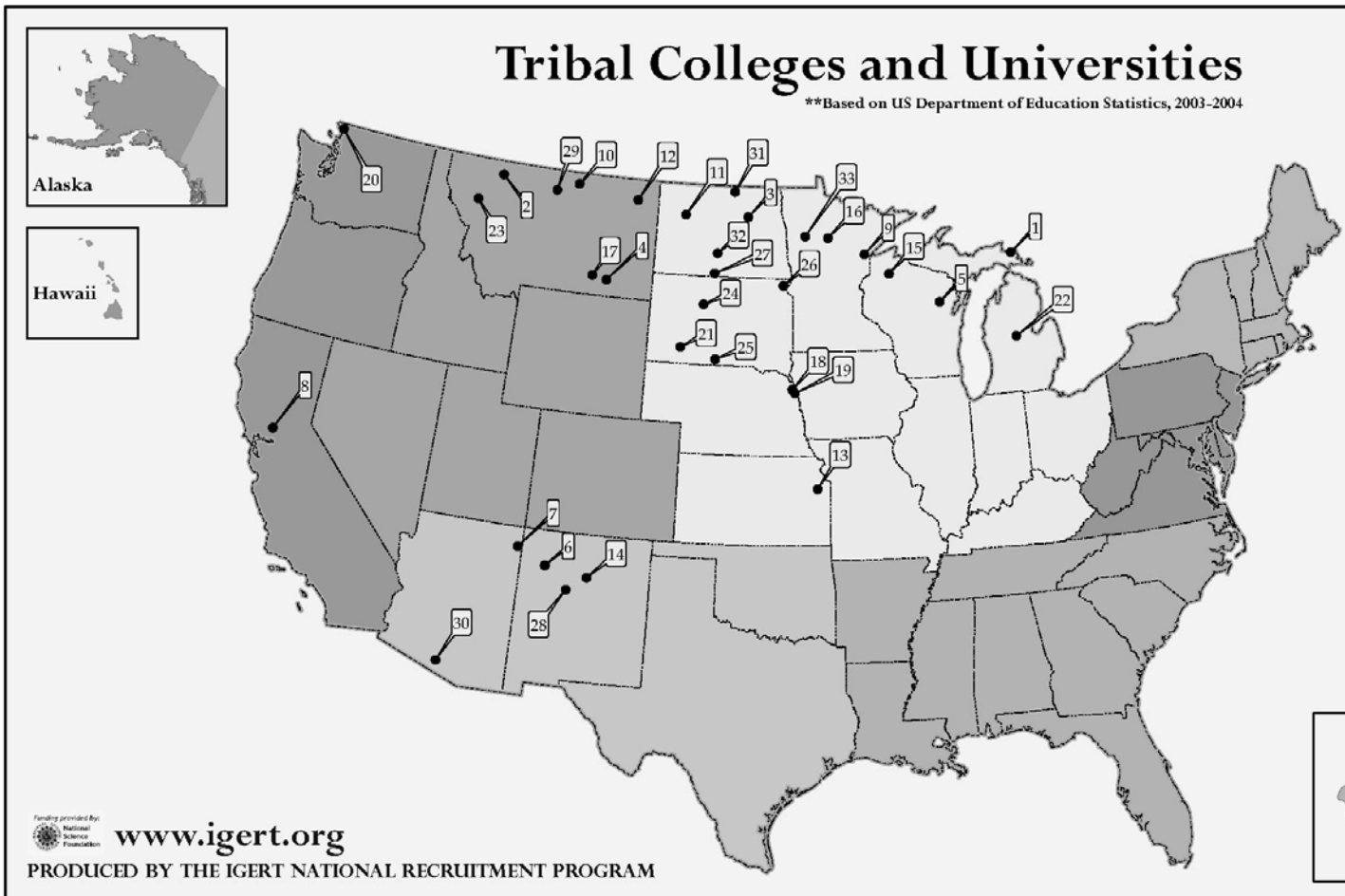
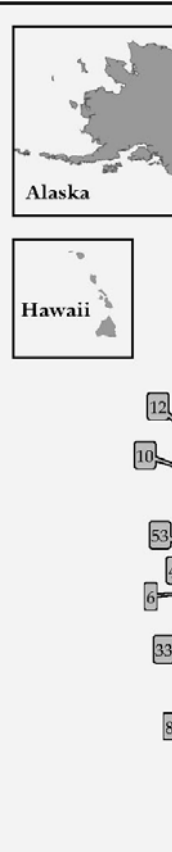
“In its analysis, ‘Diversity and the Ph.D.’ is not liberal or conservative but impatient. We have set a course that should not divide those supporting or opposed to affirmative action.”

(Continued on page 17)

Locating Minority-Serving Institutions

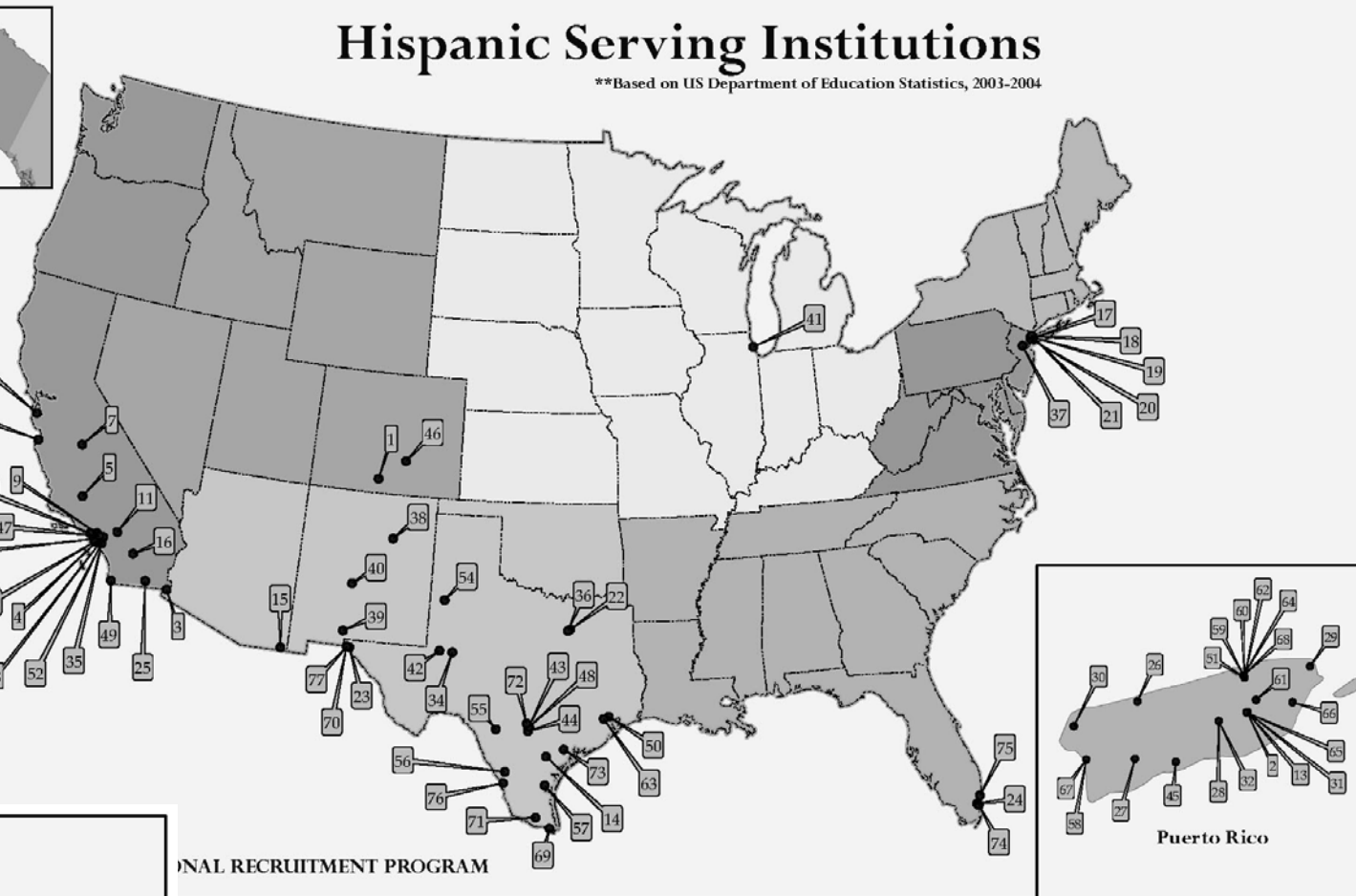
Adapted from www.igert.org, reproduced with permission

- | | | |
|---------------------------------------|--|---|
| 1 Adams State College | 27 Inter-Am. U. Puerto Rico, Ponce | 54 South Plains College |
| 2 American Univ. of Puerto Rico | 28 Inter-Am. U. Puerto Rico, Barranquita | 55 Southwest Texas Junior College |
| 3 Arizona Western College | 29 Inter-Am. U. Puerto Rico, Fajardo | 56 Texas A&M International Univ. |
| 4 Calif. State Univ., Long Beach | 30 Inter-Am. U. Puerto Rico, Aguadilla | 57 Texas A&M Univ., Kingsville |
| 5 Calif. State Univ., Bakersfield | 31 Inter-Am. U. Puerto Rico, Bayamon | 58 Univ. Puerto Rico, Mayagüez |
| 6 Calif. State Univ., Dominguez | 33 Los Angeles Harbor College | 59 Univ. Puerto Rico, Rio Piedras |
| 7 Calif. State Univ., Fresno | 34 Midland College | 60 Universidad del Este |
| 8 Calif. State Univ., Fullerton | 35 Mount San Antonio College | 61 Universidad del Turabo |
| 9 Calif. State Univ., Los Angeles | 36 Mountain View College | 62 Universidad Metropolitana |
| 10 Calif. State Univ., Monterey | 37 New Jersey City University | 63 University of Houston |
| 11 Calif. State Univ., San Bernardino | 38 New Mexico Highlands University | 64 Univ. Puerto Rico, San Juan |
| 12 Canada College | 39 New Mexico State University | 65 Univ. Puerto Rico, Bayamon |
| 13 Caribbean University | 40 New Mexico Tech | 66 Univ. Puerto Rico, Humacao |
| 14 Coastal Bend College | 41 Northeastern Illinois University | 67 Univ. Puerto Rico, Mayagüez |
| 15 Cochise College | 42 Odessa College | 68 Univ. Puerto Rico, Rio Piedras |
| 16 College of the Desert | 43 Our Lady of the Lake University | 69 Univ. Texas, Brownsville |
| 17 CUNY, Hunter College | 44 Palo Alto College | 70 University of Texas, El Paso |
| 18 CUNY, Bronx Community Coll. | 45 Pontifical Catholic Univ. Puerto Rico | 71 Univ. Texas, Pan American |
| 19 CUNY, City College of New York | 46 Pueblo Community College | 72 Univ. Texas, San Antonio |
| 20 CUNY, John Jay College | 47 Rio Hondo College | 73 Victoria College |
| 21 CUNY, Lehman College | 48 San Antonio College | 74 City College |
| 22 El Centro College | 49 San Diego State University | 75 Florida National College |
| 23 El Paso Community College | 50 San Jacinto College, North Campus | 76 Laredo Community College |
| 24 Florida International University | 51 San Juan Mayor's Office | 77 Western Technical Institute |
| 25 Imperial Valley College | 52 Santa Ana College | 78 Inter-Am. U. Puerto Rico, San German |
| 26 Inter-Am. U. Puerto Rico, Arecibo | 53 Santa Monica College | 79 College of Business and Technology |
| | | 80 Saint Augustine College |



Hispanic Serving Institutions

**Based on US Department of Education Statistics, 2003-2004



- 1 Bay Mills Community College
- 2 Blackfeet Community College
- 3 Cankdeska Cikana Comm. Coll.
- 4 Chief Dull Knife College
- 5 College of Menominee Nation
- 6 Crownpoint Inst. of Technology
- 7 Dine College
- 8 D-Q University
- 9 Fond du Lac Tribal and Comm. Coll.
- 10 Fort Belknap College
- 11 For Berthold Comm. College
- 12 Fort Peck Community College
- 13 Haskell Indian Nations Univ.
- 14 Inst. of American Indian and Alaska Native Culture
- 15 Lac Courte Oreilles Ojibwa Comm. College

- 16 Leech Lake Tribal College
- 17 Little Big Horn College
- 18 Little Priest Tribal College
- 19 Nebraska Indian Comm. College
- 20 Northwest Indian Comm. College
- 21 Oglala Lakota College
- 22 Saginaw Chippewa Tribal College
- 23 Salish Kootenai College
- 24 Si Tanka Huron Univ., Eagle Butte
- 25 Sinte Gleska University
- 26 Sisseton Wahpeton College
- 27 Sitting Bull College
- 28 Southwestern Indian Polytechnic Inst.
- 29 Stone Child College
- 30 Tohono O'Odham Comm. College
- 31 Turtle Mountain Comm. College
- 32 United Tribes Technical College
- 33 White Earth Tribal and Comm. Coll.

Continued on p. 15.

APS Selects Minority Undergraduate Scholars (cont'd)

(Continued from page 10)

The new scholars are a diverse group, hailing from throughout the US and Puerto Rico. Among the 16 new scholars, four are women. They have all amassed impressive awards and honors. Some have already engaged in physics research. The scholars will attend diverse institutions, including Ivy League universities and historically black colleges and universities. They have expressed interest in many areas of physics, including astrophysics, biophysics, and nuclear physics. All share a passion for physics and a curiosity about the universe.

A member of the Chippewa tribe, new minority scholar Anton Gereau would like to go into nuclear physics, in part, because he is concerned about pollution and the need to reduce our reliance on fossil fuels. He also just likes solving physics problems. According to Gereau, "I like that it gives me a real-world scenario to use math." He first became interested in physics, somewhat by chance, in eighth grade. "I had to do a report on someone, and I just happened to choose Einstein." Gereau also enjoys scuba diving, rock climbing, reading. He spent the past summer in California before heading off to Rensselaer Polytechnic Institute in the fall.

Lara Autrey-Rodriguez, of Houston, is a determined young woman who is attending Yale this fall. In eleventh grade at her high school, physics was not a required class. Nonetheless, she decided to try it and found she loved the subject. Physics appeals to her because it shows "how everything fits together." Autrey-Rodriguez admits that she has some fears about studying physics in college. "Physics is a real challenge. I'm scared of doing physics, but I want to challenge myself." Autrey-Rodriguez believes she can break the stereotype of physics being for 'nerdy white males.' "Usually you don't see a lot of women. That actually motivates me. I could break the stereotype. I have to have faith in myself. I'm good at it and I'm a woman." Among other activities this past summer, Autrey-Rodriguez taught English at a summer program for students who come from disadvantaged backgrounds. In addition to her other interests, she says, "I have a strong passion for Latin American culture." She even has considered a career combining that passion with physics, possibly working in a Latin American country where she could use her physics training to improve the infrastructure.

The endless possibilities of space attracted Sarajane Williams, of Prairie View, Texas, to the study of physics. She has been fascinated by stargazing and by reading books about space. Last summer, she took an astronomy class at Harvard and was especially intrigued by black holes. Williams says that she is not at all discouraged by the low numbers of women and minorities in physics. "I was never really fazed by that," she says. Williams says that she has been influenced and encouraged by the successful women in her life, including her mother. Williams enjoys acting, singing, dancing and writing. Recently she was a lead attorney in "Waller County Teen Court," which basically functions like a real court of law, except that teenagers run it. Offenders can be sentenced to community service. Because she had participated in many summer classes and activities over the past few years, Williams decided to spend most of this summer at home, relaxing. "It seems like I've always been going, going, going," she says. In the fall she will be attending Yale University. Williams wants to share her outlook on life: "I want to encourage people to not doubt themselves. People are too afraid to try new things." Her motto is: "If in doubt, do it anyway." Many of the new minority scholars seem to have followed that advice as well.

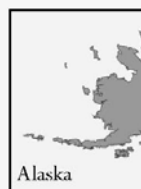
Applications for the 2006-2007 competition are due February 3, 2006, and are available from the APS Committee on Minorities website at: www.aps.org/educ/com/scholars/index.cfm

New Scholarships:

Lara Autrey-Rodriguez
Luis Bryce
Marissa Cevallos
Okenna Egwu
Rodrigo Farnham
Anton Gereau
Collin Joseph
Hassan Korre
Marc Martinez
Eric Paniagua
Aaron Pollack
Matthew Rickert
Eduardo Ruiz-Rivera
Casey Stevens
Luis Vargas
Sarajane Williams

Renewals:

Samuel Alemayehu
Peter Blair
Micaela Casas
Brian Chavarria
Bree Guerra
Christopher Hain
Gilbert Lee IV
Michael Maindi
Jeremy Morales
James Silva
Sharon Torres

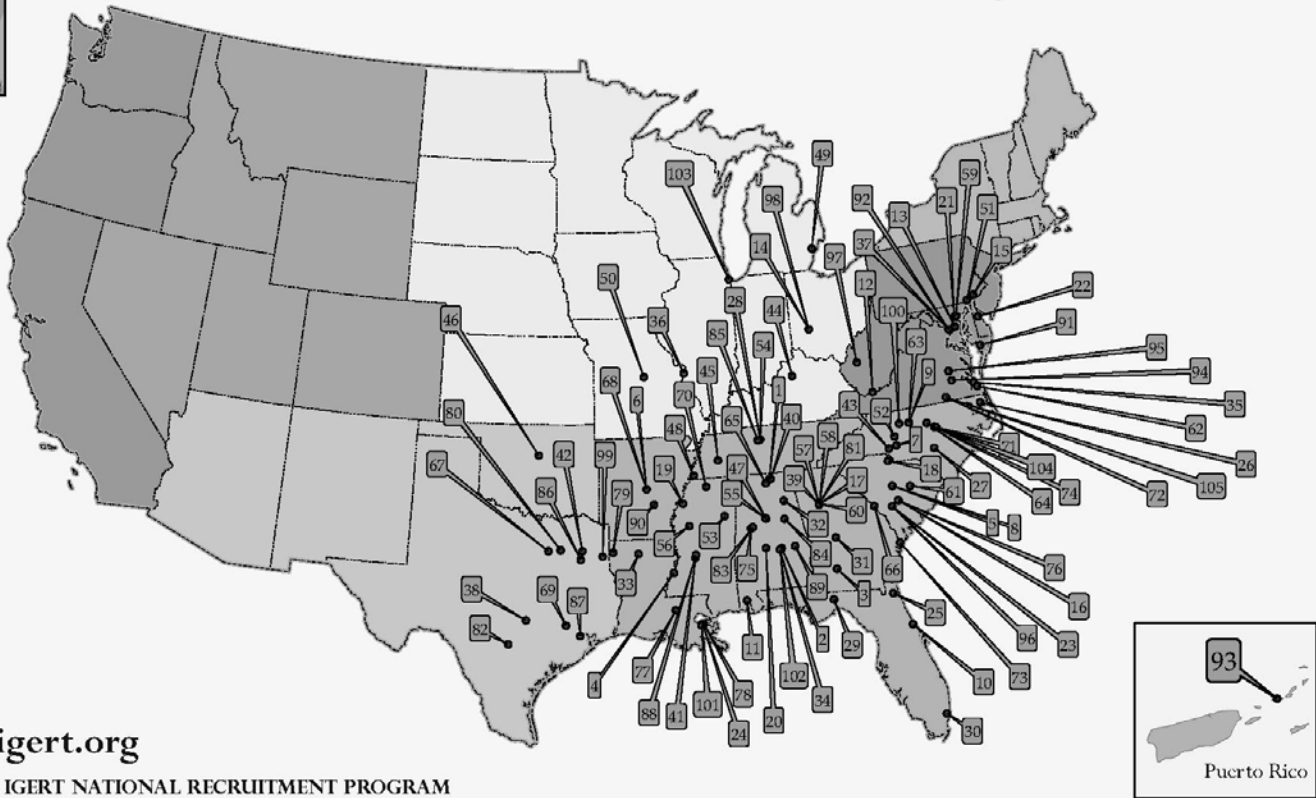


PRODUCED BY

Locating Minority-Serving Institutions (cont'd)

Historically Black Colleges and Universities

**Based on US Department of Education Statistics, 2003-2004



www.igert.org

BY THE IGERT NATIONAL RECRUITMENT PROGRAM

- | | | | |
|-------------------------------|---------------------------------|--------------------------------|---------------------------------|
| 1 Alabama A&M University | 27 Fayetteville State Univ. | 53 Mary Holmes College | 79 Southern Univ., Shreveport |
| 2 Alabama State University | 28 Fisk University | 54 Meharry Medical College | 80 Southwestern Christian Coll. |
| 3 Albany State University | 29 Florida A&M University | 55 Miles College | 81 Spelman College |
| 4 Alcorn State University | 30 Florida Memorial College | 56 Mississippi Valley State U. | 82 St. Philips College |
| 5 Allen University | 31 Fort Valley State University | 57 Morehouse College | 83 Stillman College |
| 6 Arkansas Baptist College | 32 Gadsden State Comm. Coll. | 58 Morehouse School of Med. | 84 Talladega College |
| 7 Barber-Scotia College | 33 Grambling State University | 59 Morgan State University | 85 Tennessee State University |
| 8 Benedict College | 34 H Councill Trenholm State | 60 Morris Brown College | 86 Texas College |
| 9 Bennett College | 35 Hampton University | 61 Morris College | 87 Texas Southern University |
| 10 Bethune Cookman College | 36 Harris-Stowe State College | 62 Norfolk State University | 88 Tougaloo College |
| 11 Bishop State Comm. Coll. | 37 Howard University | 63 North Carolina A&T | 89 Tuskegee University |
| 12 Bluefield State College | 38 Huston-Tillotson College | 64 North Carolina Central | 90 Univ. Arkansas, Pine Bluff |
| 13 Bowie State University | 39 Interdenom. Theol. Center | 65 Oakwood College | 91 Univ. Maryland, Easern Shore |
| 14 Central State University | 40 JF Drake State Tech. Coll. | 66 Paine College | 92 University of DC |
| 15 Cheyney Univ. Penn. | 41 Jackson State University | 67 Paul Quinn College | 93 Univ. of the Virgin Islands |
| 16 Claflin University | 42 Jarvis Christian College | 68 Philander Smith College | 94 Virginia State University |
| 17 Clark Atlanta University | 43 Johnson C Smith University | 69 Prairie View A&M Univ. | 95 Virginia Union University |
| 18 Clinton Junior College | 44 Kentucky State University | 70 Rust College | 96 Voorhees College |
| 19 Coahoma Comm. College | 45 Lane College | 71 Saint Augustines College | 97 West Virginia State College |
| 20 Concordia College | 46 Langston University | 72 Saint Pauls College | 98 Wilberforce University |
| 21 Coppin State College | 47 Lawson State Comm. Coll. | 73 Savannah State University | 99 Wiley College |
| 22 Delaware State University | 48 Le Moyne-Owen College | 74 Shaw University | 100 Winston-Salem State Univ. |
| 23 Denmark Technical College | 49 Lewis College of Business | 75 Shelton State Comm. Coll. | 101 Xavier University |
| 24 Dillard University | 50 Lincoln Univ., Jefferson | 76 South Carolina State Univ. | 102 Trenholm State Tech. Coll. |
| 25 Edward Waters College | 51 Lincoln University | 77 Southern University A&M | 103 Chicago State University |
| 26 Elizabeth City State Univ. | 52 Livingstone College | 78 Southern Univ., New Orleans | 104 St. Augustine's College |
| | | | 105 St. Paul's College |

Obliterating Myths About Minority Institutions (cont'd)

(Continued from page 7)

clearly aligned with NASA's space-science research objectives and with the proposing institution's own long-term strategic plans. Faculty members we talked with were typically teaching physics or working in related disciplines, and they were eager to engage in space science. Some had been trying for years to find ways to do so; others were eager to jump at the new opportunity being offered.

This first solicitation was vastly oversubscribed—which in itself was a significant measure of the interest generated. MUCERPI funded 15 projects with grants of up to \$250,000 per year for three years (2001 to 2003). The program also provided the participants with ongoing post-selection support—regular conversations, meetings, and site visits—aimed at making the participants genuine members of the NASA space-science community. We kept them abreast of activities, programs, and plans emerging from the office of space science, and worked at identifying and immediately addressing issues that might be hindering any individual project.

As the program progressed, we were humbled by the achievements of the participants—achievements that obliterated any myths that underrepresented minorities and minority institutions were somehow not interested or not capable of succeeding in space science. After only three years, the 15 participating institutions had collectively created 68 new or revised space-science courses and 12 new or revised space-science degree programs. They had established 25 space-science faculty posi-



Support from NASA's MUCERPI helped bring Salish Kootenai College (SKC), a tribal college on the Flathead Indian Reservation in Montana, into the world of space science. SKC is now a partner on NASA's Mars hand-lens imager (MAHLI), which will fly onboard the Mars Science Laboratory to provide high-resolution close up images of Martian rocks. In 2009, a tribal college is going to Mars.

tions, the majority of which were tenure-track and were continued after the grant period was over. They participated in 50 collaborative space-science research projects with major research institutions and were involved in 10



South Carolina State University physics major Erica Lamar working on CCD detectors at Lawrence Livermore National Laboratory.

NASA space-science flight missions or suborbital flight projects. They conducted a wide range of space-science teacher training and public outreach programs, and, in settings where space science had previously been essentially nonexistent, they brought students into the field (see, for instance, the figure on page 50). Nearly 1800 students enrolled in space-science courses and nearly 100 signed up for space-science degree programs.⁴ Even more significant, space science became institutionalized at many of the MUCERPI campuses.

Bolstered by these initial successes, we offered a second opportunity for new MUCERPI proposals. As was explicitly stated in the first program solicitation, MUCERPI was intended not to provide long-term institutional funding but to provide seed money for new activities whose support would then be picked up by each participating institution as part of its own mission. In accord with that philosophy, previously funded MUCERPI principal investigators (PIs) were eligible to reapply only if their new proposals represented major new directions or significant enhancements to their previous work.

The second solicitation was again heavily oversubscribed. The previous successes, coupled with the overall high quality of the new proposals, convinced NASA top management to increase program funding. The expanded MUCERPI included 16 projects, 6 of which were from new PIs, for the years 2004 to 2006. The projects' annual budgets were increased to up to \$275,000. In an interesting progression, many of the MUCERPI PIs who had concentrated on building academic capabilities dur-

(Continued on page 23)

Diversity and the PhD (cont'd)

(Continued from page 11)

resulted in a tangled thicket of programs, and political pressures are clearly key factors in the continuing inability of institutions of higher education to meet their own goals for minority representation. The present system of graduate program support for minorities is severely Balkanized. Dozens of funding agencies sponsor dozens of programs, with different goals, different eligibility criteria, different support levels, different types of support, different administrative structures, different application processes, and different willingness to invest in disciplinary areas. It is no wonder that so diffuse a system of supports offers no means to compare various approaches' effects; no wonder that it offers no means of coordinating them toward a common set of goals; and, most important, no wonder that, while these supports have contributed in small ways to doctoral diversity, change has been slow and, at best, incremental.

From the perspective of a student, this is a serious problem. Although university financial aid offices surely are familiar with multiple sources of aid, and probably share their insights with one another, a student can turn to no common information source to determine where, or to whom, he or she should apply. With sufficient diligence, a student can probably obtain most facts from Internet sources, but even these will not include realistic information on an application's chances of success.

The problem is equally serious from the perspective of those who provide support. Program leaders cannot easily demonstrate that their programs' efforts are effective, or as effective as the efforts of others. No common model outlines what to do if offers of support for one student overlap, or how to coordinate university support with external support. (There are many systems of information exchange, but little guarantee that these information exchanges lead to action, much less systematic action.) Moreover, there is no mechanism for identifying students who have been overlooked (or may have been declared ineligible) by other programs and who could be greatly helped by one's program.

In its June 2003 decision, the U.S. Supreme

Court expressed the hope and belief that the need for special recruitment efforts aimed toward minorities would disappear in 25 years. The question is whether the programs now in place will enable higher education to reach that goal. On balance, current trends do not support much optimism.

- **The level of financial support for minority applicants to colleges and universities is falling.** Eligibility criteria for diversity programs have been significantly broadened to include non-minority students who also meet criteria of financial need, urban residency, and so on. This shift reflects, in part, the replacement of old programs with new ones that have different criteria; in part it results from changes in eligibility rules for continuing programs. The general consequence: the pool of eligible students is much larger, while funding has remained fixed—or even shrunk.
- **The change in the mix of support programs is systematically excluding mid-level minority applicants.** Top-ranked colleges and universities continue to offer significant financial aid, and a few foundations continue to offer prestigious fellowships to outstanding students, but these benefits go only to the very top students. By definition, need-based financial aid goes only to members of the lower socioeconomic strata. Thus the current constellation of support programs is cherry-picking at the top and providing diluted aid at the bottom, while the programs that used to contribute to the support of middle income and qualified but not outstanding students have largely vanished.
- On the positive side, **it is increasingly common for mainstream federal programs** (such as NSF'S IGERT program) **to require that grant recipients include students or faculty of color. It is unclear, however, to what extent these requirements are enforced,** and such requirements typically offer little guidance as to how the goals are to be achieved. They may, in fact, only set up competitions among grant recipients for members of the small pool

“The presence of more faculty from underrepresented groups can position universities to achieve greater successes.”

(Continued on page 18)

Diversity and the PhD (cont'd)

(Continued from page 17)

of students already committed to academic careers. Evidently the intention is to use existing undergraduate programs such as LSAMP and McNair to identify and prepare candidates for these graduate programs, but no coordinated strategy for supporting this linkage exists.

- **In response to legal challenges** to university programs, **many programs have modified their structures, their eligibility criteria, and even their names.** Some maintain low public profiles whether or not they feel vulnerable to legal challenges.

Even from this brief survey, several recommendations emerge.

1. **Communication:** Every survey participant felt the need for more communication among agencies working on minority recruitment issues, and expressed support for the creation of an active consortium of organizations committed to minority representation in higher education. With multiple functions and genuine commitment, such an organization could do much to fill gaps in understanding and coordination.

An active consortium of organizations committed to improving minority representation in graduate education would serve as a data bank for members, an information center for students, a potential clearing house for the placement of minorities in higher education programs, a policy center for resolving issues related to overlapping support programs, a focus for annual conferences on minority recruitment, and a voice in the development of public policy. Such a group could be modeled on a number of existing higher education consortia, with leadership rotating among representatives of member organizations. Given sufficient funding, this consortium might sponsor research on the relative effectiveness and appropriateness of alternative support programs.
2. **Research:** All the players in this arena—the agencies themselves, the proposed consortium of those agencies, the institutions of higher

education, the government, the nonprofits and foundations supporting this work—have a pressing need for more research. Because data are spotty and support programs lack coherence, a great many unknowns remain. Longitudinal data, which could reveal much about the success over time of doctoral students who have participated in various kinds of programs, is particularly scarce. At present it is almost impossible to design improvements in minority recruitment programs because there is little good evidence on what strategies work. The following are just a few of the issues:

- a) How effective are programs that focus on socioeconomic variables in attracting minority students into the professoriate?
 - b) Do external funds for the support of minority students lead to incremental expenditures, above and beyond what a university would have invested anyway, or do the funds simply replace internal funds, effectively diverting the new infusion to other purposes?
 - c) How should the educational system prepare students for graduate study? At what point on the academic ladder should intervention begin? How can institutions of higher education help to prepare students for college?
 - d) In what ways does the departmental structure of graduate education, which isolates actual operations from the central direction of deans and provosts, support or interfere with effective recruitment of minority students?
 - e) The comparative effectiveness of different forms of mentoring has been the subject of a great deal of conflicting research. Does a dollar committed to intervention truly have more impact than a dollar committed to direct financial support?
 - f) What is the best way to deal with the particular challenge of the sciences and engineering, which appear to require commitment early in one's academic career?
3. **Vertical integration:** Institutions of higher education must ally more actively with the K-12 educational system. Most university-based

“In few other arenas has a lack of national consensus had such a fundamental impact on actual programs.”

(Continued on page 19)

CHARACTERISTICS OF SURVEYED PROGRAMS

Individual Fellowship Programs

The Ford Foundation: Predoctoral, Dissertation, and Postdoctoral Diversity Fellowships

The National Endowment for the Humanities: Faculty Research Awards at Historically Black Colleges and Universities, Hispanic Serving Institutions, and Tribal Colleges

The Southern Regional Education Board: Compact for Faculty Diversity

The Bill & Melinda Gates Foundation: Gates Millennium Scholars

Institution-Based Fellowship Programs

The GE Fund: Faculty for the Future

The Sloan Foundation: Increasing Ph.D.s for Underrepresented Minorities

Support Services

The KPMG Foundation: The Ph.D. Program

The Mellon Foundation: Mellon Mays University Fellows

The U.S. Department of Education: Ronald E. McNair Post-Baccalaureate Achievement

The National Science Foundation: Alliances for Graduate Education and the Professoriate (AGEP)

General Programs Emphasizing Inclusiveness

The American Sociological Association: Minority Opportunities through School Transformation (MOST)

The Council of Graduate Schools: CGS/Peterson's Award for Promoting an Inclusive Graduate Community

The National Science Foundation: Integrative Graduate Education and Research Training (IGERT)

(Continued from page 18)

affirmative action programs begin at (or just before) the admissions stage—which means that rather than increasing the flow of minority students into higher education, they are largely competing for members of a pool of candidates that is already fixed in number. Very few of the programs surveyed concerned themselves with the earlier education of students to help make them comfortable with, and ready for, the prospect of going on to college, yet that early comfort level may be indispensable for the next step into doctoral education.

Answers to these questions will come only if program managers become more willing to accumulate longitudinal data that will support effective review of their own programs, and make them available to independent researchers. Both supporters and opponents of minority recruitment and support programs must become less confident that they already know what works and what does not work and become more open to the possibility that extremely complex problems do not lend themselves to simple solutions. And, by making common cause with others doing similar work, program leaders must become more prepared to demonstrate the essential value of their efforts in the

nation's workplace and intellectual life.

4. **Intellectual support:** In any number of ways, doctoral students of color may feel disconnected from their peers, and from the larger academic enterprise. According to an American Council on Education report, they “do not feel mentored nor supported in the way that white students are. . . . This sense of isolation and lack of support was nearly universal among the minority graduate students [interviewed].” Indeed the traditional structures and emphases of the Ph.D. may seem abstract and irrelevant, however unintentionally, to students of color. Chris Golde and Tim Dore, in a 2001 report for The Pew Charitable Trusts, observed that a greater percentage of doctoral students of color look to non-academic careers than do white doctoral students, while Golde, in another study prepared for the Compact for Faculty Diversity, finds that students of color “are more interested than their white counterparts in collaborating in interdisciplinary research.” To become more attractive to and engaging for minority Ph.D.s, and to cultivate a future generation of faculty of color, the American doctorate must find ways to become more socially engaged, responsive, and relevant.

(Continued on page 22)

Einstein and Racism in America (cont'd)

(Continued from page 3)

first step might be simply to join in Einstein's pledge: "I will not remain silent about it." One can envision the impact of such a statement signed by one or two thousand physicists and published in newspapers across the country. (Although one wonders if a physics society or other scientific association would circulate such a pledge today.)

But aren't you making this too much of an issue, our skeptical reader will argue: America has made great strides since Einstein's day; black people are no longer barred by law from housing, schools, beaches, or buses, and just look at all the African Americans in public office!

To be sure, thanks to the dedication and sacrifices of the civil rights movement, a number of the more blatant back-of-the-bus bylaws of bigotry have been overturned, but a closer look shows something that will come as no surprise to people of color in this country: America's long river of racism is not so much dammed up as it is diverted.

It doesn't take an Einstein to identify racial inequities in today's society. US Labor Department reports continue to show that the jobless rate among black workers is far higher than among whites; the Institute of Medicine has documented that African Americans and other minorities receive inferior health care; and in New York City, officials recently announced that after a project that lasted all of two years, they simply can't do anything to change the woefully inadequate education in the city's poorer, darker-skinned districts.³

If you teach at a major university in this country, try counting the number of African American physics professors. A recent survey of physics faculty members at the 50 top-ranked departments revealed that 12 people out of a total of 1988—0.6%—had identifiable African heritage.⁴

But racism in the physics community today is more than a story of numbers. In this case, the dearth of black faculty members illustrates underlying attitudes. The following story was related by S. James Gates, director of the Center for String and Particle Theory at the University of Maryland and

"Einstein's pledge not to remain silent about racism has an ironic echo today: Virtually all traces of his passionate commitment to civil rights have been erased from his image."

former president of the National Society of Black Physicists. "A young African American PhD recipient applies to a well-known university for a postdoctoral position. His application is via paper and the scientist carrying out the evaluation is sufficiently impressed to invite him for an interview. At the appointed time, the young aspirant is seated in the secre-

tary's office. The senior scientist sticks his head into the office, looks around, and retreats without comment. Some minutes later, he does so again, and then again, and finally asks the secretary whether she has heard anything from the postdoctoral student due there for an interview."⁵ It may not come as a total surprise that some African Americans question university administrators' explanations that they simply cannot find qualified minority applicants for positions in physics and other science departments.

"One can envision the impact of a statement [opposing racism] signed by one or two thousand physicists and published in newspapers across the country."

Opposing racism today doesn't require organizing a march on Washington. At many colleges and universities, student groups are turning up the volume of their demands for more professors and students of color. A faculty group seeking more African American professors could have instant allies among students. Indeed, building a multiracial teaching staff, from postdocs to tenured professors, should attract support from every corner of the campus. Diversity is not an African American issue. In today's increasingly tribalized world, a multicolored, multi-ethnic faculty of women and men is, in itself, an educational asset for all teachers and students.

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Truly equal opportunity in higher education, it should be emphasized, cannot be won without eliminating racial tracking in the public school system, and that also involves the struggle for equal housing and affordable health care. With an administration whose education policy is to eliminate evolution rather than racism, all those issues will likely lead to political battles on the local and national levels.

But we are scientists, our unconvinced reader eagerly interjects. Our mission is research, not meddling in politics.

As a writer, I am hardly qualified to offer suggestions to physicists. But in Einstein's view, scientists have both a special opportunity and a responsibility to speak out for social justice. Because "the scientist as a citizen has influence," he argued, "it follows that the scientist has the duty to be active on political questions. He must have the courage to stand for his opinions—in the area of politics and economics, as well as science—as a teacher and public figure."⁶

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Challenging the Status Quo

When my coauthor Rodger Taylor and I give talks about *Einstein on Race and Racism*, the question people most frequently ask—besides "Why haven't we heard about this before?"—is "Why was Einstein so concerned about racism?" The question itself opens a window onto the nature of our society: If we were discussing the life of a black scientist, or any black person in America, no one would ask why he or she was against racism. Racism, it seems, has become a problem only for its victims. For the majority of European Americans, racism may be unfortunate but it brings only an emotional shrug: "It's not my problem."

Einstein served his anti-intolerance apprenticeship in Germany where, before moving to this country as America's most famous refugee from Nazism, he faced years of anti-Semitism. More than any other scientist, arguably more than any other human being, Einstein—a genius who was also a Jew, a democrat, and later, a socialist—gave the lie to Hitler's Nazi theories. He was invited to speak and hailed by audiences around the world.

Einstein's commitment against racism began with, but grew beyond, his own experience into what is often called a social conscience. It was, and is, a commitment dangerous to society's once and would-be slavemasters because it is contagious.

Perhaps Einstein's approach to the world was influenced in part by his approach to the universe—a boldness in challenging the status quo. "Race prejudice," he told a student newspaper at Cheyney State Teachers College, an African American school in Pennsylvania, "has unfortunately become an American tradition which is uncritically handed down from one generation to the next." In a 1946 article for *Pageant* magazine, he explained, "The more I feel an American, the more this situation pains me. I can escape the feeling of complicity in it only by speaking out." And he invited the magazine's mostly white readership to join in the anti-racist struggle: "I do not believe there is a way in which this deeply entrenched evil can be quickly healed. But until this goal is reached there is no greater satisfaction for a just and well-meaning person than the knowledge that he has devoted his best energies to the service of the good cause."

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Diversity and the PhD (cont'd)

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5. **Mentoring and professionalizing experiences.** Experience—that of many of the organizations surveyed for this report as well as for the Woodrow Wilson Fellowship Foundation itself—demonstrates the importance of a wide range of mentoring activities, for all students but especially for students of color. Many campuses seek, through local programs, to provide particular mentoring and networking opportunities for minority doctoral students, and a number of the national programs surveyed do likewise. More such opportunities must be made available. In particular, the fellowships and financial awards that remain available to graduate students should not obviate participation in such professionalizing experiences as laboratory work in the sciences and teaching experience in all disciplines. Such experiences ground doctoral work, making it tangible and applicable, and prepare Ph.D. candidates for the real-world and classroom challenges that await them beyond the doctorate.

6. **Race and need together.** Recent data, including that presented in William Bowen's influential 2004 Jefferson Lectures at the University of Virginia, clearly show flaws in the assumption that shifting to descriptors as "low-income" or "first in family to attend college" will serve adequately to engage students of color in higher education. While financial assistance is undeniably important in doctoral education, as are support services for students whose sociocultural backgrounds may not have prepared them for Ph.D. programs, such supports must not be treated as alternatives to initiatives that treat racial and ethnic diversity, frankly and openly, as goals for doctoral education.

7. **Leadership:** Many interviewees felt that the federal government has sidestepped its responsibility to provide leadership in minority recruitment programs. Almost every grant from the NSF, NIH, NEH, or the Department of Edu-

cation includes a condition not only that the funded program be open to all, but that it actively seek to increase the diversity of its participants. Despite these strictures, none of these agencies provide guidance or assistance in carrying out the mandate. Many agencies demand extensive reports on the demographic characteristics of the participants in funded programs, as well as requiring documentation on the progress of students. To date, none of those data are available publicly, and none seem to have been used to inform program design. (Indeed, it

"To become more attractive to and engaging for minority Ph.D.s, and to cultivate a future generation of faculty of color, the American doctorate must become more socially engaged, responsive, and relevant."

is not clear that all the data have even been retained.) It is time for the federal government to use its expertise to help its grantees to carry out the mandates that the government itself has imposed on them.

It is clear that institutions of higher education, many organizations, and indeed many leaders see the need to increase the representation of people of color in U.S. doctoral programs. It is less clear that, under current conditions, the programs seeking to create greater representation have the resources, political capital, or institutional commitment to achieve their goals. All concerned parties—policymakers, program directors, funders, institutional officers, faculty, students, and community leaders—must together address these issues in order to diversify the American Ph.D.

Diversity and the Ph.D. is available online from the Woodrow Wilson Foundation's website at:

www.woodrow.org/newsroom/News_Releases/phd_diversity.html

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Obliterating Myths About Minority Institutions (cont'd)

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ing their first three years turned to developing research capabilities in the second three years.

Spreading the success

Are the successes reported here anomalies, or are they replicable? Certainly not every accepted project was successful, but the vast majority of projects managed to dazzle us with what they accomplished. Such successes can be replicated at other institutions and in other areas of science. To do so requires taking on the attitudes and levels of commitment displayed by those involved in successful MUCERPI projects. For scientists at major universities and research laboratories, it means believing that colleagues at minority institutions are exactly that: capable scientific colleagues. It means taking the initiative to meet minority-institution faculty members, to seek out those with related interests, and to invite them into genuine collaborations. It means asking—and listening to—potential partners at minority institutions about the situations on their own campuses, about what they would like to do as scientific partners, and about what they need to participate effectively. It means following up promises with continued support, shared resources, and inclusion in meetings, seminars, and conferences. While these may seem like challenging tasks, they are not that different from what one normally does with colleagues at “recognized” institutions.

For funding agencies, it means making the involvement of minority institutions part of an agency’s main line of business rather than dealing with them through a specialized organization detached from the real action. Minority-institution programs should be managed by the science organizations in an agency. Minority-institution program administrators should have the authority necessary to set policies and direct activities within the organization, to influence activities of scientists outside the organization, and to see that the outcomes of minority-institution programs directly contribute to the agency’s scientific objectives.

Solicitations should be open to meeting the broad needs of all types of minority institutions while ensuring that those institutions can become genuinely involved in the work of the agency. Just sending money doesn’t do the job. The agencies also must actively work with the institutions fol-

lowing selection. The communities of scientists regularly funded by the agencies must be motivated and mobilized to serve as mentors and colleagues to newcomers from minority institutions, and they must be willing to become substantially involved. Carrying out these mandates may entail significant changes in the agencies’ ways of doing business, but standard procedures have not been very successful to date. The myths are wrong. Actions can replace rhetoric. Positive results speak for themselves. Something different is possible. We hope that our experience will make the road a little easier for those who follow.

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