



An uneven split. a, The proportion of scientists and engineers by race/ethnicity in 1995. b, The resident population of the United States by race/ethnicity in 1995.

Because research opportunities for undergraduates typically do not open up until the junior or senior year, populations such as the American Indian community, which have high early dropout rates, never get exposure to lab work in the first place.

Attempts to boost minority achievement in maths and science go back a generation. But the now largely dismantled programmes of the Affirmative Action era tended to have a built-in remedial bias that assumed the underperformance of non-whites.

Opinion today holds that a more productive approach is to push under-represented students rather than sequester them from the mainstream and feed them watered-down coursework. "High-school math programmes have been dumbed down for minorities, so students with talent are victimized by their teachers," says Manuel Berriozábal, who runs TexPREP, a maths and science enrichment programme for high-school students.

"If you push students to build communities based on a shared passion it's easier to help them make A's than to focus on their putative deficiencies," argues Uri Treisman, who started the Emerging Scholars Program at the University of Texas in 1988, based on his studies of minority achievement at Berkeley in the 1970s. The programme focuses on boosting students' grades in calculus.

### Daunting numbers

Similar work needs to be done to help minorities settle into college. John Matsui runs the Biology Scholars Program at the University of California, Berkeley, which gives academic support to 400 mostly minority students. Part of the programme is Matsui's new course to help acclimatize transfer students from community colleges — an overlooked source of minority talent, he says — to university life. "I tell them about the culture of universities, how science is done and how it's funded, how courses are structured, why they may find assistant professors grumpy and hard to reach."

But for all the successes of such programmes, their graduates number only in the thousands, while the scope of the

problem must be counted in the millions. Antonio Flores is president of the Hispanic Association of Colleges and Universities, based in Texas, which represents 237 colleges and universities with high Hispanic student enrolments in North and Latin America. He cites studies that show Latino students lagging two years behind Whites in maths. Perhaps not surprisingly, a study last year by the Educational Testing Service shows that only 55 per cent of Latino eighth graders in the United States expect to go to college, compared with 64 per cent of African Americans and 72 per cent of Asians.

Much of the blame is attributable to below-par elementary and secondary schools in poorer districts. A current spate of lawsuits in California and other states, arguing that egregious deficiencies in academic programmes and physical facilities in poorer schools amount to a structural form of discrimination against minorities, aim to force state governments to guarantee basic resources in all schools. But with the inertia

of a generation of neglect, reform will come slowly.

Meanwhile, the shadows of an impending crisis grow longer. A recent report by President Bill Clinton's National Science and Technology Council predicts failing economic competitiveness and increasing social strains if present trends continue. And because the proportion of minority people in the United States will rise to 48 per cent over the next couple of generations, the disparity in representation will become even more pronounced unless something is done soon.

But the point might be made that minority under-representation and abysmal inner-city schools have been in place for at least a generation without harming the country's productivity and competitiveness. In the 1990s, the US economy roared past countries such as France and Japan, which have far better schools and early childhood education. So, leaving aside for a moment the question of social equality and limiting discussion to economic productivity, does science education really matter?

Of course it does. It is just that, as with many other essential resources, the United States imports it. Under the H1-B temporary visa plan for skilled workers, whose upper limit is likely soon to be increased to 200,000 a year, scientists and engineers flow into the United States from countries such as China, India, Taiwan and Canada.

"The quick fix is to go abroad and bring in those people to fill the jobs," says Antonio Flores. "But the strategic way of doing things would be to invest in the education of underprivileged young people here at home. It will improve not only our educational system, but our society as a whole."

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### Access to education provides a way out

The American Type Culture Collection (ATCC), a repository of bacterial and viral strains, cell culture lines and cDNA clones, has quite a diverse staff. About 32 per cent of its staff are from minority groups. But Yvonne Reid, who oversees cell culturing at the facility in Manassas, Virginia, worries that the number is not representative of minorities in science nationwide. Recently, Reid has noticed a decline in the number of African American scientists at meetings and academic labs at predominantly white institutions such as Harvard, Brown and Yale.

The sixth of seven siblings, Reid grew up in a rural district of Jamaica. Her father was a farmer and her mother stayed at home. "They could read and write, but were not educated people. It was my generation that broke that pattern," she says. During the 1950s and 1960s, when universal free education first became available in the country, the standardized curriculum meant that "the son or daughter of a labourer would have the same resources available in school as the son or daughter of a professor".

Reid earned a PhD in zoology from Howard University, Washington DC, in 1986. Her older sister has a doctorate in education from the Catholic University of America, Washington DC, another sister is a nurse, a cousin is a chemist with a degree from the University of the West Indies, and a nephew is doing a residency in surgery in New Jersey.

Reflecting on her own background, in which only education could lead the way out of poverty, Reid says: "The key to achievement, not only for minority persons but everyone, is high-quality, equal-opportunity education starting at an early age."

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