American Association of Hispanics in Higher Education, Inc.

Latinos in Science: Trends and Opportunities

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INTRODUCTION

Purpose

This report was written under the auspices of the American Association of Hispanics in Higher Education in order to provide data and information on the trends of and opportunities for Latinas and Latinos in science. It was prepared also to assist AAHHE institutions in gauging the national need and challenges for preparing students for doctoral degrees and careers in science.

For years, members of AAHHE have worked in tandem with other national organizations to ensure Latino representation and support in academe. AAHHE members recognize the prospect for Hispanic demographics, seeing great potential with greater numbers entering and graduating from colleges and universities. We hope that this report provides insightful information to administrators and faculty in higher education and to students who are in hot pursuit of studies in science, technology, engineering, and mathematics.

Focus

We focus primarily on Latinas/os in science, with some attention to Latinas/os in engineering and related professional fields like medicine and public health. Science and Engineering (S&E) are broad rubrics, encompassing a wide-range of academic disciplines. For the most part, **science** refers to the physical sciences (chemistry, physics, astronomy), earth, atmospheric & ocean sciences, mathematics, computer sciences, biological & agricultural sciences, psychology and social sciences. **Engineering** generally refers to chemical, civil, electrical, mechanical, and other engineering.

NSF's classification of S&E does not include these doctorates:

- Doctor of Medicine (M.D.),
- Doctor of Dental Surgery (D.D.S.),
- Doctor of Veterinary Medicine (D.V.M.),
- Doctor of Osteopathy (O.D.),
- Doctor of Pharmacy (Pharm.D.),
- Doctor of Psychology (Psy.D.),
- Juris Doctor (J.D.), and other similar degrees.

In turn, NSF considers these degrees as Professional Doctorates. We follow this practice below and provide data separately on these fields. Other federal and state agencies include health fields with biological and agricultural sciences under the heading "life sciences" or with biological sciences alone under the heading "biomedical sciences."

We begin with a general overview of the domestic and global interest in science, technology, engineering and mathematics. STEM is a hot topic, brought into the

limelight by 9/11, global competitiveness, and the so-called "quiet crisis" of an imbalance between supply of and demand for talent. We bring to light recent reports and data on STEM doctorates. Doctoral production serves as a gauge to American capacity to innovate, create, and produce new and advanced knowledge and technology. Then we concentrate on doctorates awarded to Latinos in Science and Engineering (S & E) since the 1970's. We have data on Latinas/os in other doctoral programs related to medicine and public health. We examine the data with snapshots of doctorates by gender, nationality, and by major field.

We are interested in the trends of Latinas and Latinos in getting doctoral degrees and the general pattern of degree completion. What fields are preferred among U.S. Latinos with doctorates and what fields of S&E do females and males pursue? Are Latino doctorates U.S. citizens, Permanent Residents (e.g. "Green-carders), or Temporary Residents? What are the principle institutions of Baccalaureates of those who complete their doctorates?

We also provide a brief analysis of these data and attempt to identify both challenges and opportunities. We add some inspirational stories in the Appendix. References, definitions, and data sources are included at the end of this report.

THE NATIONAL SCENE

Latinos are a growing part of American science. But the part that's exposed is treated more like a wart instead of something promising.

The questions we ask: Where are Latinos in terms of the national scene? What are the issues that draw support and public attention to Latinas/os in science?

Since September 11, 2001, interest has risen over American capabilities in Science, Technology, Engineering, and Mathematics (STEM). In particular, U.S. stakeholders have raised concern with global competitiveness, national security, American leadership in higher education and related labor market conditions. Within this milieu we get mixed signals about Latinos and traditionally under-represented minorities (URMs) in science.

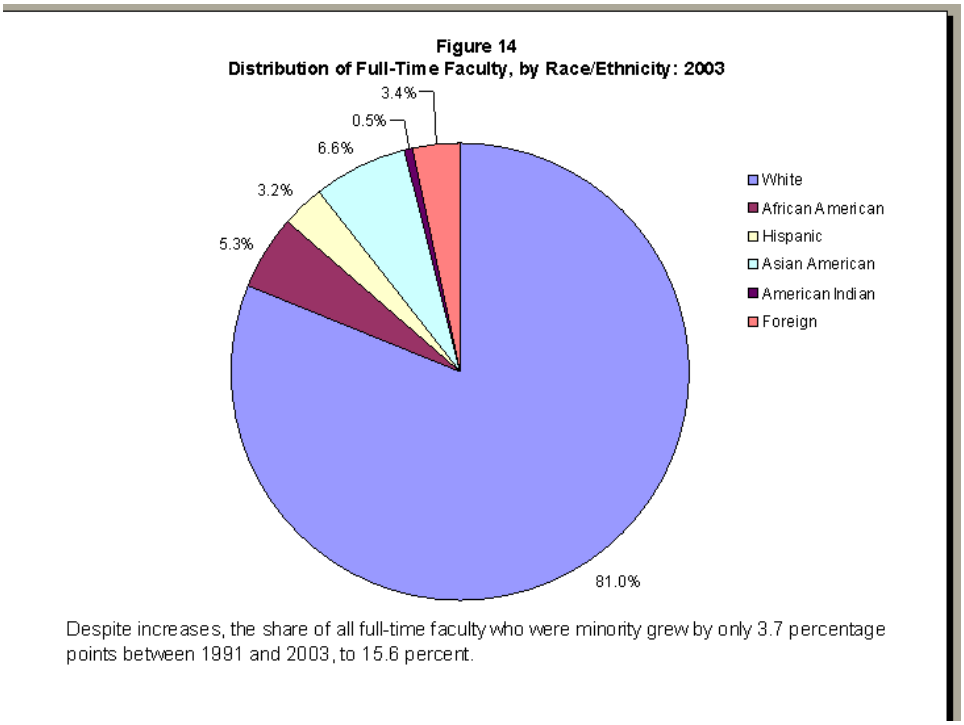
THE DOMESTIC AND GLOBAL INTEREST IN STEM
American Issues at the dawn of the 21st Century

Issues	Low visibility	Moderate concern	Major interest
1. Aging Faculty	Corporate leaders	College leaders	Science orgs. AAAS, Sigma Xi
2. Flat Enrollment in S&E.	Students in STEM	NSF & NIH	College leaders
3. Foreign Nationals in STEM	Corporate leaders	Science orgs, NIH-NIGMS, NIMH, ACE	SACNAS, SHPE, NACME, BEST, (URMs).
4. Global Competition	Students in STEM	Science orgs, PCAST, College leaders.	Corporate leaders
5. Labor Market	College leaders	US Education, DOL & Commerce.	Corporate leaders, Students in STEM
6. Limited Vision	Students in STEM	Corporate leaders, College leaders	US Dept of Education
7. STEM Opportunities	Science orgs.	College leaders, Students in STEM	Corporate leaders, NSF & NIH
8. The Failing Pipeline	Corporate leaders	NSF & NIH	AAHHE, HSI's, SHPE.

1) Aging Faculty

Academic scientists are retiring and the aging baby-boom generation, educated in the 1950s and 1960s, portends a large retirement ahead. America's leading science organizations are calling attention to the erosion of talent and the absence of Ph.D.s prepared to step into U.S. laboratories and classrooms to maintain, let alone lead, the next generations of innovations and technological advances. Some college leaders are paying high scale wages to continue their grant supported research and teaching programs.

At the same time with a demographic boom in U.S. minorities, American Council on Education (ACE) reports that the number of minority full-time faculty increased significantly, from 65,000 positions in 1993 to more than 97,000 positions in 2003, a 50 percent increase. However, in 2003, URMs accounted for less than 20 percent of full-time faculty.



Source: American Council on Education (ACE). Minorities in Higher Education: Twenty-Second Annual Status Report, 2006.

While we have some information on the current miniscule pool of Hispanic full-time instructional faculty, we see few plans to hire more and to prepare for the day when they retire. Yet, as shown in this table, more than half of the Hispanic professors in higher education were between 45 to 64 years of age in 2003. That is, 5,600 out of the 9,800 reported for 2003, the latest date for which we have numbers. As noted in the Table, a larger proportion of senior Hispanic professors are male, 3,200 to 2,400 female professors between 45 to 64 years of age.

Number and Percent of Total U.S. and Hispanic professors in degree-granting institutions, by gender and selected characteristics: Fall - 2003

Full-time instructional faculty and staff.	Total in U.S. Degree Granting Institutions	Full-time Hispanic Male faculty/staff	Full-time Hispanic Female faculty/staff	Total Hispanic
Number of Full-time Faculty and Staff	682,000	13,000	10,000	23,000
Percent of Total	100	2.0	1.5	3.5
Number in Public Research	162,000	1,800	1,100	2,900
Percent in Public Research	100	1.0	0.7	1.7
Number in Public Doctoral	51,000	1,100	1,300	2,400
Percent in Public Doctoral	100	2.2	2.5	4.7
Full Professor	194,000	1,800	800	2,600
Percent at Rank	100	0.01	0.01	0.02
Associate Professor	150,000	1,700	1,300	3,000
Percent at Associate	100	0.01	0.01	0.02
Assistant Professor	158,000	2,300	1,900	4,200
Percent at Assistant	100	0.02	0.01	0.03
Total No. Professors	502,000	5,800	4,000	9,800
Percent of Total	100	0.01	0.01	0.02
Under Age 45	248,000	5,200	4,600	9,800
Percent Under 45	100	0.02	0.02	0.04
Age 45 - 64	400,000	3,200	2,400	5,600
Percent 45-64	100	0.01	0.01	0.02

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2003, National Study of Postsecondary Faculty (NSOPF:04). (This data was posted at NCES in September 2005.) http://nces.ed.gov/programs/digest/d05/tables/dt05_231.asp.

2) Flat Enrollment in Science & Engineering

Over the last two decades, enrollment in U.S. colleges and universities has increased by about 25 percent from 12.6 million in 1983 to 15.7 million in 2002. Some stakeholders have voiced concern with the failure of schools (K-12) to maintain the pipeline of students in STEM.

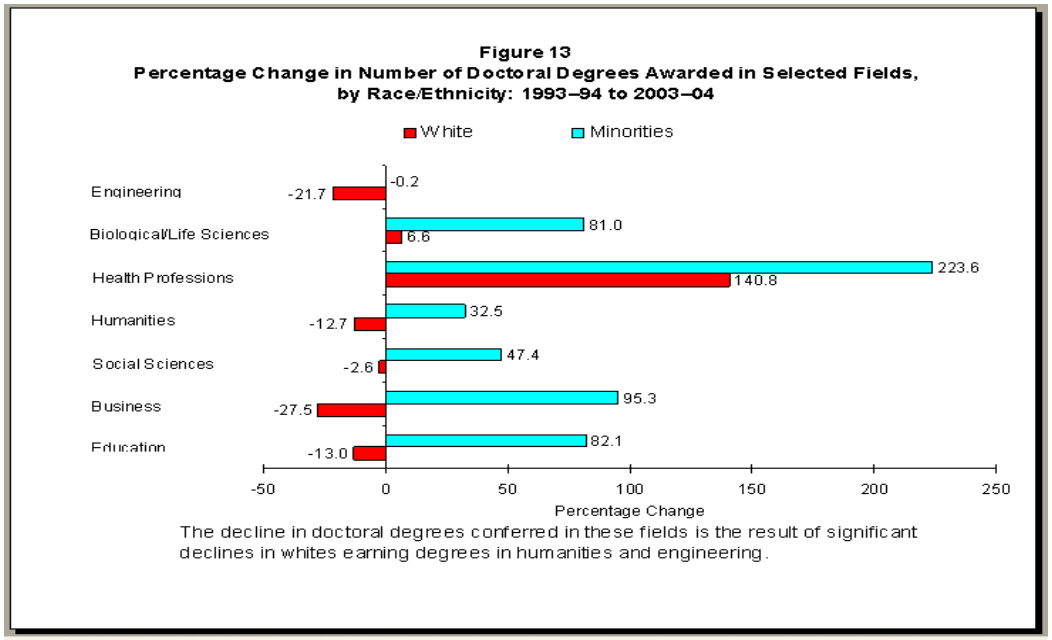
Reports by the Higher Education Research Institute at UCLA suggest that the percentage of freshman intending to study science and engineering, or S&E, will remain relatively flat, with only about one-third of U.S. students interested in studying science and engineering. (See: www.gseis.ucla.edu/heri/ for related reports).

Nonetheless, the annual reports of the Council of Graduate Schools and ACE indicate a promising trend within URMs who seek and obtain doctorates in STEM and professional fields of health, business and education.

	2005	% Change 2004 to 2005	Average Annual % Change 1986 to 2005	2005	% Change 2004 to 2005	Average Annual % Change 1986 to 2005	2005	% Change 2004 to 2005	Average Annual % Change 1986 to 2005
	African American			*American Indian*			*Asian*		
Total	**135,020**	6%	5%	**8,164**	2%	4%	**70,800**	2%	5%
Biological Sciences*	2,554	8%	5%	334	5%	6%	3,981	3%	6%
Business	19,201	3%	5%	936	8%	4%	14,996	3%	8%
Education	31,741	4%	5%	2,041	-1%	4%	7,875	0%	8%
Engineering	3,255	11%	6%	253	7%	5%	8,148	2%	3%
Health Sciences	8,694	16%	7%	669	14%	5%	6,825	10%	9%
Humanities and Arts	4,197	7%	5%	540	7%	6%	3,420	2%	6%
Physical Sciences	3,605	1%	5%	289	7%	5%	6,556	-2%	4%
Public Admin.& Serv.	8,494	1%	5%	489	-7%	5%	1,803	7%	8%
Social Sciences	9,865	2%	5%	866	1%	6%	4,930	3%	7%
Other Fields**	10,801	-1%	4%	545	11%	4%	3,844	-2%	5%
	Hispanic/Latino			*White*					
Total	**85,764**	2%	6%	**854,786**	2%	0%			
Biological Sciences*	2,758	16%	5%	38,746	1%	0%			
Business	10,790	12%	5%	104,192	0%	-1%			
Education	22,483	-2%	7%	207,508	0%	1%			
Engineering	3,253	-5%	5%	38,733	2%	0%			
Health Sciences	4,757	4%	8%	71,532	14%	3%			
Humanities and Arts	5,830	3%	5%	65,491	2%	1%			
Physical Sciences	3,261	0%	4%	45,654	2%	0%			
Public Admin.& Serv.	4,721	6%	3%	32,156	0%	2%			
Social Sciences	7,778	3%	5%	65,359	2%	1%			
Other Fields**	7,386	43%	4%	64,373	7%	1%			

NOTE: Because not all institutions responded to all items, detail variables may not sum to total. Percentages are based on total of known field.
*"Biological Sciences" includes agriculture.
**The category "Other Fields" includes architecture, communications, home economics, library science, and religion.
Source: CGS/GRE Survey of Graduate Enrollment

Source: Council of Graduate Schools, CGS/GRE Survey of Graduate Enrollment, 2005.
http://cgsnet.org/Default.aspx?tabid=168



Source: American Council on Education (ACE). Minorities in Higher Education: Twenty-Second Annual Status Report, 2006.

3) Foreign Nationals in STEM

The Council of Graduate Schools (CGS) annual report provides a breakdown of graduate enrollment by field and citizenship as of Fall 2005. U.S. Citizens and Permanent Residents are in the majority. However, S&E enrollments include relatively high percentages of Non-U.S. Citizen, Temporary Residents in Engineering (48%), Physical Sciences (40%), and Biological Sciences (27%).

Minority leaders and proponents for more federal support for URMs are concerned that foreign nationals take graduate positions for which they are qualified. The foreign competition reportedly comes from the best and the brightest of countries with large reserves of labor and low prospects for them to return to their home countries. How this plays out is still to be assessed for the impact on U.S. minority scientists and engineers.

Fall 2005 graduate enrollment by field and citizenship

Major Field	Total	U.S. Citizens and Permanent Residents		Non-U.S. Citizen Temporary Residents	
Total	**1,517,976**	**1,154,534**	**84%**	**221,878**	**16%**
Biological Sciences*	68,952	48,373	73%	17,711	27%
Business	219,953	150,115	83%	31,550	17%
Education	306,704	271,648	96%	12,182	4%
Engineering	108,086	53,642	52%	48,649	48%
Health Sciences	111,846	92,477	91%	9,577	9%
Humanities & Arts	100,678	79,478	86%	13,309	14%
Physical Sciences	105,170	59,365	60%	40,188	40%
Public Administration and Services	54,309	47,663	95%	2,358	5%
Social Sciences	115,345	88,798	84%	16,609	16%
Other Fields**	104,933	86,949	90%	9,778	10%

NOTE: Because not all institutions responded to all items, detail variables may not sum to total. Percentages by field are based on total of known citizenship.
*"Biological Sciences" includes agriculture.
**The category "Other Fields" includes architecture, communications, home economics, library science, and religion.

Source: CGS/GRE, 2006 Annual Report. The Council of Graduate Schools annual survey, *Graduate Enrollment and Degrees: 1986-2005*, (September 2006).

4) Global Competition

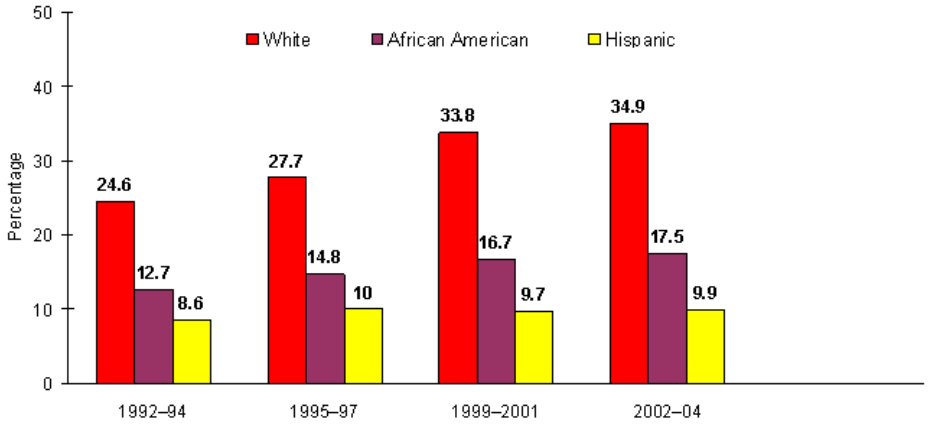
Last year, the National Science Board issued a report highlighting the U.S. decline from third in the world in 1975 to 17th today in the proportion of 24 year olds who earn a degree in the natural sciences or engineering. [NSF, Science and Engineering Indicators, 2004].

According to Dewayne Matthews, senior research director at the Lumina Foundation for Education, the United States ranks first among the largest modern democracies in attainment of bachelor's degrees by those ages 55 to 64, at 35 percent. But the country drops to eighth in the rankings of bachelor's degrees by those ages 25 to 34. He reportedly presented statistics, which compared the United States with the other 29 members of the Organization for Economic Cooperation and Development, showing that about 37 percent of Americans ages 25 to 34 have bachelor's degrees. Canada, at 53 percent, and Japan, at 52 percent, lead the list. Other countries with percentages higher than the United States are, in order of ranking, South Korea, Sweden, Finland, Norway, and Belgium. "Other countries are not complacent, and their young people are increasing their educational attainment levels," said Mr. Matthews.

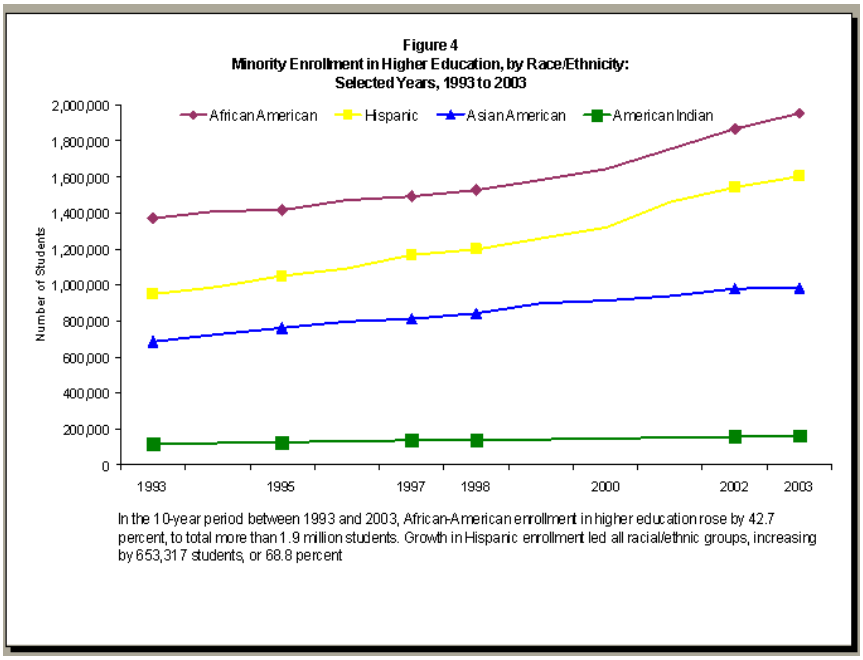
The trends for attainment of bachelor's degrees are likely to worsen in the United States, Mr. Matthews said. He noted that: ***The country's fastest-growing minority group is Hispanic Americans, and they have traditionally gone to college at lower rates than all other segments of the population.*** (Emphasis added). Source: Martin Van Der Werf, "Conference Roundup: American Colleges Seem Ill-Prepared for Foreign Competition and Natural Calamities." February 20, 2007, http://chronicle.com/daily/2007/02/2007022001n.htm.

Facts of the matter as reported by ACE in its annual report by Cook and Cordova (2006):

Figure 3
Percentage of Persons 25 to 29 Years Old Who Completed Four or More Years of College, by Race/Ethnicity: Selected Years, 1992–94 to 2002–04



By 2002–04, 17.5 percent of 25- to 29-year-old African Americans had completed four or more years of college, an increase of 4.8 percentage points from 1992–94. From 1992–94 to 2002–04, Hispanics made little gain in the educational attainment rate among persons aged 25 to 29 years; this rate rose from 8.6 percent to 9.9 percent.



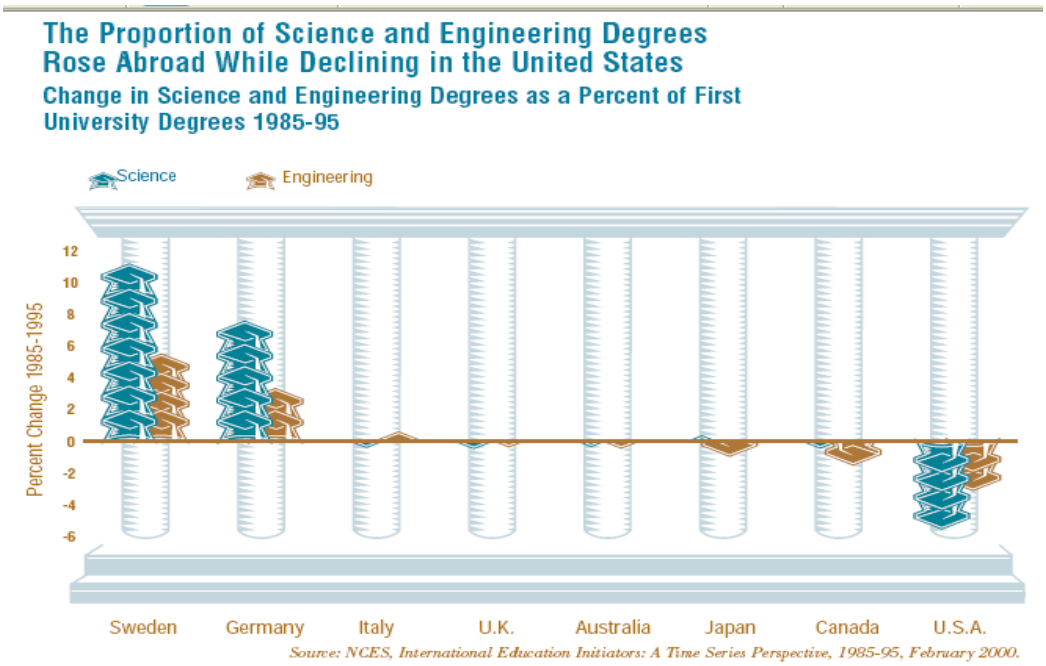
Source: Cook, Bryan J. and Diana I. Cordova. Minorities in Higher Education: Twenty-second Annual Status Report. Power Point Addendum. American Council on Education. www.acenet.edu.

A report from the National Bureau of Economic Research finds that growth in China's S&E enrollment has been very impressive at the doctoral level, increasing from 8,139 in 1995 to 48,740 in 2003. India too has been a rising star in graduate growth in computer programming and information technology. (Freeman, National Bureau of Economic Research, 2005.)

Bill Gates, chairman of Microsoft Corp. and co-chairman of the Bill and Melinda Gates Foundation, published an OpEd in the Washington Post (February 28, 2007) stating that the growing economic importance of countries such as China and India is not bad. "On the contrary, the world benefits as more people acquire the skills needed to foster innovation." His solution for global competition: "Two steps are critical. First, we must demand strong schools so that young Americans enter the workforce with the math, science and problem-solving skills they need to succeed in the knowledge economy. We must also make it easier for foreign-born scientists and engineers to work for U.S. companies."

Gates added: "American competitiveness also requires immigration reforms that reflect the importance of highly skilled foreign-born employees. Demand for specialized technical skills has long exceeded the supply of native-born workers with advanced degrees, and scientists and engineers from other countries fill this gap."

Shirley Ann Jackson, while President of AAAS, highlighted global competition with this chart.



Source: Shirley Ann Jackson. The Quiet Crisis: Falling Short in Producing American Scientific and Technical Talent," (BEST 2004), p.2.

5) Labor Market Uncertainties

Nationally there are labor market uncertainties related to the cost of doing business in America and the need for domestic scientists and engineers. Several global companies have out-sourced employees in other countries for information technology and other fields of science. Shirley Ann Jackson (BEST, 2004) addressed the U.S. labor market situation as a "Quiet Crisis," specifically a growing imbalance in supply and demand for scientific and technical talent. To quote:

"There is a quiet crisis building in the United States — a crisis that could jeopardize the nation's pre-eminence and well-being. The crisis has been mounting gradually, but inexorably, over several decades. If permitted to continue unmitigated, it could reverse the global leadership Americans currently enjoy. The crisis stems from the gap between the nation's growing need for scientists, engineers, and other technically skilled workers, and its production of them. As the generation educated in the 1950s and 1960s prepares to retire, our colleges and universities are not graduating enough scientific and technical talent to step into research laboratories, software and other design centers, refineries, defense installations, science policy offices, manufacturing shop floors and high-tech start- ups. This "gap" represents a shortfall in our national scientific and technical capabilities." (2004, p.1).

The Population Reference Bureau, a national organization that addresses demographic shifts and economic conditions, asked: Is There a U.S. Shortage of Scientists and Engineers? And answered its question: It Depends Where You Live. (Mark Mather. March 2006: prb.org). According to Mark Mather, deputy director at the Bureau: "What is often overlooked in this debate is the imbalance of science and engineering (S&E)

workers across different parts of the United States. In general, S&E jobs are concentrated in states on the East and West coasts, with fewer opportunities in the Midwest and South."

Louisiana, for example, has difficultly attracting or retaining scientists and engineers because of a lack of job opportunities for individuals with post-graduate degrees or technical skills. Other states such as California are "importers" of high-tech workers: "They recruit scientists and engineers from the rest of the United States and increasingly from other countries, creating geographic variation in the technical skills of the U.S. workforce." Moreover, according to Mather: "Rural areas in particular have difficulty competing for scarce S&E jobs…. To increase S&E employment in remote areas, states need to make significant investments in the education and technical skills of the rural workforce."

Mather also noted that: "… there is a mismatch in the education levels and technical skills of minority groups and the demands of the knowledge-based economy…. The lack of professionals in many minority communities also means that there are few role models for youth interested in pursuing careers in science. Within metro areas, black and Latino youth are much more likely to be living in distressed neighborhoods with high proportions of people in poverty, high school dropouts, and working-age males who are unemployed to the labor force. More research is needed to determine the potential impact of neighborhood characteristics on youth education and career trajectories." (Mather, 2006).

6) Limited Vision or Leadership

In the aftermath of 9/11, national attention shifted slightly towards preparing more Americans with skills in mathematics, science and technology. Nonetheless, it took 19 members of the Commission on the Future of Higher Education to coalesce around a long-term vision for the nation's colleges. In the end, the Commission largely warned of complacency and called for sweeping changes. Yet it whimpered with impassionate statements to the press. [http://www.ed.gov/about/bdscomm/list/hiedfuture/index.html].

To wit:

1. We want a world-class higher-education system that creates new knowledge, contributes to economic prosperity and global competitiveness, and empowers citizens;
2. We want a system that is accessible to all Americans, throughout their lives;
3. We want postsecondary institutions to provide high-quality instruction while improving their efficiency in order to be more affordable to the students, taxpayers, and donors who sustain them;
4. We want a higher-education system that gives Americans the workplace skills they need to adapt to a rapidly changing economy;
5. We want post-secondary institutions to adapt to a world altered by technology, changing demographics and globalization, in which the higher-education

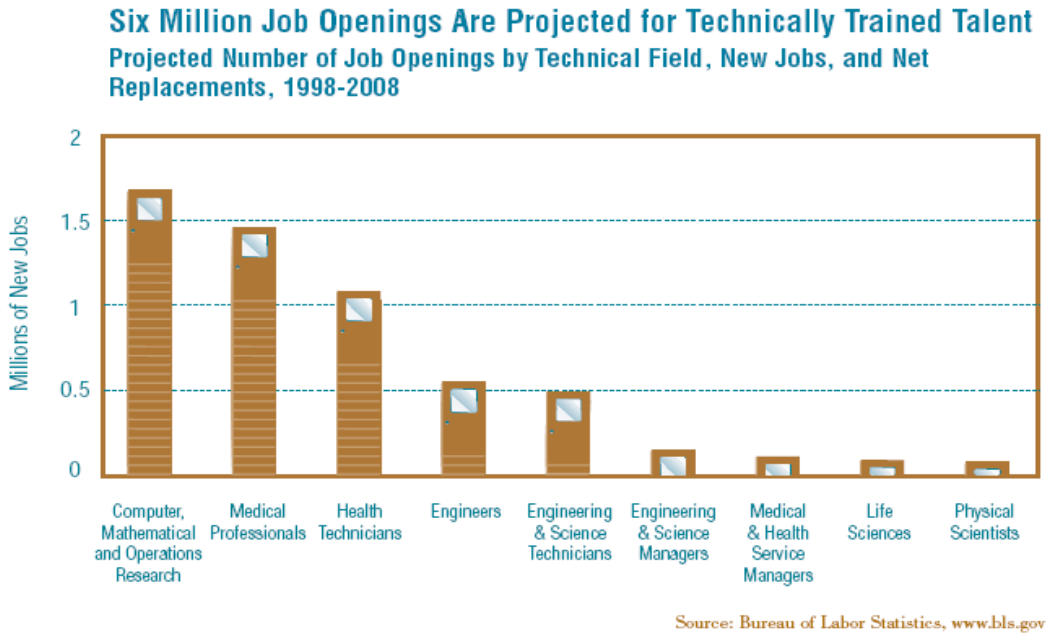
landscape includes new providers and new paradigms, from for-profit universities to distance learning.

We ask, what's new in this vision? Where is the strategic plan, dynamic agenda, appeals for more federal and state support, and/or rallying calls for the nation to respond to these points of the Commission? Where is commitment to join Latino leaders in advancing the cause for Latinas/os in science? Judging from the recent articles in professional journals, this vision is shortsighted and fails generally at leadership in science, technology, engineering and mathematics (STEM).

7) STEM Opportunities

Despite the limited vision and the questionable domestic enrollments in STEM, there has been a concern with the lack of specific information on job growth and the future needs employers.

The Bureau of Labor Statistics forecasts that employment in traditional S&E occupations will increase about 70% faster than the overall growth rate of all occupations. (Olsen, 2006). At the same time, the Bureau of Labor Statistics forecasts new needs across the nation, especially in fields of computer, mathematical, and operations research, medical professions, and generally in science, technology, engineering and mathematics (STEM). For example: to operate public health laboratories, to generate life-saving technology, to address international pandemics, and to respond effectively to Global Warming.



Source of chart: Jackson. (BEST 2004, p.5)

Science organizations (including Sigma Xi, the huge American Chemical Society, and the American Association for the Advancement of Science – AAAS) report the need for more scientists in fields of chemistry, geology, meteorology, astrology, physics,

microbiology/molecular biology, and a number of emerging interdisciplinary fields like ecology, nano-technology, bio-engineering, genome, neuroscience, astrophysics, environmental sciences, and more.

Bill Gates' concern: "Computer science employment is growing by nearly 100,000 jobs annually. But at the same time studies show that there is a dramatic decline in the number of students graduating with computer science degrees." Bill Gates' solution: "The United States provides 65,000 temporary H-1B visas each year to make up this shortfall -- not nearly enough to fill open technical positions."

Encouraging students to consider "untraditional" career options, related to STEM, should be a growing part of nation's agenda. This would be in new areas of public health, manufacturing, and new topics like "global warming," Katrina disasters and prevention measures, and global pandemics.

Additionally, jobs not typically classified as S&E will increasingly require some understanding of science and technology. These evolving needs should be exciting and a way to be creative in higher education.

8) The Leaky Pipeline

The so-called leaky pipeline is based on the simple depiction of a spigot at the end of a large system of pipelines and gravitational flows of water. According to this depiction, huge systems of pipelines yield mere trickles at the end because of leaks and weak connections.

Educational pipeline issues are: (1) under-preparation of students in K-12 courses in English, math and science, (2) failure to complete advanced placement courses, (3) little home support and incentives to prepare students for higher stages of education, and (4) few students entering and completing college degrees of the highest order.

Some research shows that Latino pathways through K-12 begin early in youth and are complex to understand. (See: Cooper, Chavira & Mena, 2005 for analysis of the Latino pipeline dilemma). The RAND report by Philip Garcia (2002) identifies a number of obstacles and barriers to Hispanic Baccalaureates along the way to higher education.

The companion articles by Chapa/DelaRosa and Gandara in the Journal of Hispanic Higher Education (July 2006) identify sizeable leaks in the pipeline from K-12 through college. According to Chapa/DelaRosa: "The educational 'pipeline' for Latinos is rife with massive leaks...In 2000 Latino individuals accounted for 12.5% of the total population and 17.5% of the college-age population; however, only 10.8% of the high school graduates were Latino, 9.9% of the associate degree recipients were Latino, and only 6.6% of all bachelor's degrees and 3.8% of all doctorates were Latino individuals." (Journal of Hispanic Higher Education, July 2006, p. 204).

"The comparison between the overall Latino student population and the very small numbers of these with PhDs will truly make the pipeline seem much more like a pipette." (2006, p. 208).

Gandara adds that: "Because Latino students begin school far behind their non-Hispanic peers, moving more of them into the math and science pipeline will require a broad strategy that begins with preliteracy skills." (July 2006, p. 222).

The pipeline analogy is a tough one to ignore. We see many Latinos enter K-12 and relatively few who attain Baccalaureate standing, let alone a Professional or Doctoral degree. The most recent Census data for 2005, highlights the fact that approximately 21 million Hispanics are in the Civilian labor force. Of these, the numbers of Hispanics who hold Professional and Doctoral degrees is small, about 216,000, or about 1 percent of the total of Hispanic Civilian workers. The Hispanic numbers are relatively small compared to other populations in America.
(Source: http://www.census.gov/population/www/socdemo/education/cps2006.html)

We also see the phenomenon of relatively few Latinos employed professionally in numbers commensurate with their proportion in the nation's workforce. The current state of S&E employment is reflected in this chart of professional attainment by degree.

Breakdown of Science and Engineering Professionals

Percent Distribution by Race/Ethnicity

Highest Degree Held	Total	African American	Asian	Caucasian	Hispanic	Native American
Doctorate	593,700*	3.6%	17.6%	76.7%	2.1%	0.0%
Master's Degree	1,155,700*	3.1%	16.5%	76.9%	3.3%	0.2%
Bachelor's Degree	3,223,700*	7.2%	12.6%	76.2%	3.7%	0.3%
Associate's Degree	657,000*	11.6%	5.7%	80.0%	2.1%	0.5%
High School Diploma	1,657,000*	11.3%	4.4%	77.8%	5.5%	1.0%
Grand Total	7,287,100*					

Source: Current Population Survey, April 2001
*Rounded to the nearest 100.

Other Leaks in the Pipeline

As reported in the President's Council of Advisors on Science and Technology Report on Maintaining the Strength of Our Science and Engineering Capabilities, (PCAST, June 2004), Latinos are not the only ones with a pipeline leakage. Others leave the Science Track from Grade 9 to the BS degree. From grade 9 to a BS degree, the drop-off is high within America.

The Pipeline to the PhD in Science

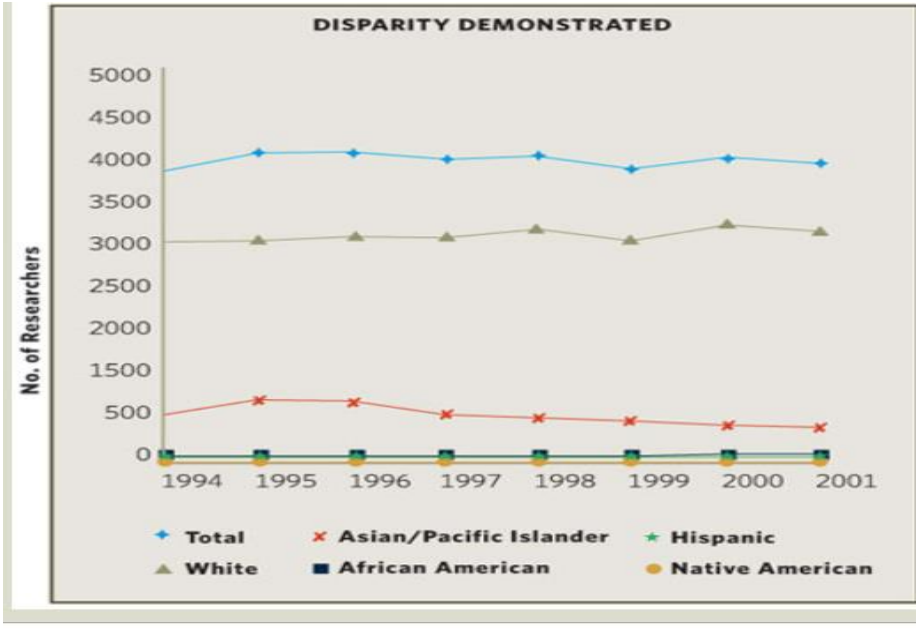
	Percent of all U.S. 9th Graders	
	Men	Women
In Grade 9, Enrolls in Science Track	14 %	11 %
As College Freshman, Plans to Major in Science	7 %	2 %
Achieves a Bachelors in Science	2 %	1 %

Source: J.S. Long (Ed.) (2001). From Scarcity to Visibility: Gender Differences in the Careers of Doctoral Scientists and Engineers, National Research Council.

Source: http://www.ostp.gov/PCAST/FINALPCASTSECAPABILITIESPACKAGE.pdf)

For Latinos: More Than a Pipeline Issue

Amri Johnson, **(***The Scientist* 2005), makes it evident in his graph (Disparity Demonstrated) that there is more than meets the eye in the pipeline model. As shown, there is a wide divide between racial and ethnic groups in STEM, apparent since 1994. Hispanics have been at the bottom of research and science positions along with African- and Native-Americans. (For related reading see: ACE, The Continuing Significance of Racism: U.S. Colleges and Universities, 2002).

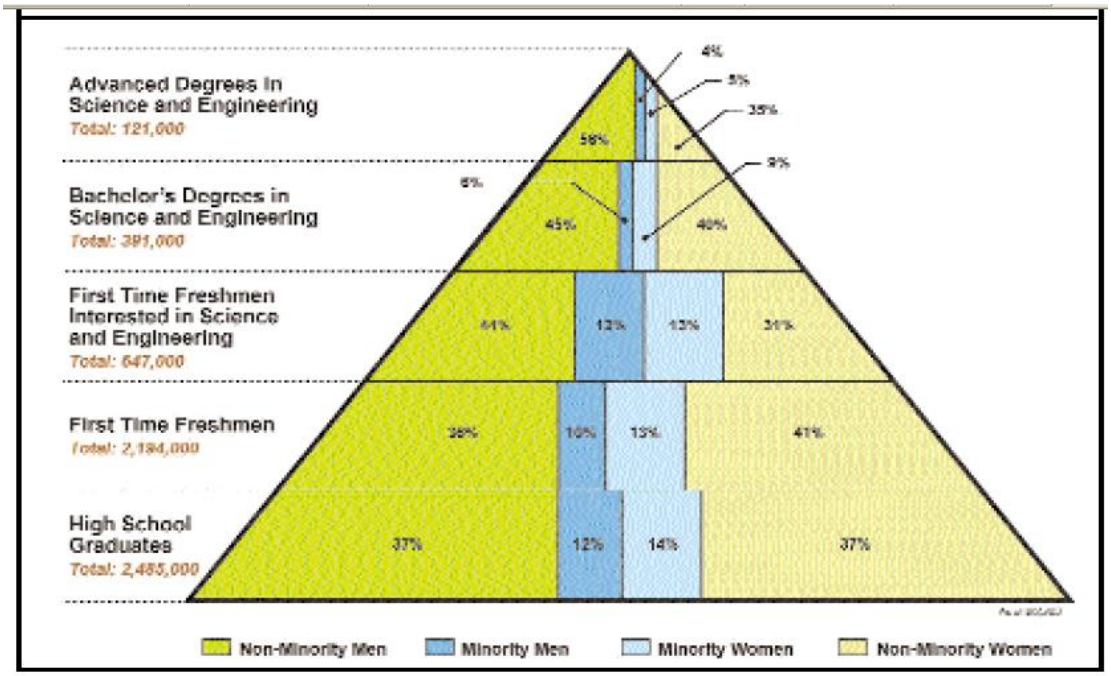


Facing The Pyramid

There is also another way of looking at the challenges of increasing Latinos in science. It's the Pyramid of Education, advanced by BEST (circa 2004). It depicts the sorting process in STEM, whereby the base is large but the size of the talent pool shrinks at each successive phase of education, eliminating African Americans, Hispanics and Native Americans in disproportionate numbers. The higher up the educational ladder one goes, the more their participation rate declines. The imbalance is further reflected in degrees attained. According to the creators of this pyramid, in 2000 one-third of all African American, Hispanic or Native American undergraduates earned a bachelor's degree in a technical discipline, but from then one, few progressed higher towards the doctorate.

A recent report by the American Council on Education (ACE, 2007)) sheds light into what happens to students in pursuit of STEM.

Pyramid of Advanced Degrees in Science and Engineering



According to this report: *Increasing the Success of Minority Students in Science and Technology*, the fourth publication in the ACE series *The Unfinished Agenda: Ensuring Success for Students of Color*:

1) African American and Hispanic students begin college interested in majoring in science, technology, engineering and math (STEM) fields at rates similar to those of white and Asian-American students, and persist in these fields through their

third year of study, but do not earn their bachelor's degrees at the same rate as their peers.
2) African American and Hispanic students majoring in STEM fields who persisted beyond the third year did not drop out, but were still enrolled and working toward a degree after six years.
3) A statistical analysis showed that majoring in STEM fields did not affect student persistence. Instead, the variables strongly related to persistence for all students, regardless of major or race/ethnicity were full-time attendance, hours worked while enrolled, and rigor of high school curriculum.

The ACE (2007) analysis identified a number of key differences between students who earned a bachelor's degree by spring 2001 in a STEM field and those who did not.

1) Completers were better prepared for postsecondary education because a larger percentage took a highly rigorous high school curriculum.
2) Nearly all completers were younger than 19 when they entered college in 1995-96 compared with 83.9 percent of non-completers.
3) Completers were more likely to have at least one parent with a bachelor's degree or higher.
4) Completers came from families with higher incomes.
5) Non-completers were more likely to work 15 hours or more a week.

According to Eugene Anderson, associate director of the Center for Policy Analysis at ACE and co-author of the report. "We find that these students do pursue these majors and persist beyond the third year, but are not earning enough credits each year to attain a degree within six years. The challenge now is to move traditionally underrepresented students in the STEM fields toward timely degree completion by supporting these students—both academically and financially throughout their undergraduate careers." Furthermore, according to Anderson, "Higher education institutions must know how to better identify those students who need support—and what type of support, both academic and financial—would be most helpful in order to be successful in the STEM fields. Institutions must also encourage students to work less and attend full time consistently. This is a major challenge because these are two areas institutions can do little to control. Also, the federal government must recommit to financial aid for the neediest students." (ACE Press release, September 15, 2006: http://www.acenet.edu/AM/Template.cfm?Section=Search&template=/CM/HTMLDisplay.cfm&ContentID=19511)

In line with Anderson's comments, the challenge ahead is to widen the pyramid at the top, ASAP, to address the thin layer of Latinas/os at the top of the pyramid of education.

New Rules Needed to Address the Pipeline

One of the reported bottlenecks in both the pipeline and the pyramid is a systematic set of policies that impede degree completion and extend the task. In the report by Shulock and Moore (February 2007) those policies are particularly endemic in California Community

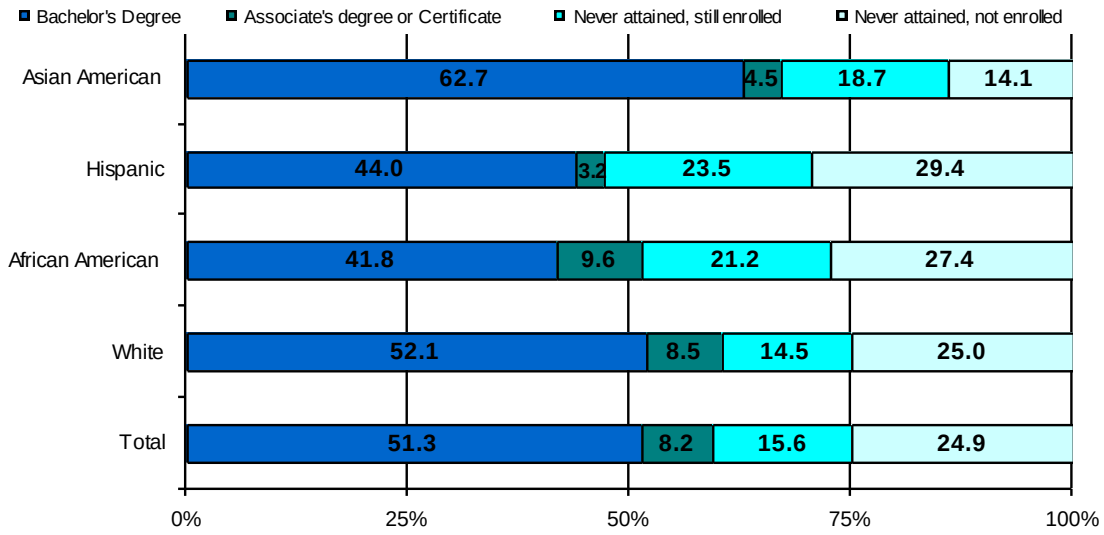
Colleges. They find that "access-oriented policies" have the unintended consequence of inhibiting degree completion. Those policies are presented in five clusters. According to the authors: "Four of the policy clusters involve finance, broadly defined to include laws and regulations that affect how much funding each college receives, how colleges can use their funds, the fees students pay, and the conditions of student financial aid eligibility… A fifth set of policies influences how students are advised and counseled to choose courses and make academic decisions. These policies are especially influential for under-prepared students." (2007, p.10).

Shulock and Moore add that: "The rapidly growing Latino population is currently the least-well educated. Without significant gains in educational attainment among Latinos, the average education level of the California workforce will decline." (2007, p.4). For a copy of this report: http://www.csus.edu/ihe/PDFs/Rules%20of%20the%20Game%20FINAL.pdf.

Furthermore, there is clearly a need to look more closely at the way policies and programs are being implemented in general. Even if we address the system of "access-oriented policies," we would still need to address more fundamental and complex access issues facing Latinos, in particular. Such as the use of SAT and ACT scores for college admissions and the removal of pre-college instruction for general education classes in math and English. Especially critical is the impact of raising college tuition and fees. As Latinos work more to complete their degrees they appear to reduce their enrollment to part-time. For an in depth analysis these few points, see Philip Garcia's report on "Understanding Obstacles and Barriers to Hispanic Baccalaureates," 2002.

Overall, the bottom line is spelled out in this graph from ACE (ACE Report, by Cook and Cordova, Power Point Addendum, Minorities in Science, 2006).

Figure 5A
Persistence of Degree Seeking 1989-90 Beginning Students at Four-Year Institutions After Five Years, by Race/Ethnicity



LATINAS/OS IN HIGHER EDUCATION: HOW MANY?

Sheer numbers alone support the increase of Latinas/os in higher education. With greater numbers in the college-age bracket, there is a good chance for an increase in Latinos going to college. What's needed is a closer look at their numbers in colleges and universities today and their potential graduate enrollment, especially in fields of science.

College Age Latinas/os and College Enrollment: 2003-04

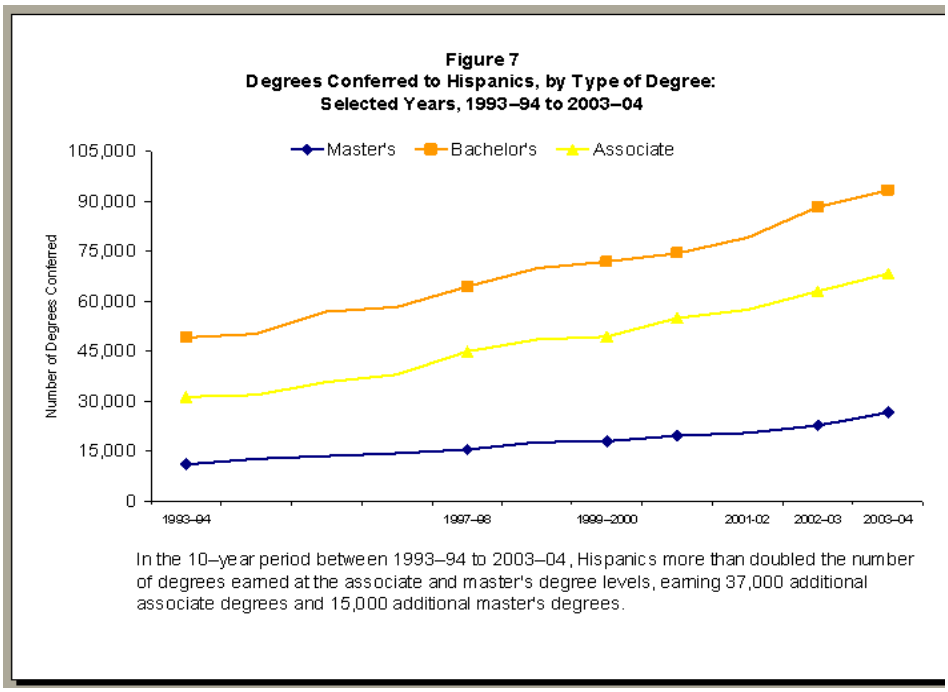
In 2000, according to Chapa/DeLaRosa, the number of college-age Latinas/os was about 3.7 million, out of a population of nearly 36 million, based on the U.S. Census of Population. College-age was defined at percent Latinos between 18-24 years of age, out of the total population of similarly aged adults within the United States.

Today there are approximately 42 million U.S. Hispanics, with approximately 64 percent of Mexican origin (about 27 million), followed by Puerto Rican at 9 percent (3.8 million), and Cuban origin at 3.5 percent (1.4 million). Dominican origin is the fourth largest group at 2.7% (1.2 million). Source: Pew Hispanic Center. A Statistical Portrait of Hispanics at Mid-Decade. August 2006. http://pewhispanic.org/reports/middecade/

If we consider like Chapa/DeLaRosa (2006, Figure 1, p.205) that the Latino college-age population is about 10.3% of the Latino population, then we estimate that today's number of college-age Latinos is about 4.3 million (between 18-24 years of age).

Despite making substantial increases in college enrollment, Hispanics continued to trail Whites in the so-called college participation rate. This is a measure of the percent Latino out of all Latinos that enroll in college. Since the Latino population is growing quickly, their college-enrollment would have to increase at a significantly higher rate than their absolute numbers within the U.S. In short, the flat rate of college enrollment is not the result of a zero change in Latino college enrollment but rather a substantial increase in the overall Latino population. On the other hand, there is a large decline in the size of the White college-age population, causing the college participation rate of Whites to increase.

To quote the ACE report (2006): " From 1993 to 2003, growth in Hispanic enrollment led all racial/ethnic groups, increasing by nearly 70 percent or more than 650,000 students. The largest growth took place at four-year institutions, where Hispanic enrollment rose by 75.1 percent, compared with a 64.2 percent increase at two-year institutions. (Cook and Cordova, April 2006, p. x). Thus, the numbers of degrees conferred on Latinos is going up steadily – based on their sheer increase in population. In 2003-04, BA/BS degree completion was relatively high for Latinos.



Source: ACE Report, by Cook and Cordova, Power Point Addendum, Minorities in Science, 2006.

Hispanic Degrees Conferred 2003-04: Associate, Bachelor's, and Masters

Degree	Total Number Conferred 2003-04	Percent of Latinos of college-age 2003-04	Male/Latino Total	Female/Latina Total
Associate	**68,356**	**10.3**	**26,098**	**42,258**
Bachelor's	**93,448**	**6.4**	**36,564**	**56,884**
Masters	**26,635**	**4.7**	**9,608**	**17.027**

Source: Cook and Cordova, ACE, 2006, Tables14, 15, 16, on corrected errata sheets.

Hispanics 25 years and over in 2006: Educational Attainment

More recent data from the U.S. Census shows the educational attainment of Hispanic origin persons, 25 years and over. As of 2006, Hispanic degree completion reached these numbers:

- 1.12 million with Associates degrees,
- 1.65 million with Bachelor's degrees,
- 469,000 with Master's degrees,
- 133,000 with Professional degrees and
- 83,000 with Doctoral degrees (with over 73,000 held by Latinos above 35 years of age).

Table 1. Educational Attainment of Hispanic Origin Persons, 18 Years and Over, in Labor Force, by Age: 2006 (Numbers in thousands. Civilian non-institutionalized population.)

Hispanic Civilians in Labor Force	Total	High school graduate	Some college no degree	AA degree	BA/BS degree	MA/MS degree	Professional degree	Doctoral degree
18 to 24 years	3,388	1,178	805	136	113	7	1	-
25 to 29 years	3,207	1,033	521	234	266	40	5	5
30 to 34 years	3,001	912	434	194	317	81	29	5
35 to 44 years	5,178	1,519	657	335	554	162	42	22
45 to 54 years	3,387	923	476	231	333	118	42	31
55 to 64 years	1,456	405	202	102	141	54	13	18
65 years and over	340	93	46	15	37	14	2	2
18 years and over	19,957	6,064	3,142	1,248	1,760	476	133	83
25 years and over	16,569	4,886	2,337	1,112	1,647	469	133	83

Source: U.S. Census Bureau, Current Population Survey, 2006 Annual Social and Economic Supplement - Internet Release date: March 15, 2007. A dash (-) represents zero or rounds to zero.

Projections of college going by Latinas/os: 2000 to 2050

The U.S. Department of Education, projected enrollment at degree-granting colleges and universities from 2004 to 2015. Its projections show enrollment growth of 42 percent for Hispanic students, 30 percent for American Indian or Alaska Native students, 28 percent for Asian or Pacific Islander students, and 27 percent for black, non-Hispanic students. Enrollment for white, non-Hispanic students is prejected to rise 6 percent, while nonresident-alien enrollment is expected to rise 34 percent. (NCES 2006-084 Projections of Education Statistics to 2015 Thirty-fourth Edition, September 2006 see: http://nces.ed.gov/pubs2006/2006084.pdf. Note: This is the first time the NCES' annual report, first published in 1964, has included projections of college enrollment by race and ethnicity).

Projections by Chapa/DeLaRosa (2006), Table 1, show that Latinos can be expected to more than double their rates of college degree completion, from 3.7 million in 2000 to 8.9 million by 2040. What's more, if Latinos adjust to the White rate of college completion (increase graduation rates from 6% to 13.3%), their college degree completion could reach 1.2 million by 2040.

Table 1. Projected Hispanic Population and Percent of Nations' Total: 2000 to 2050.

Indicator	2000	2020	2030	2040
Hispanic Population	35,622,000	59,756,000	73,055,000	87,585,000
Percent of U.S. Population	12.6	17.8	20.1	22.3
No. of College Age Latinos	3,679,000	5,981,000	7,330,000	8,895,000
Projected Latino Degrees at Current Rate (6%)	221,844	360,654	441,999	536,369
Projected Latino Degrees at Current White Rate (13.3%)	487,835	793,081	971,958	1,179,477

Source: Chapa/DeLaRosa (July 2006) Tables 11 & 12, p. 216. (Based on U.S. Bureau of the Census, 2004) See also: U.S. Census Bureau, Cumulative Estimates of the Components of Population Change by Race and Hispanic or Latino Origin for the United States: April 1, 2000 to July 1, 2004 (NC-EST2004-05, Table 5).

In March 2004 the Census Bureau projected the overall population of the United States to grow by nearly 50 percent to 420 million by 2050. Whites are expected to account for 50.1 percent of the population in 2050. And, the Census Bureau predicts the population among whites will drop between 2040 and 2050 as aging baby boomers start to die. Whites born in 1964 will be 76 in 2040. Nearly 67 million people of Hispanic origin are expected to be added to the population from 2000 to 2050, a 188 percent increase from 35.6 million to 102.6 million. They will account for 24 percent of the overall population, the Census Bureau predicts.

While the population of White non-Hispanics in the United States grows slowly, the relative youth of the U.S. Hispanic population means that it will supply much of the U.S. population growth for decades to come. As a result, Chapa and De La Rosa (July 2006) suggest that Latinas/os can reshape American higher education, by increasing the enrollment and expressing their preferences for degrees, by affecting the curriculum, and ultimately the composition of staff and faculty.

Moreover, Latinos have widespread geographic distribution, increasing in areas like the Midwest where the traditional White and Black communities are shrinking in population. (Millard & Chapa, 2004). The foundation of Latinos for graduate enrollment is already in college, in community colleges and four-year colleges. Alfredo Jr. and Gerardo de los Santos (2006) note that Latinos are increasing enrollment levels in community colleges and increasingly in top-tier research universities. Latino trends are upward and a sure sign of progress. (See also: Lopez, Ramirez, Rochin, 1999).

LATINA/O GRADUATE ENROLLMENT

The Council of Graduate Schools annual survey, *Graduate Enrollment and Degrees: 1986-2005*, (September 2006) revealed that:

- From 1986 to 2005, Latinas increased their numbers in graduate enrollment by an annual average rate of 7%. The comparable rate for Latinos was 5%.
- Latina/o graduate enrollment was 85,764 in Fall 2005, comprised of 31,556 Latinos (males) and 53,633 Latinas (females).

Graduate Enrollment in 2005, by race/ethnicity and gender

Source: Council of Graduate Schools, *Graduate Enrollment and Degrees: 1986-2005*, (2006)

Group	2005 Total	1-Year % Change	Average Annual % Change, 1986-2005
Total	1,154,534	+3%	+1%
—Men	440,550	+2%	+0%
—Women	697,691	+3%	+2%
African American	135,020	+6%	+5%
—Men	38,591	+6%	+4%
—Women	95,428	+5%	+5%
American Indian	8,164	+2%	+4%
—Men	2,857	+0%	+3%
—Women	5,194	+3%	+4%
Asian	70,800	+2%	+5%
—Men	32,282	+2%	+4%
—Women	37,758	+3%	+7%
Hispanic	85,764	+2%	+6%
—Men	31,556	+0%	+5%
—Women	53,633	+3%	+7%
White	854,786	+2%	+0%
—Men	335,264	+1%	+0%
—Women	505,678	+2%	+1%

As indicated in the next table:

- For Latinas and Latinos the largest enrollment was in Education (22,483), Business (10,790), and Social Sciences (7,778).
- The Latino rate of enrollment surpassed the White rate of change in every field from 1986 to 2005.
- First-time Hispanic enrollment was up 10%, with Hispanic enrollment in Biological Sciences increasing by 16% from 1986 to 2005.

Graduate enrollment by ethnic group and field, fall 2005

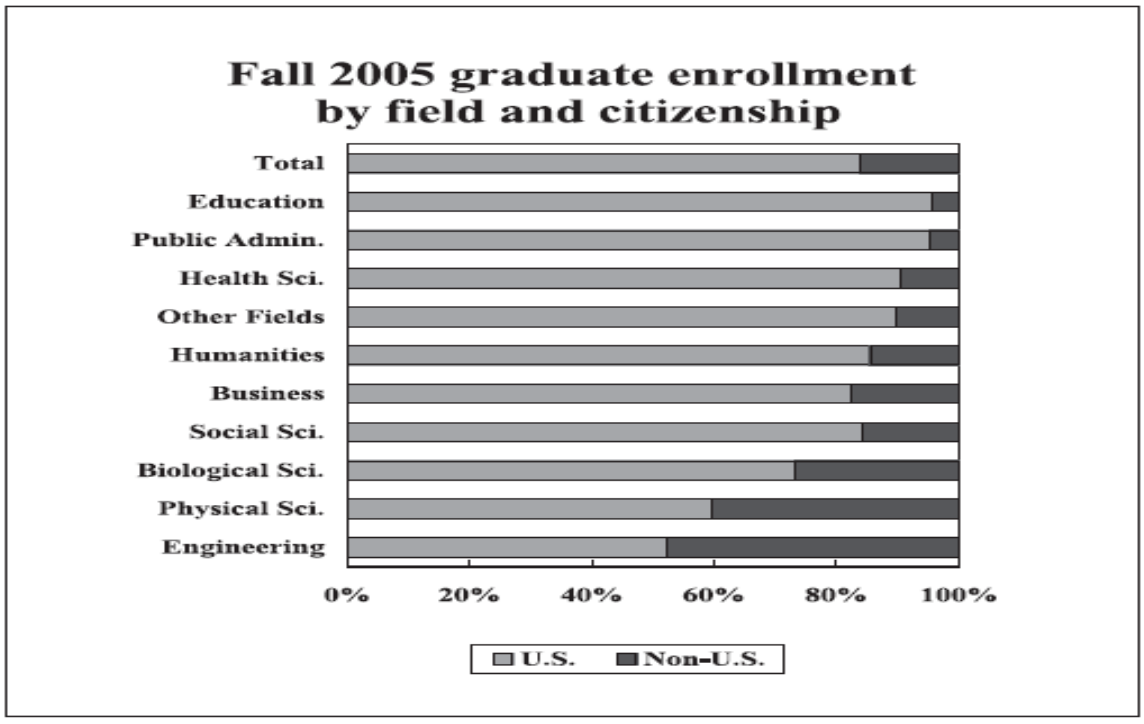
(U.S. citizens and permanent residents only)

Major Field	African American		American Indian		Asian		Hispanic/ Latino		White	
Total	**135,020**	**100%**	**8,164**	**100%**	**70,800**	**100%**	**85,764**	**100%**	**854,786**	**100%**
Biological Sciences*	2,554	2%	334	5%	3,981	6%	2,758	4%	38,746	5%
Business	19,201	19%	936	13%	14,996	24%	10,790	15%	104,192	14%
Education	31,741	31%	2,041	29%	7,875	13%	22,483	31%	207,508	28%
Engineering	3,255	3%	253	4%	8,148	13%	3,253	4%	38,733	5%
Health Sciences	8,694	8%	669	10%	6,825	11%	4,757	7%	71,532	10%
Humanities and Arts	4,197	4%	540	8%	3,420	5%	5,830	8%	65,491	9%
Physical Sciences	3,605	4%	289	4%	6,556	11%	3,261	4%	45,654	6%
Public Administration and Services	8,494	8%	489	7%	1,803	3%	4,721	6%	32,156	4%
Social Sciences	9,865	10%	866	12%	4,930	8%	7,778	11%	65,359	9%
Other Fields**	10,801	11%	545	8%	3,844	6%	7,386	10%	64,373	9%

NOTE: Because not all institutions responded to all items, detail variables may not sum to total. Percentages by ethnicity are based on total of known field.
*"Biological Sciences" includes agriculture.
**The category "Other Fields" includes architecture, communications, home economics, library science, and religion.
Source: CGS/GRE Survey of Graduate Enrollment

Source: http://www.cgsnet.org/portals/0/pdf/R_GED2005.pdf

Graduate Enrollment of Non-Resident Aliens by Field: 2005



Source: CGS/GRE, 2006 Annual Report. The Council of Graduate Schools annual survey, *Graduate Enrollment and Degrees: 1986-2005*, (September 2006)

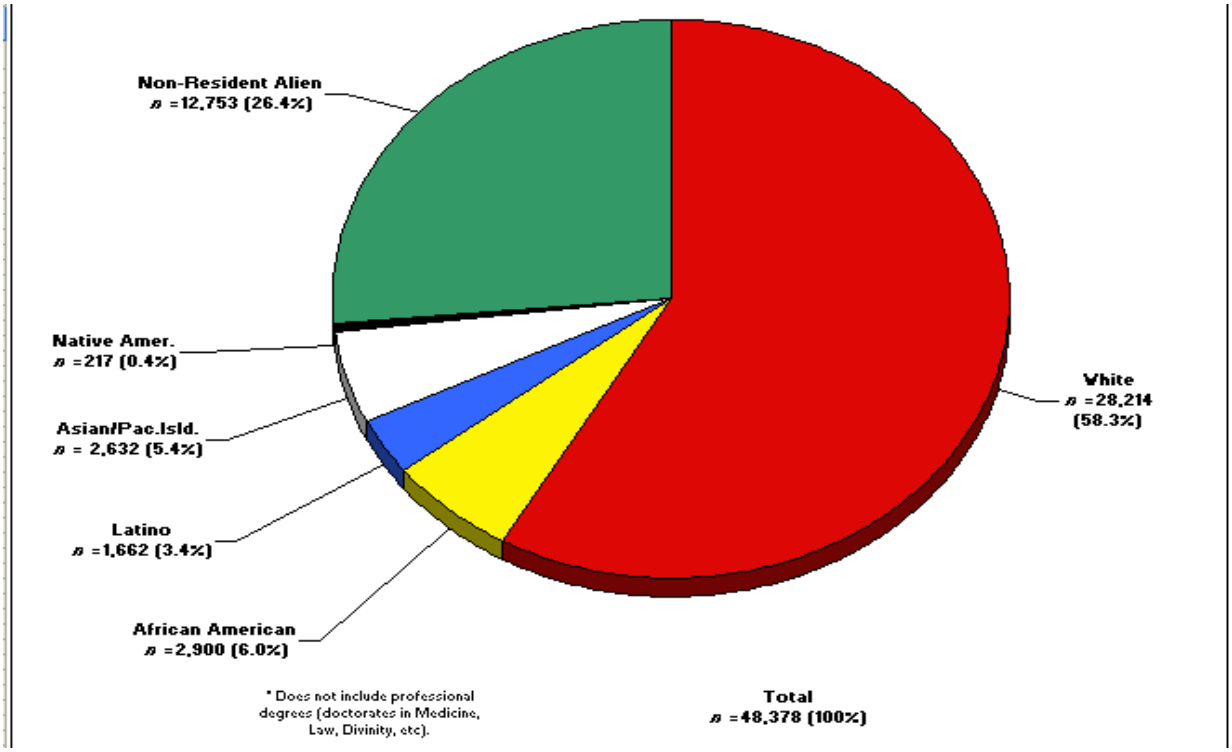
U.S. DOCTORAL DEGREES: 2003-04

The number of doctoral degrees conferred in 2003-04 includes fields of S&E and excludes professional fields of medicine, law, and public health. For the most part, **science** refers to the physical sciences (chemistry, physics, astronomy), earth, atmospheric & ocean sciences, mathematics, computer sciences, biological & agricultural sciences, psychology and social sciences. **Engineering** generally refers to chemical, civil, electrical, mechanical, and other engineering.

There were 48,378 doctoral degrees conferred in the U.S. in 2003-04. Of these, 58.3% went to White and 26.4% went to non-resident aliens. Latinas/os earned a total of 1,662 degrees, representing about 3.5%. Both Asian/Pacific Americans and African Americans earned 2,632 and 2,900 of the doctoral degrees, respectively, representing close to 6 percent each.

Number of doctoral degrees* awarded by ethnicity, degree-granting institutions in the United States (2003-04) (Number in thousands)

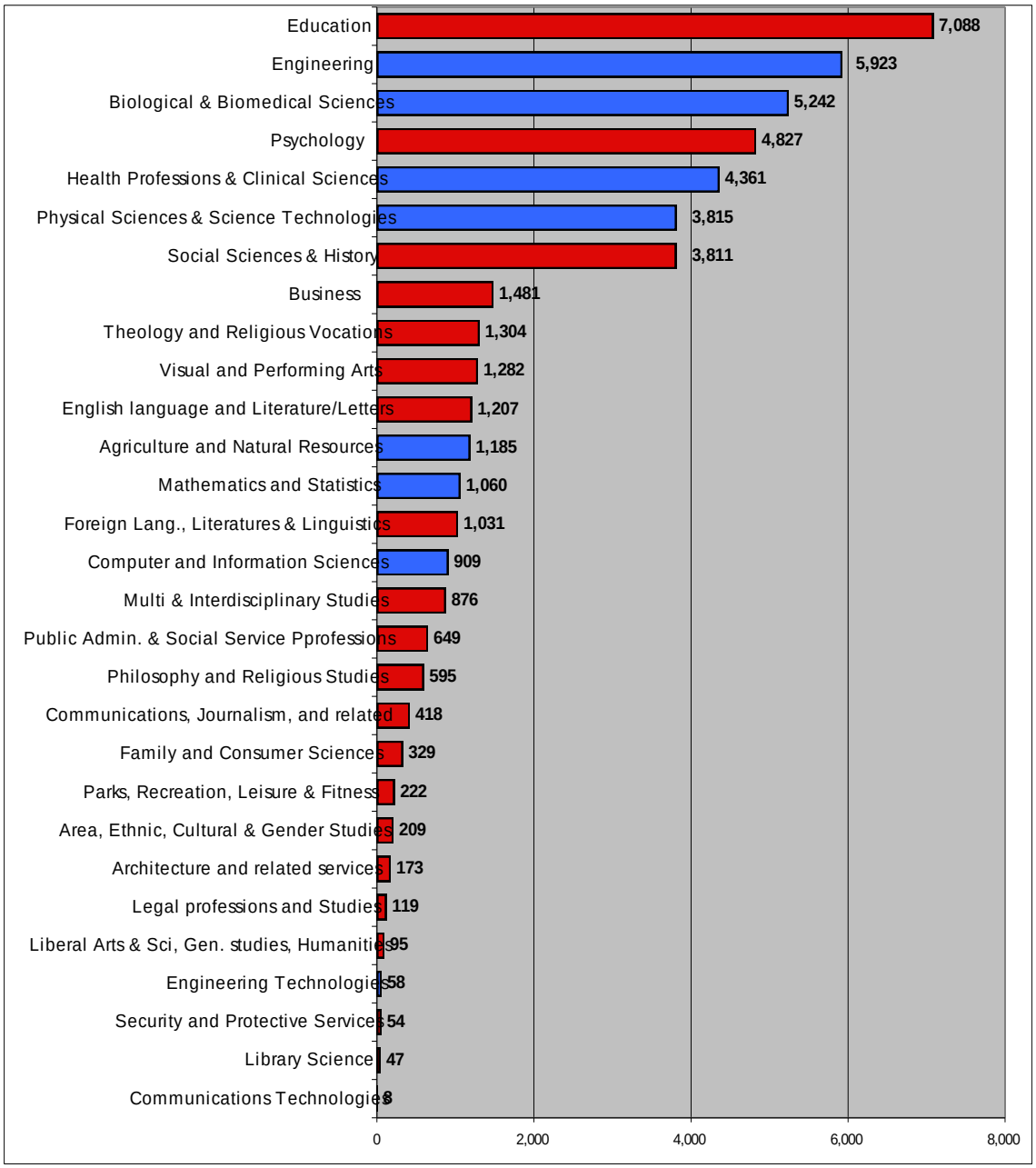
Source: U.S. Dept. of Education, NCES, "2003-04 Integrated Postsecondary Education Data System" (IPEDS), Table 268.



Education is at the top of the list of doctoral degrees conferred in 2003-04, followed closely by doctorates in Engineering and biological & biomedical sciences.

Total number of doctoral degrees awarded by major, degree-granting institutions in the United States (2003-04)

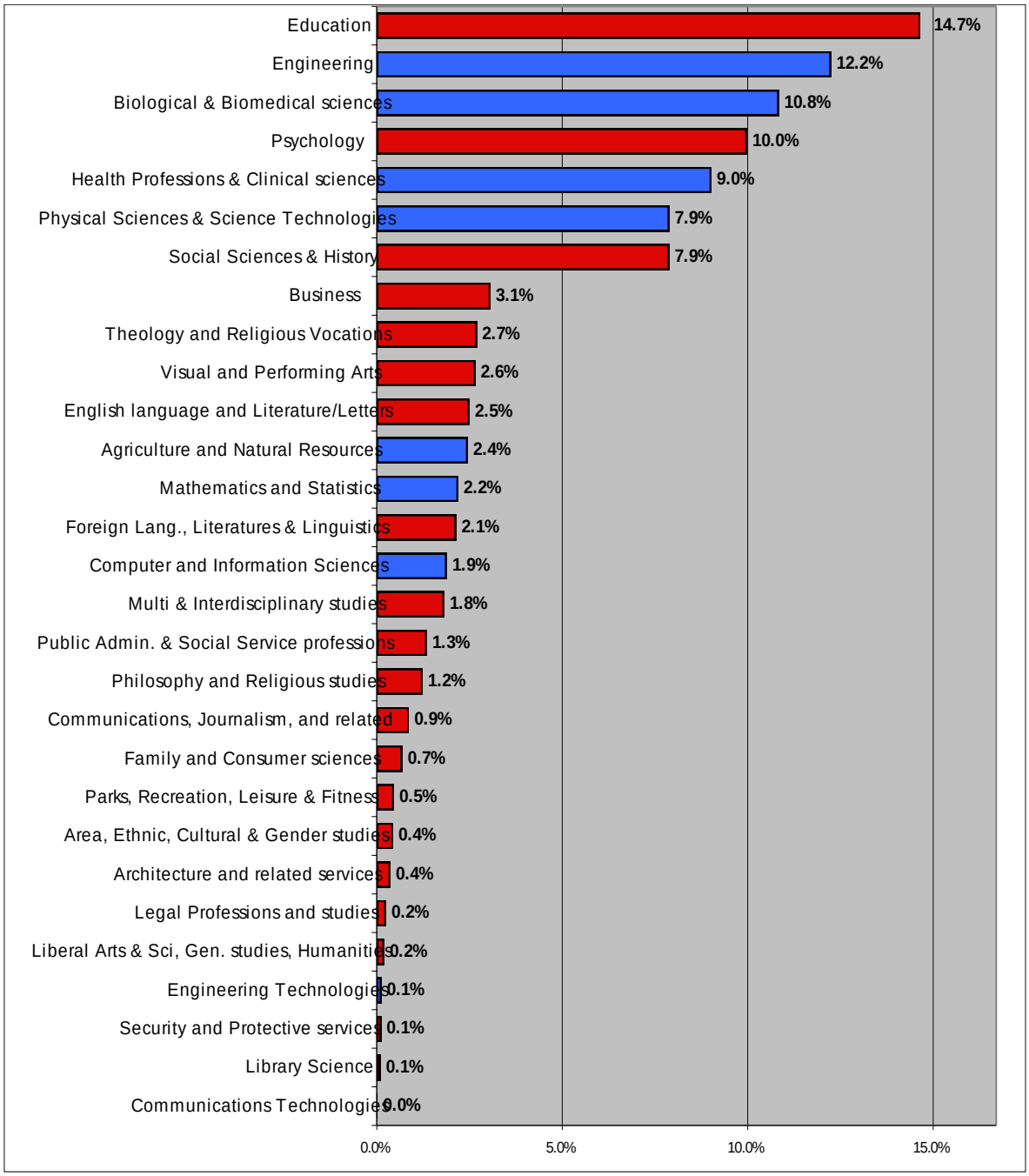
Source: U.S. Dept. of Education, NCES, "2003-04 Integrated Postsecondary Education Data System" (IPEDS), Table 268.



The distribution of all U.S. doctorates in 2003-04 is illustrated below. This shows that nearly 15% of all doctorates were in Education (not counting Professional doctorates).

Percent of doctoral degrees* awarded by major, degree-granting institutions in the United States (2003-04)

Source: U.S. Dept. of Education, NCES, "2003-04 Integrated Postsecondary Education Data System" (IPEDS), Table 268.



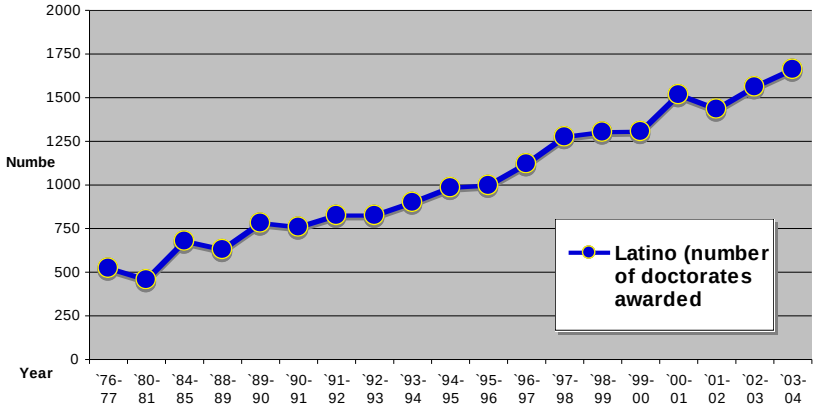
TRENDS IN LATINA-LATINO DOCTORATES

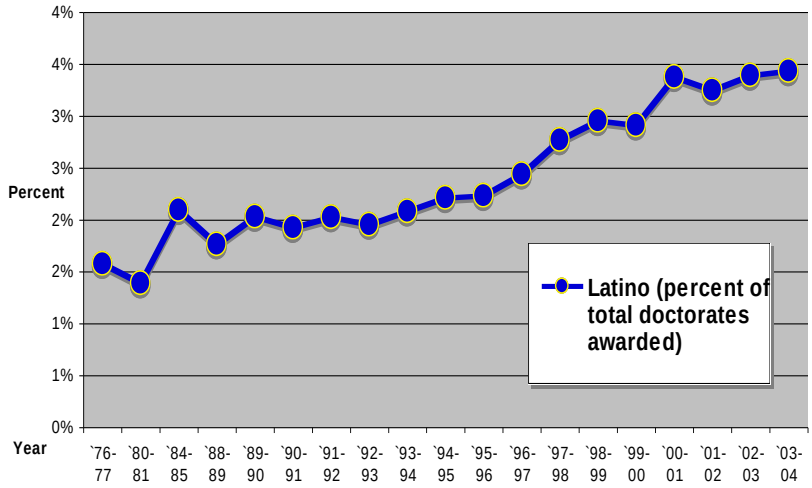
Trends in Doctorates: 1976-2004

Data has been estimated for the number of doctorates conferred to Hispanics since 1976 by the National Center for Education Statistics. From 1976 to 1996, the annual numbers of Hispanic doctorates were less than a 1,000 per year, representing less than 2 percent of U.S. doctorates. However, since 1996, the number of Latino doctorates has increased to a high of 1,662 in 2004, representing 3.4% of all doctorates. Latina/o doctorates have increased steadily from 1976 to 2004, with just a minor dip between 2001 and 2002. Their share of the national total has been upwards since 1976.

Doctoral degrees (Number and Percent) awarded to Latino graduates by degree-granting institutions in the United States (1976-77 through 2003-04)

Source: U.S. Department of Education, National Center for Education Statistics, Higher Education General Information Survey (HEGIS).

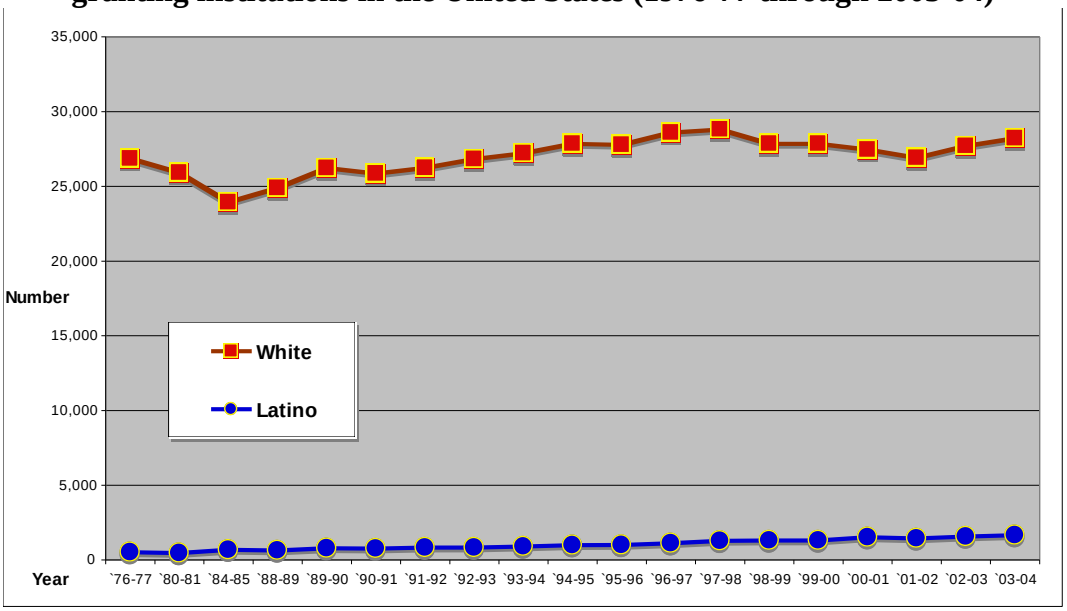




Comparison of White and Latino Trends: 1976-2005

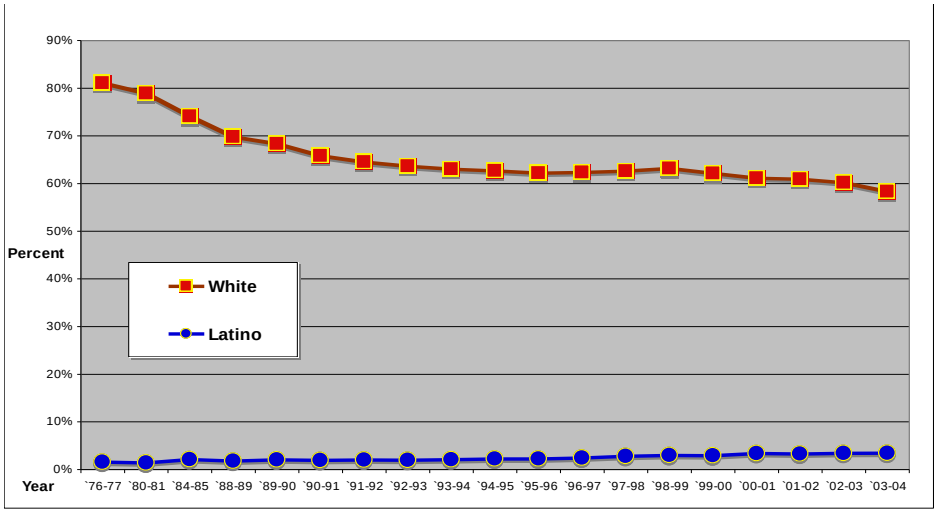
A comparison of the White doctorates over 27 years to 2004 shows a flat line of doctorates. Far below the White line is the marginal rise in Latina/o doctorates. There is a huge divide between the two groups.

Number of doctoral degrees awarded to White and Latino graduates by degree-granting institutions in the United States (1976-77 through 2003-04)



SOURCE: U.S. Department of Education, National Center for Education Statistics, Higher Education General Information Survey (HEGIS).

Percent of doctoral degrees awarded to White and Latino graduates by degree-granting institutions in the United States (1976-77 through 2003-04)



SOURCE: U.S. Department of Education, National Center for Education Statistics, Higher Education General Information Survey (HEGIS).

But, looking at Latino doctorates as a percent of total, we see a steady increase in their share of doctoral degrees since 1976. Juxtaposed to Latinos, the White share of doctorates is on a sharp and eye-opening rate of decline. Since the Latino number is rising annually, we wonder why it is not getting as much attention within the national situation (described earlier).

Trends by Gender: 1976-2004

Table – shows a breakdown by gender of the annual doctorates awarded to Hispanics from 1976 to 2004. There is a notable shift in the numbers of Latina and Latino doctorates overtime.

From 1976 to 1994, Hispanic males received more doctorates than Hispanic females.

In1995, females took the lead. Since 1998 to 2004, Hispanic female doctorates have outnumbered Hispanic male doctorates, by a growing margin. In 2004, there were 896 Latina doctoral recipients, compared to 766 Latino doctoral recipients. These numbers exclude first-professional degrees, such as M.D., D.D.S., and law degrees. (Discussed below).

Table . Numbers of Doctorates Conferred, U.S. & Hispanic Total: 1976-2004.

Year	U.S. Total	Total Latino Hispanic	Hispanic Males	Hispanic Females	% Hispanic U.S. Total
`76-77	33,126	522	383	139	1.6%
`80-81	32,839	456	277	179	1.4%
`84-85	32,307	677	431	246	2.1%
`88-89	35,659	629	350	279	1.8%
`89-90	38,371	780	419	361	2.0%
`90-91	39,294	757	399	358	1.9%
`91-92	40,659	824	465	359	2.0%
`92-93	42,132	824	437	387	2.0%
`93-94	43,185	900	463	437	2.1%
`94-95	44,446	984	488	496*	2.2%
`95-96	44,652	997	514	483	2.2%
`96-97	45,876	1,120	585	535	2.4%
`97-98	46,010	1,275	652	623	2.8%
`98-99	44,077	1,302	625	677*	3.0%
`99-00	44,808	1,305	611	694*	2.9%
`00-01	44,904	1,516	687	829*	3.4%
`01-02	44,160	1,434	650	784*	3.2%
`02-03	46,024	1,561	742	819*	3.4%
`03-04	48,378	1,662	766	896*	3.4%

SOURCE: U.S. Department of Education, National Center for Education Statistics, Higher Education General Information Survey (HEGIS), "Degrees and Other Formal Awards Conferred" surveys, 1976-77 through 1984-85; and 1988-89 through 2003-04 Integrated Postsecondary Education Data System, "Completions Survey" (IPEDS-C:89-99), and Fall 2000 through Fall 2004. (This table was prepared July 2005.) *Note: Table Includes Ph.D., Ed.D, and comparable degrees at the doctoral level. Excludes first-professional degrees, such as M.D., D.D.S., and law degrees.

Trends by Latino Citizenship Status: 1975-99

In a period of about 25 years, 1975-99, the United States produced 816,956 PhDs. Of these, 28,419 were doctorates of Latinas/os, or 3.5% of the national total.

Since 1975, most PhDs have gone to U.S. Citizens and Permanent Residents. The same can be said for all Hispanic PhDs. Moreover, most PhDs in Science and Engineering have gone to U.S. Citizens and Permanent Residents. However, about half of all Hispanic PhDs in Science and Engineering have gone to Temporary Residents who are counted as Hispanic. Of 12,317 Hispanic males who received doctorates, 6,148 were Hispanic males with Temporary Residence. Of 4,963 Hispanic females who received doctorates, 1,238 were Hispanic females with Temporary Residence.

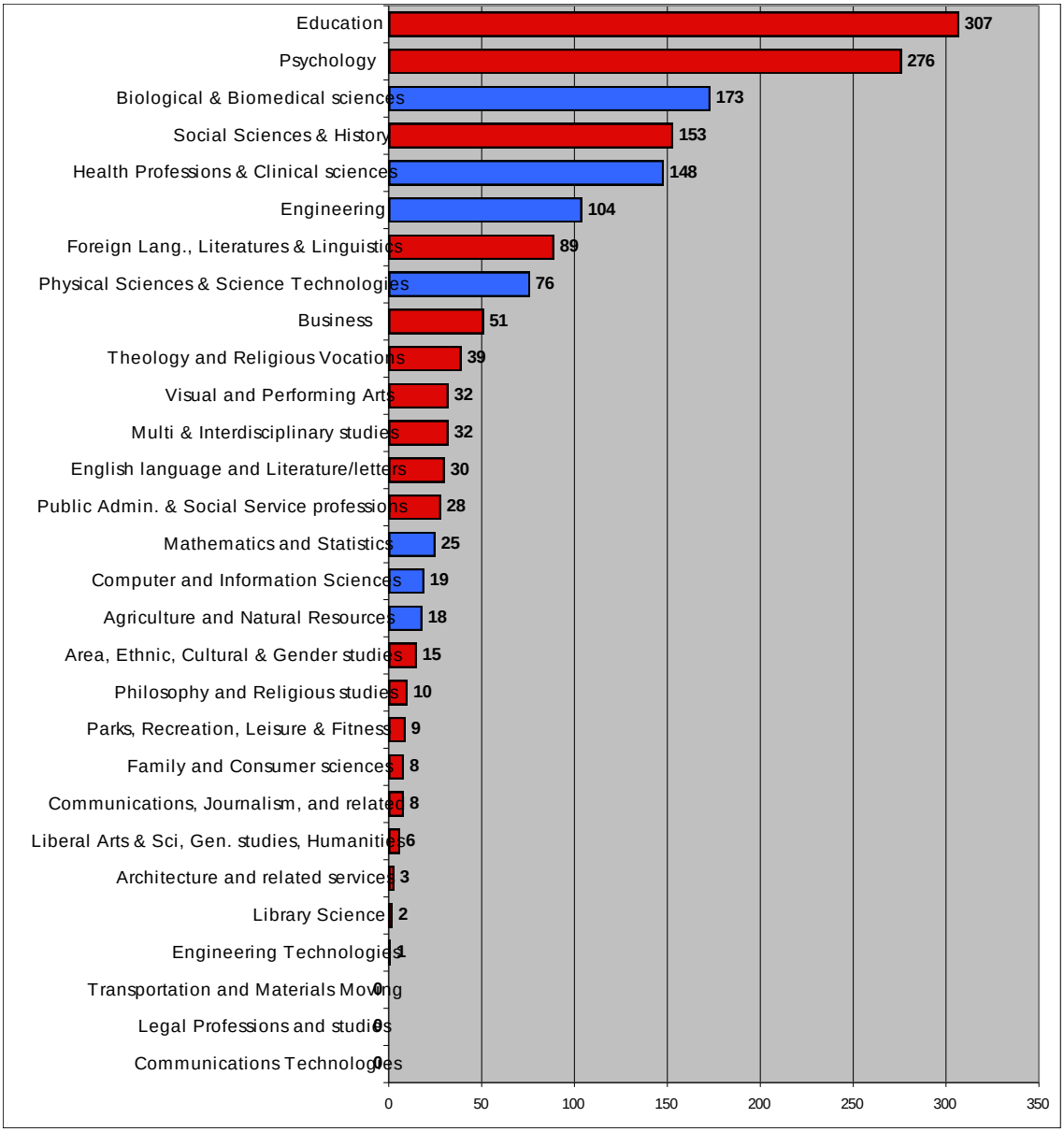
U.S. Total and Citizenship Status of PhDs: 1975–99.
Source: NSF. Table A-2 - http://www.nsf.gov/statistics/nsf96334/append.htm#tables

Characteristic	Total U.S. PhDs	Total Male Latino PhDs	Total Female Latina PhDs	Latina/o % of row total
All PhDs	640,434	9,102	7,548	2.6
U.S. Citizen				
Permanent Resident	48,679	1,520	930	5.0
Temporary Resident	127,843	7,347	1,972	5.8
Total – all PhDs	816,956	17,969	10,450	3.5
All S&E				
U.S. Citizen S&E	356,531	5,150	3,264	2.4
Permanent S&E	36,037	1,019	461	4.1
Temporary	127,843	6,148	1,238	5.8
Total S&E	520,411	12,317	4,963	3.3

LATINA-LATINO DOCTORATES: 2003-04

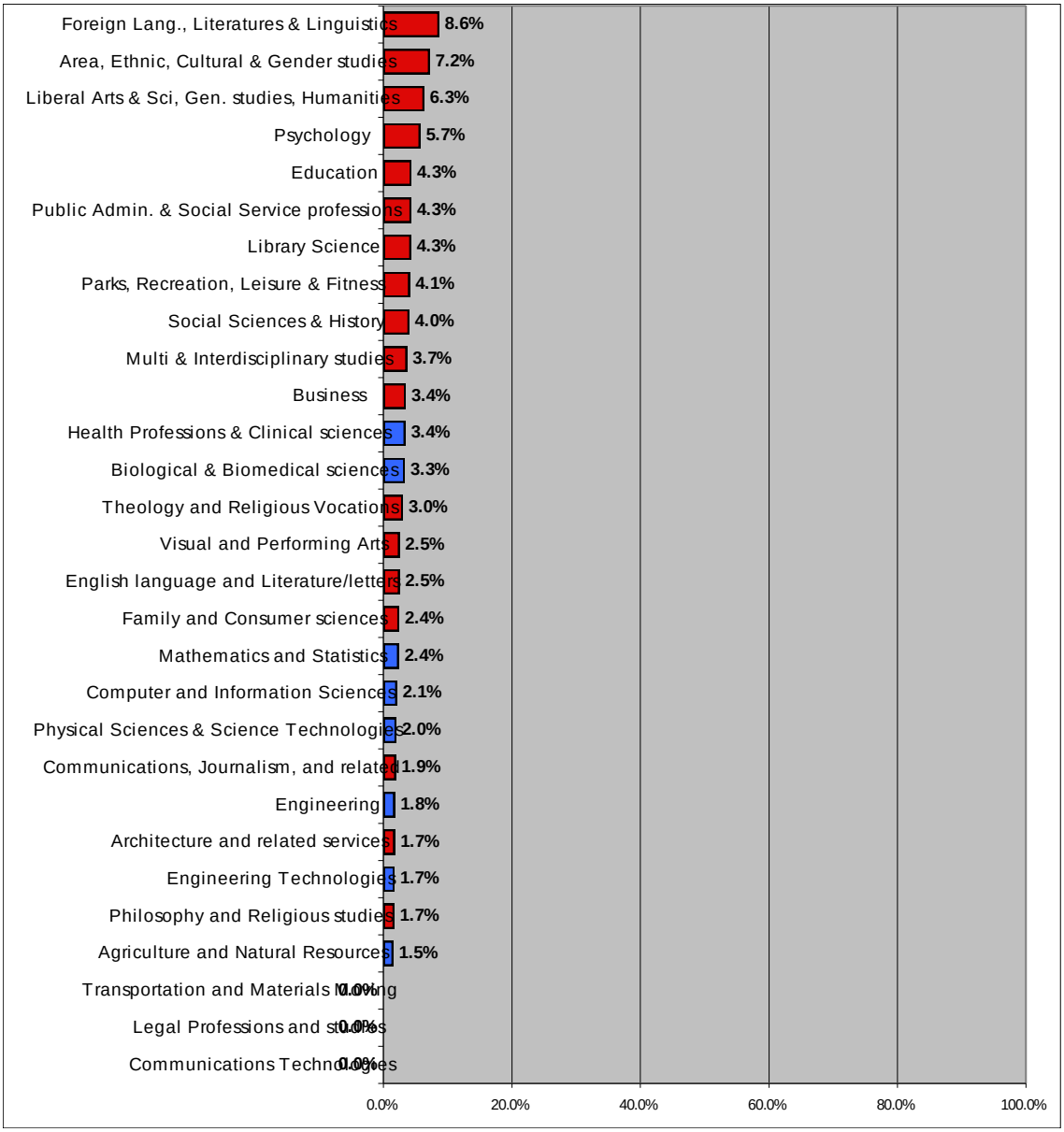
Number of doctoral degrees* awarded to Latino graduates by degree-granting institutions in the United States (2003-04)

Source: U.S. Dept. of Education, NCES, "2003-04 Integrated Postsecondary Education Data System" (IPEDS), Table 268.



* *Note: Does not include professional doctoral degrees (Medicine, Law, Divinity, etc.).

Percent of doctoral degrees* awarded to Latino graduates
by degree-granting institutions in the United States (2003-04)
Source: U.S. Dept. of Education, NCES, "2003-04 Integrated Postsecondary Education Data System" (IPEDS), Table 268.



Comparison of White and Latino Doctorates by Major Field

A. Latino Preferences for Doctorates Without the Professional Fields

Chart A is based on Table A below that lists doctorates by field in 2003-04. It shows the preference ordering of doctorates of each respective group by major. Here the

denominator of these percentages is the sum of all doctorates by group; N = 28,214 doctorates for White and 1,662 for Latino. The White bar is for White and the dark bar for Latino doctorates. For example, Education is high on the White list with 16.8% of all White doctorates. Latinos have a slightly higher percentage of their doctorates in Education with 18.5%. However, as we go down the chart to Psychology, Health Professions, and other doctorates, etc., the percent of each group's interest differs. The reader can see different patterns of doctoral degree completion by major.

Chart A - Comparison of "within-major" percents of doctoral degrees awarded to Latino and White graduates, United States (2003-04)*

Source: U.S. Dept. of Education, NCES, "2003-04 Integrated Postsecondary Education Data System" (IPEDS), Table 268.

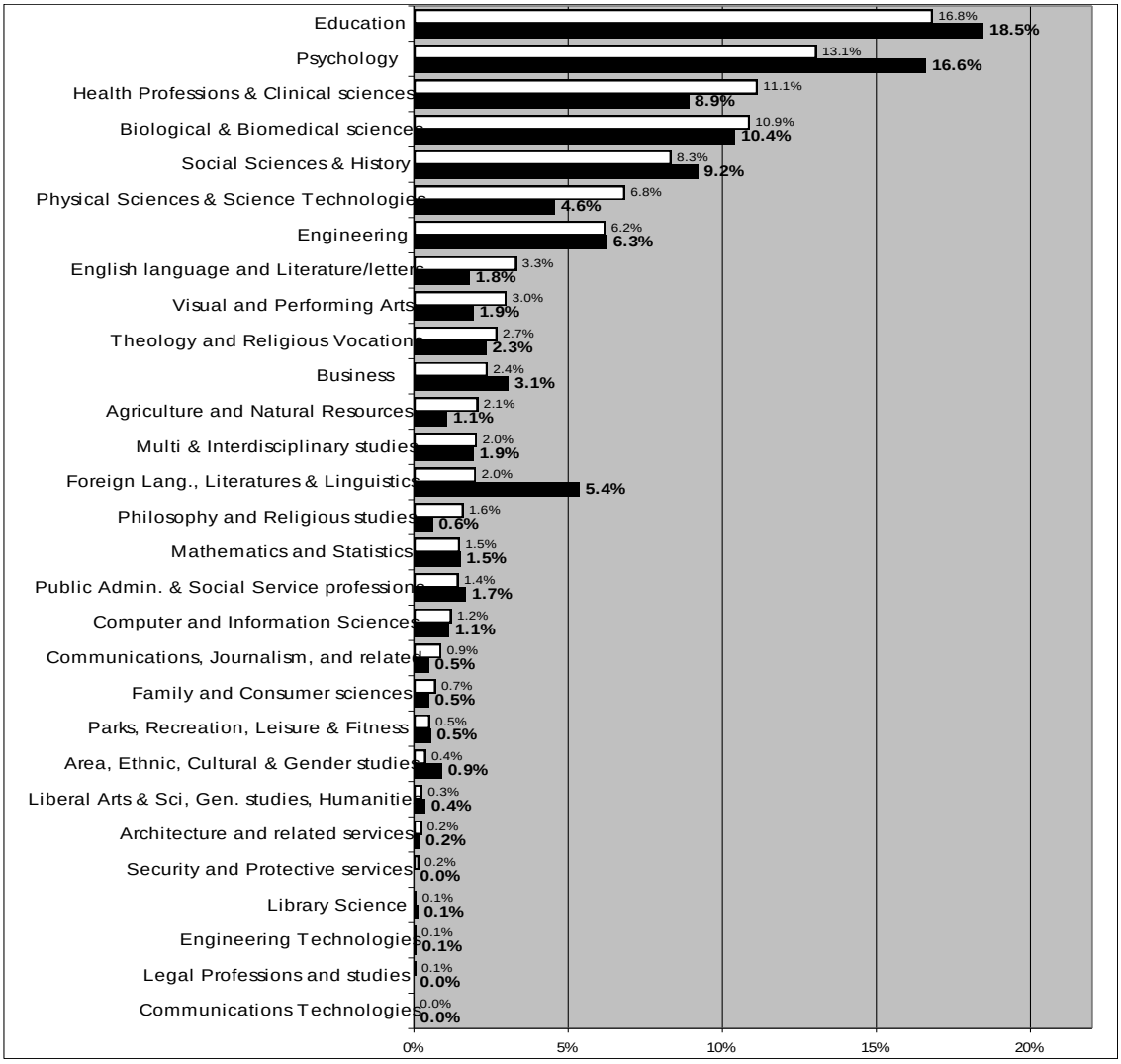


Table A. Doctoral and Professional Degrees Awarded to U.S. graduates, (2003-04)*

Does Not Include all Professional Fields	Table A. S&E and Non-S&E Doctorate Total (Number) 2003-04						
Sorted by White		White, non-Hispanic	Black non-Hispanic	Latinos Hispanic	Asian/Pacific Islander	Am. Indian/Alaska Native	Nonresident alien
Major field of study	Total						
Communications Technologies	8	5	0	0	0	0	3
Legal Professions and studies	119	17	8	0	3	0	91
Engineering Technologies	58	20	6	1	4	0	27
Library Science	47	24	5	2	3	0	13
Security and Protective services	54	46	3	0	0	0	5
Architecture and related services	173	69	7	3	13	0	81
Liberal Arts & Sci, Gen. studies, Humanities	95	76	4	6	1	0	8
Area, Ethnic, Cultural & Gender studies	209	109	24	15	20	3	38
Parks, Recreation, Leisure & Fitness	222	146	9	9	9	0	49
Family and Consumer sciences	329	198	43	8	7	2	71
Communications, Journalism, and related	418	250	29	8	19	2	110
Computer and Information Sciences	909	344	21	19	69	1	455
Public Admin. & Social Service professions	649	407	92	28	23	4	95
Mathematics and Statistics	1,060	419	9	25	50	0	557
Philosophy and Religious studies	595	454	17	10	26	2	86
Foreign Lang., Literatures & Linguistics	1,031	567	26	89	39	1	309
Multi & Interdisciplinary studies	876	575	50	32	61	5	153
Agriculture and Natural Resources	1,185	587	24	18	33	7	516
Business	1,481	673	112	51	67	9	569

	Theology and Religious Vocations	1,304	762	130	39	116	2	255
	Visual and Performing Arts	1,282	847	29	32	76	2	296
	English language and Literature/letters	1,207	939	64	30	49	6	119
	Engineering	5,923	1,751	104	104	368	8	3,588
	Physical Sciences & Science Technologies	3,815	1,929	72	76	192	16	1,530
	Social Sciences & History	3,811	2,354	188	153	152	16	948
	Biological & Biomedical sciences	5,242	3,072	163	173	496	16	1,322
	Health Professions & Clinical sciences	4,361	3,144	209	148	286	19	555
	Psychology	4,827	3,684	341	276	247	40	239
	Education	7,088	4,746	1,111	307	203	56	665
	TOTAL	48,378	28,214	2,900	1,662	2,632	217	12,753

B. Latino Preferences for Doctorates across All Fields, Including Professional Degrees

Chart B is based on doctorates and professional doctorates as listed on Table B. To a degree it is important to keep the broader listing. Latinas and Latinos have career choices between a biomedical degree (Science Field) and Medical degree (Non S&E field). When we add Law, Medicine and Pharmacy, the rank order of Doctorates changes from Chart A above to Chart B. Here, the denominator is the sum of doctorates per group as shown below in Table B. So that in 2003-04, Hispanics received 5,935 doctorates, of that number 2,430 of the degrees were in Law (35.1%).

Overall, when we list all of the different types of doctorates, it looks as if Latinos prefer the Professional doctorates over the other doctorates or PhDs. Thus, colleges and universities that aim to recruit the best and the brightest of Latino students into STEM, will have to address the proclivity of high achieving Latinos to get professional degrees.

Chart B. Comparison of "within-group" percents of doctoral and professional degrees awarded to Latino and White graduates, United States (2003-04)*

Source: U.S. Dept. of Education, NCES, "2003-04 Integrated Postsecondary Education Data System" (IPEDS), Tables 268.and 271 combined.

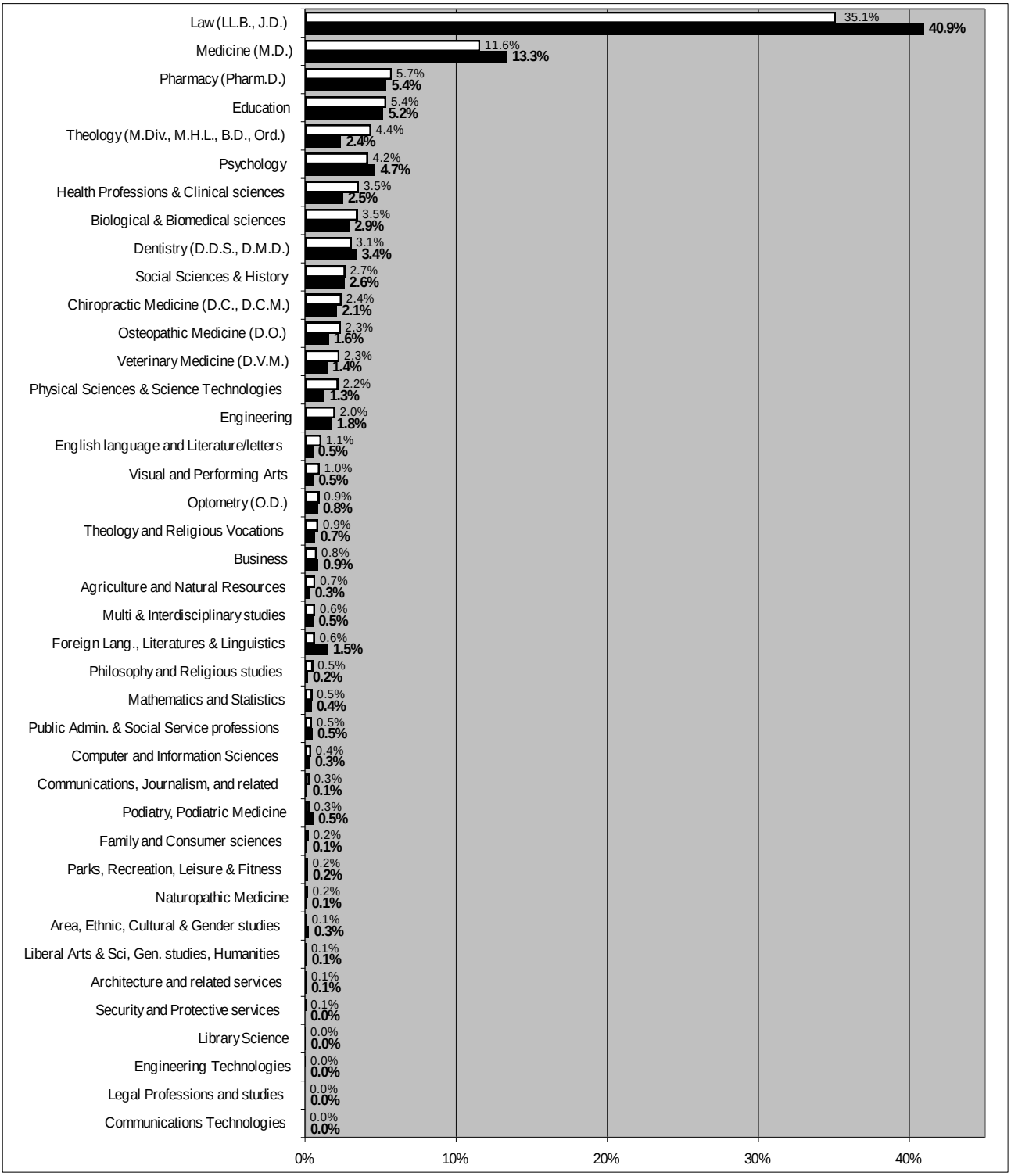


Table B. Doctoral and Professional Degrees Awarded to U.S. graduates, (2003-04)*

Source: U.S. Dept. of Education, NCES, "2003-04 Integrated Postsecondary Education Data System" (IPEDS). Tables 268.and 271 combined.

Sorted by White	All Doctorates Including Professional Degrees (Number) 2003-04						
Major field of study	Total	White, non-Hispanic	Black non-Hispanic	Latino Hispanic	Asian / Pacific Islander	Am.Indian/ Alaska Native	Nonresident alien
Construction trades	0	0	0	0	0	0	0
Precision Production	0	0	0	0	0	0	0
Military Technologies	0	0	0	0	0	0	0
Mechanics and Repair Technologies	0	0	0	0	0	0	0
Transportation and Materials Moving	0	0	0	0	0	0	0
Communications Technologies	8	5	0	0	0	0	3
Legal Professions and studies	119	17	8	0	3	0	91
Engineering Technologies	58	20	6	1	4	0	27
Library Science	47	24	5	2	3	0	13
Security and Protective services	54	46	3	0	0	0	5
Architecture and related services	173	69	7	3	13	0	81
Liberal Arts & Sci, Gen. studies, Humanities	95	76	4	6	1	0	8
Area, Ethnic, Cultural & Gender studies	209	109	24	15	20	3	38
Naturopathic Medicine	165	141	3	6	9	1	5
Parks, Recreation, Leisure & Fitness	222	146	9	9	9	0	49
Family and Consumer sciences	329	198	43	8	7	2	71
Podiatry, Podiatric Medicine	382	237	46	31	52	6	10
Communications, Journalism, and related	418	250	29	8	19	2	110
Computer and Information Sciences	909	344	21	19	69	1	455
Public Admin. & Social Service professions	649	407	92	28	23	4	95
Mathematics and Statistics	1,060	419	9	25	50	0	557
Philosophy and Religious studies	595	454	17	10	26	2	86
Foreign Lang.,	1,031	567	26	89	39	1	309

Literatures & Linguistics							
Multi & Interdisciplinary studies	876	575	50	32	61	5	153
Agriculture and Natural Resources	1,185	587	24	18	33	7	516
Business	1,481	673	112	51	67	9	569
Theology and Religious Vocations	1,304	762	130	39	116	2	255
Optometry (O.D.)	1,275	815	29	49	326	2	54
Visual and Performing Arts	1,282	847	29	32	76	2	296
English language and Literature/letters	1,207	939	64	30	49	6	119
Engineering	5,923	1,751	104	104	368	8	3,588
Physical Sciences & Science Technologies	3,815	1,929	72	76	192	16	1,530
Veterinary Medicine (D.V.M.)	2,228	2,003	53	86	60	18	8
Osteopathic Medicine (D.O.)	2,722	2,064	96	93	447	17	5
Chiropractic Medicine (D.C., D.C.M.)	2,730	2,129	97	125	211	15	153
Social Sciences & History	3,811	2,354	188	153	152	16	948
Dentistry (D.D.S., D.M.D.)	4,335	2,703	194	202	896	17	323
Biological & Biomedical sciences	5,242	3,072	163	173	496	16	1,322
Health Professions & Clinical sciences	4,361	3,144	209	148	286	19	555
Psychology	4,827	3,684	341	276	247	40	239
Theology (M.Div., M.H.L., B.D., Ord.)	5,332	3,869	742	140	251	13	317
Education	7,088	4,746	1,111	307	203	56	665
Pharmacy (Pharm.D.)	8,221	5,076	684	319	1,910	43	189
Medicine (M.D.)	15,442	10,255	1,051	792	3,034	111	199
Law (LL.B., J.D.)	40,209	31,087	2,935	2,430	2,768	322	667
TOTAL	131,419	88,593	8,830	5,935	12,596	782	14,683

*** Includes doctorates in Non-S&E fields; e.g. Medicine, Law, Pharmacy, etc.**

Top ten doctorates conferred upon White and Hispanic graduates: 2003-04

In 2003-04 there were a total of 131,419 doctorates covering all fields of S&E and Non-S&E. Some fields like Medicine, Dentistry and Pharmacy are not treated as S&E in most federal statistics. Out of this grand total, Latinos received 5,935 doctorates in both PhD and Professional Fields. At the same time White (non-Hispanics) received 88,593 doctorates; African Americans 8,830; Asian Americans, 12,596; Native Americans, 782; and non-resident aliens, 14,683.

Both White and Latino did not have doctorates in construction trades, precision production, military technologies, mechanics and transportation and materials, although the federal government lists these fields for possible doctoral degrees.

Latinos and White have similar, but not overlapping, interests in doctorates and professional degrees. For example, we compare the top ten doctorates of both Latino and White in the following table.

What differs by comparison is the higher interest of White in Theology (5th place), compared to the interest in Theology of Latinos (10th place). Latinos gave relatively more effort to doctorates in Dentistry and Biological & Biomedical Sciences than White graduates.

The top ten doctorates by White and Hispanic, 2003-04

White Ranking of Top Ten	Latino Ranking of Top Ten
1) Law (LLB, JD) 2) Medicine (M.D.) 3) Pharmacy (Pharm.D.) 4) Education 5) Theology (M.Div.,M.H.L.,B.D., Ord.) 6) Psychology 7) Health Professions & Clinical sciences 8) Biological & Biomedical sciences 9) Dentistry (D.D.S., D.M.D.) 10) Social Sciences & History	1) Law (LLB, JD) 2) Medicine (M.D.) 3) Pharmacy (Pharm.D.) 4) Education 5) Psychology 6) Dentistry (D.D.S., D.M.D.) 7) Biological & Biomedical sciences 8) Social Sciences & History 9) Health Professions & Clinical sciences 10) Theology (M.Div.,M.H.L.,B.D.,Ord.)

Latinos for the most part receive fewer than 4% of all doctorates and professional degrees. We estimate the average to be 3.4% of all doctorates in 2004. However, there are some majors where Latinos rank higher in terms of the national share of doctorates.

Majors Wherein Latinos Received Over 5% of the National Total, 2003-04

Major field of study	U.S. Degree Total	No. Latino-Hispanic	% Latino Hispanic
Foreign Lang., Literatures & Linguistics	1,031	89	8.6%
Area, Ethnic, Cultural & Gender studies	209	15	7.2%
Liberal Arts & Sci, Gen. studies, Humanities	95	6	6.3%
Law (LLB, JD)	40,209	2,430	6.0%
Psychology	4,827	276	5.7%
Medicine (M.D.)	15,442	792	5.1%

LATINA/O DOCTORATES IN SCIENCE & ENGINEERING

Doctorates in S&E - Overview

As reported by the NSF, in 2005, total doctorate awards in science and engineering (S&E) increased for the third year in a row to 27,974, surpassing the previous all-time high from 1998 (27,273). The number of S&E doctorates increased from 26,272 in 2004 and from 25,274 in 2003.

(Source: National Science Foundation, Division of Science Resources Statistics, "S&E Doctorates Hit All-time High in 2005." Arlington, VA (NSF 07-301) [November 2006]. Posted at: http://www.nsf.gov/statistics/infbrief/nsf07301/#tab1.)

For several fields of S&E, the 2005 counts were higher than the previous period of increase in the late 1990s. Fields reaching new highs in 2005 were:

1. Biological sciences (6,368)
2. Engineering (6,404)
3. Mathematics (1,203)
4. Computer sciences (1,136)

Psychology and social sciences, in contrast, remained unchanged from 2004. For the broad non-S&E fields, the 2005 total of 15,380 represented a decline from the all-time high of 15,845 in 2004.

In 2005, a total of 19,564 doctorates were awarded to women—10,533 of these in science and engineering fields. The number of female S&E doctorate recipients has continued to increase overall, but their share of each field varies considerably by field of study. In S&E fields, the concentration of female doctorate recipients in 2005 is highest within psychology (68%), biological sciences (49%), and social sciences (45%).

In the fields where women had the lowest representation there were increases between 1996 and 2005. Female representation increased among:

1. Engineering PhDs, from 12% to 18%
2. Physics PhDs, from 13% to 15%
3. Computer science PhDs, from 15% to 20%

Latino Doctorates in Science & Engineering: 1996-2005

From the same report there was unpublished data on the doctorates in science for 1996 to 2005. Here we provide the numbers for 2005 as well as for prior years. Overall, doctoral degree completion for all Hispanics was highest in the Biological Sciences (227 in 2005). Next in order were Psychology (188) and Social Sciences (149).

The Mexican American doctorates (for which there is data) were highest in 2005 in Biological Sciences (71) and Psychology (62), followed in third place by Social Sciences (54).

Hispanic & Mexican doctorates by field of science & engineering.	1996	2000	2004	2005
Hispanic total all PhDs	1,113	1,310	1,299	1,426
Science and engineering	626	730	718	799
Science total Hispanic	527	648	630	710
Agricultural sciences	13	29	16	18
Biological sciences	131	174	192	227
Computer sciences	16	14	13	12
Earth, atmospheric, and ocean sciences	19	16	11	18
Mathematics	11	15	26	24
Physical sciences	67	77	62	74
- Astronomy	2	3	6	3
- Chemistry	36	51	43	55
- Physics	29	23	13	16
Psychology	173	211	172	188
Social sciences	97	112	138	149
Mexican American total all PhDs	293	415	457	519
Science and engineering	149	214	232	248
Science total Mexican American	121	188	208	224
Agricultural sciences	2	7	6	3
Biological sciences	28	46	58	71
Computer sciences	1	4	3	3
Earth, atmospheric, and ocean sciences	5	4	3	3
Mathematics	2	8	8	8
Physical sciences	23	23	21	20
- Astronomy	1	1	2	2
- Chemistry	15	17	14	11
- Physics	7	5	5	7
Psychology	38	61	53	62
Social sciences	22	35	56	54

Source: National Science Foundation, *Doctorate Recipients from U.S. Universities: Summary Report 2005*.http://www.nsf.gov/statistics/infbrief/nsf07301/#tab1
(Table 5xls)

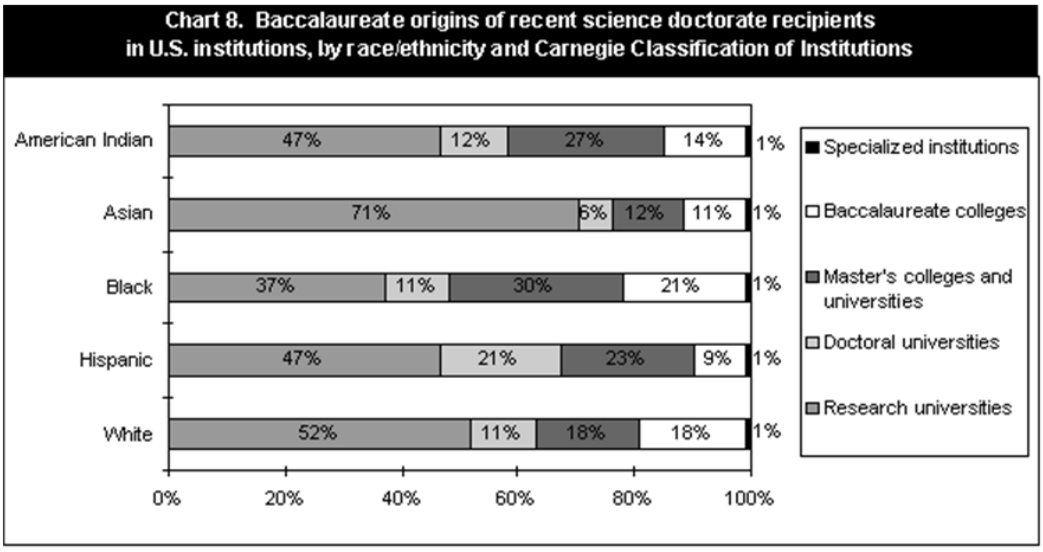
Undergraduate Baccalaureates of Latino Doctorates

In NSF's report on the undergraduate origins of S&E doctorates (1996), only about 325 universities in the United States provided doctorate-level education in science and engineering (S&E), but a broad base of institutions provided students their foundation in science or engineering.

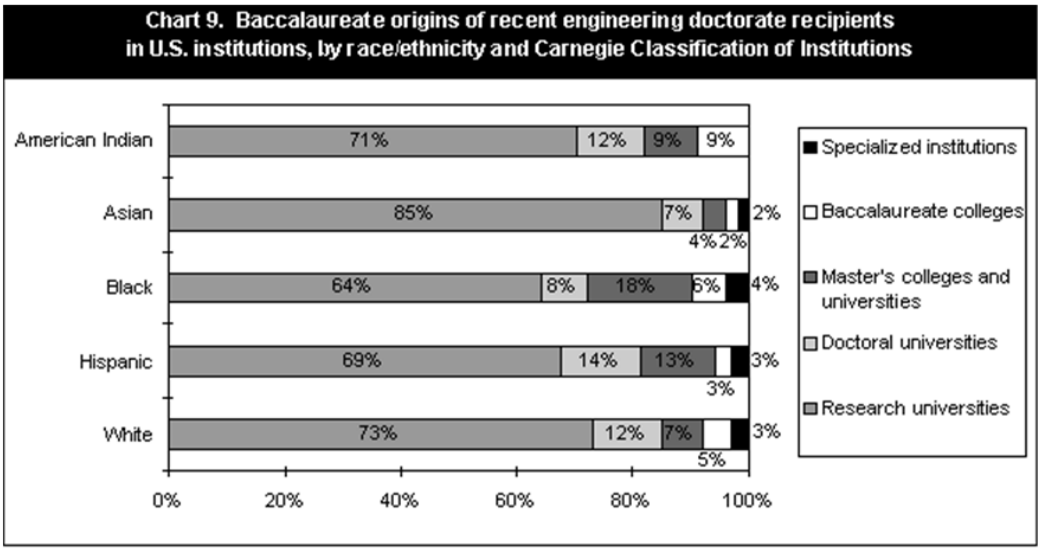
1. Almost 2,200 4-year colleges that offer undergraduate S&E degrees;

2. About 1,400 2-year schools that offer S&E instruction and/or training in S&E technologies;
3. Over 23,000 high schools that provide mathematics and science courses; and
4. Numerous high schools, colleges, and universities in foreign countries that educate the many students who came to the United States for their graduate degrees.

The NSF report (1996, NSF96-334) also noted that research universities play less of a role in the baccalaureate education of PhDs. Moreover, according to the report: Asians were much more likely than whites to have received their undergraduate degrees at research universities, and black S&E doctorate holders were less likely than whites to have attended research universities.



NOTES: See Technical Notes for more information on the Carnegie Classification. Percentages may



NOTES: See Technical Notes for more information on the Carnegie Classification. Percentages may not add to 100 due to rounding.

The list of the prominent baccalaureate-origin institutions cited by Hispanic S&E doctorate holders also differed greatly from the list for all S&E doctorate holders. Many of the Hispanic S&E doctorates received their baccalaureates from four Puerto Rican universities. Moreover, significant numbers of institutions cited by the Hispanics were located in California, Florida, New Mexico, and Texas, as would be expected given the geographic concentrations of Mexican Americans.

Top 25 institutions that were baccalaureate origins of 1991-95 science and engineering (S&E) doctorate recipients who were Hispanic U.S. citizens, ranked according to total S&E doctorates, by field of doctorate. Table 14.

	Total	Total	Field of science							Total
Baccalaureate-origin institution	S&E	Sciences	Physical sciences[1]	Math	Computer sciences	Biological sciences	Agricultural sciences	Psychology	Social sciences	Engineering
University of Puerto Rico-Rio Piedras*	233	220	58	2	3	44	7	53	53	13
University of Puerto Rico-Mayaguez*	69	57	13	0	1	21	8	9	5	12
University of California-Berkeley	64	52	9	2	1	20	0	7	13	12
University of California-Los Angeles	42	38	5	0	1	9	0	19	4	4
University of Texas-Austin	39	32	7	0	0	8	0	9	8	7
University of Miami (FL)	37	30	6	1	0	4	0	15	4	7
Cornell University (NY)	36	28	5	0	0	11	2	6	4	8
University of New Mexico-Albuquerque*	30	27	2	0	0	9	0	12	4	3
University of California-Irvine	29	29	4	1	0	6	0	15	3	0

Massachusetts Institute of Technology	25	16	5	0	1	5	0	0	5	9
Harvard University (MA)	23	21	5	2	1	8	0	3	2	2
University of California-Santa Barbara	23	21	3	0	0	6	0	6	6	2
University of Texas-El Paso*	22	17	4	0	1	6	0	3	3	5
University of California-San Diego	22	22	8	0	0	9	0	3	2	0
Florida International University*	21	21	4	1	1	1	1	12	1	0
Texas A&M University-College Station	20	17	3	1	1	7	1	4	0	3
Stanford University (CA)	20	17	2	1	0	6	0	4	4	3
Rutgers University-New Brunswick (NJ)	19	16	2	0	1	5	1	3	4	3
University of Maryland-College Park	19	14	0	0	0	4	0	6	4	5
University of California-Davis	19	14	2	1	0	9	0	0	2	5
Inter American University of Puerto Rico-San German*	19	19	5	0	0	2	0	10	2	0
Pontifical Catholic University of Puerto Rico*	18	18	3	0	0	7	0	7	1	0
New York University	17	17	2	0	1	1	0	11	2	0
Princeton University (NJ)	17	15	1	1	0	8	0	1	4	2
University of Florida	17	14	1	0	0	1	2	6	4	3
Total, top 25	900	792	159	13	13	217	22	224	144	108
Total, all U.S. institutions.	2,090	1,844	338	44	31	450	47	586	348	246
Top 25 as a percent of all institutions	43.1%	43.0%	47.0%	29.5%	41.9%	48.2%	46.8%	38.2%	41.4%	43.9%

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates, [1] Includes earth, atmospheric, and oceanographic sciences. * Hispanic-serving institutions (with 25 percent or more Hispanic enrollment, January 1996).

Top 27 institutions that were baccalaureate origins of 1991-95 science and engineering (S&E) doctorate recipients who were Mexican-American U.S. citizens, ranked according to total S&E doctorates, by field of doctorate, Table 14b.

	Total	Total	Field of science							Total
Baccalaureate-origin institution	S&E	Sciences	Physical sciences [1]	Math	Computer sciences	Biological sciences	Agricultural sciences	Psychology	Social sciences	Engineering
University of Texas-Austin	26	20	3	0	0	5	0	7	5	6
University of California-Los Angeles	22	19	4	0	1	2	0	12	0	3
University of California-Berkeley	20	14	2	1	0	5	0	2	4	6

University of New Mexico	18	16	1	0	0	4	0	9	2	2
University of California-Irvine	18	18	3	0	0	2	0	10	3	0
University of California-Santa Barbara	17	16	3	0	0	6	0	4	3	1
University of Texas-El Paso	16	13	2	0	1	5	0	2	3	3
Stanford University (CA)	13	12	1	0	0	4	0	4	3	1
Texas A&M University-College Station	13	13	3	1	1	6	1	1	0	0
University of California-San Diego	13	13	4	0	0	6	0	1	2	0
University of California-Davis	12	9	2	0	0	6	0	0	1	3
San Diego State University (CA)	11	11	0	0	0	2	0	8	1	0
California State University-Los Angeles	11	11	1	0	0	2	0	3	5	0
University of California-Riverside	10	10	2	0	0	4	0	2	2	0
New Mexico State University	9	7	0	0	0	3	1	1	2	2
California State University-Fullerton	9	9	0	0	0	0	0	8	1	0
Pan-American University of Texas-Edinburg	9	9	1	0	0	0	1	6	1	0
California State University-Long Beach	8	8	0	0	0	1	0	5	2	0
University of Arizona	7	4	0	1	0	0	1	1	1	3
California Institute of Technology	6	4	2	2	0	0	0	0	0	2
Arizona State University-Tempe	6	6	0	1	0	1	1	2	1	0
University of Houston (TX)	6	6	0	2	0	0	0	3	1	0
California State University-Fresno	6	6	2	0	0	1	0	2	1	0
California State University-Northridge	6	5	0	0	0	0	0	4	1	1
Loyola Marymount University (CA)	6	6	0	0	0	1	1	4	0	0
Saint Mary's University of San Antonio (TX)	6	6	1	0	0	1	0	2	2	0
University of Texas-San Antonio	6	6	2	1	0	2	0	1	0	0
Total, top 27	310	277	39	9	3	69	6	104	47	33
Total, all U.S.	570	514	77	16	5	112	12	189	103	56

institutions										
Top 27 as a percent of all institutions	54.4%	53.9%	50.6%	56.2%	60.0%	61.6%	50.0%	55.0%	45.6%	58.9%

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates,
[1] Includes earth, atmospheric, and oceanographic sciences.

The Role of Community Colleges

In addition to the institutions listed above, John Tsapogas' report on the role of community colleges notes that more than 40 percent of recent S&E graduates have attended community colleges at some point in their educational paths. According to his data, based on the 2001 National Survey of Recent College Graduates: "Hispanics have attended community colleges in greater proportion than have whites, blacks, or Asian/Pacific Islanders. Female graduates in S&E fields are more likely than their male counterparts to have attended community college. This is especially true of married women with children living in the household. In addition to lower tuition and fees, the location of a community college, usually close to the student's home, may contribute to higher attendance by women who are attempting to manage families, education, and, sometimes, jobs." (April 2004, p. 6).
For copies of this report go to: http://www.nsf.gov/home/orderpub.htm. NSF04-315.

The Role of Hispanic Serving Institutions

According to the ACE report (April 2006), HSIs have played a significant role in the education of Latinos of S&E. To quote: " In 1995, Hispanic-serving institutions (HSIs) enrolled 39 percent of all Hispanic college students. Eight years later, HSIs accounted for nearly 50 percent of all Hispanic enrollment. It is important to note that the number of HSIs doubled during this period, increasing from 163 to 316 institutions. Both Hispanic male and female enrollment at HSIs increased during those eight years, as the number of Hispanic women increased by 87 percent (or 205,700) and the number of Hispanic men increased by nearly 73 percent (or 123,400). (Cook and Cordova, p. 10). The ACE report defines HSIs as accredited, degree-granting institutions with a full-time equivalent enrollment of undergraduate students that comprises at least 25 percent Hispanic students.

The federal government defines HSIs as accredited degree-granting public or private nonprofit institutions of higher education with a full-time equivalent enrollment of undergraduate students that comprises at least 25 percent Hispanic students, with no less than 50 percent of its Hispanic students being low-income and first-generation college students and another 25 percent being either low-income or first-generation college students. Federal HSIs are designed more strictly for federal grants and support.

LATINA/O DOCTORATES IN PROFESSIONAL FIELDS

In this section we report data on the so-called Non-S&E degrees, namely doctorates in professional fields:

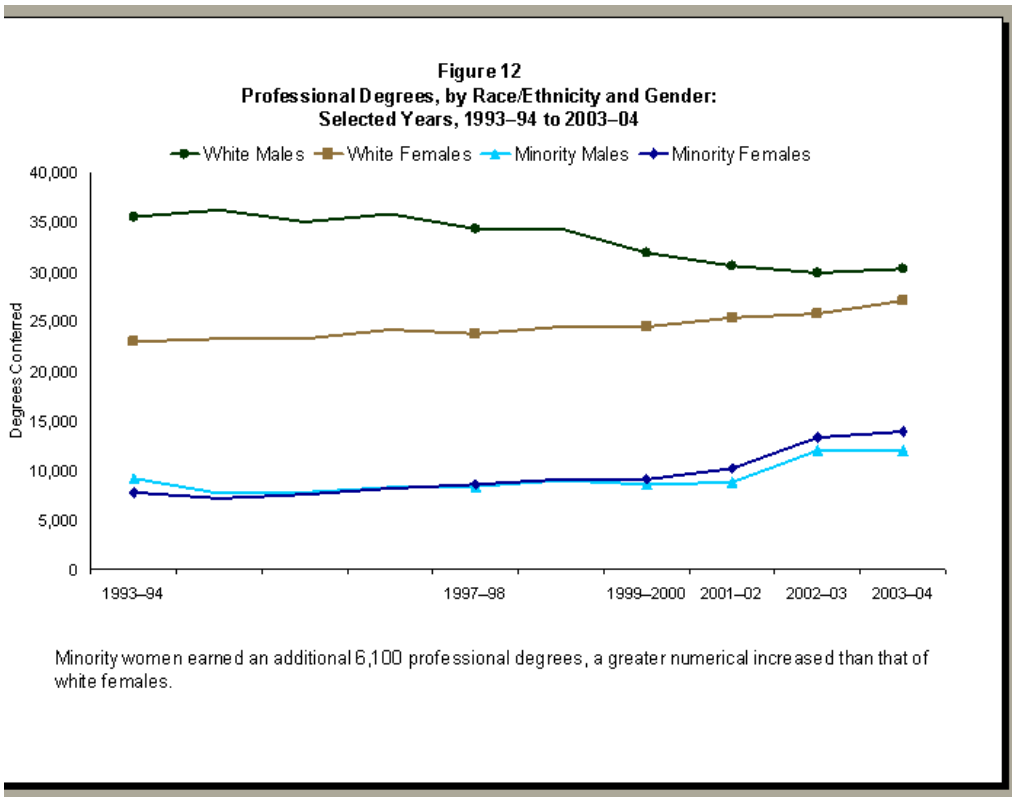
- Doctor of Medicine (M.D.),
- Doctor of Dental Surgery (D.D.S.),
- Doctor of Veterinary Medicine (D.V.M.),
- Doctor of Osteopathy (O.D.),
- Doctor of Pharmacy (Pharm.D.),
- Doctor of Psychology (Psy.D.),
- Juris Doctor (J.D.), and other similar degrees.

At the highest level of doctoral degrees within the professional fields, the number of degrees conferred increased modestly from 1993-94 to 2003-04, up by 10.1 percent within the United States. According to ACE's annual report (2006) the relatively small growth was caused by significant declines in the number of professional degrees earned by males, down 5.7 percent. In that 10 year period, women earned 33.1 percent (or 10,100) more professional degrees. ACE also notes that minority women earned an additional 4,500 professional degrees, a greater numerical increase than that of white females. Also, ACE reports (2006) that only dentistry experienced overall growth from 1993-04 to 2003-04 at 16.9 percent. Degrees conferred in medicine were flat while law experienced a slight decline of less than 1 percent. These trends were attributed to a decline in whites earning professional degrees across all three fields.

Conversely, according to ACE, minorities experienced increases in degrees awarded across all three selected fields (law at 38.5 percent, medicine at 33.3 percent, and dentistry at 45.6 percent.

Notably, according to ACE, "Hispanics had the largest percentage increase in law degrees earned (59.3 percent) and medical degrees (83.6 percent), while Asian Americans earned 67.3 percent more degrees in dentistry since 1993-94." (Published in ACE Errata Sheets, showing corrections from primarily report).

Non-S&Es represent a sizeable number of doctorates, many favored by Latinos. Some of these doctorates require undergraduate training and high performance in science courses. Yet, the students who major in science, opt out of "Science" per se, and select one of these more lucrative doctorates.



Number of First-professional doctorates conferred by degree-granting institutions, by White, Hispanic, and major field of study: 2003-04
Table 271. Absolute Number. US Department of Education Data.

Major field of study	Total	Non-Hispanic White	Hispanic Latina/o
Dentistry (D.D.S. or D.M.D.)	4,335	2,703	202
Medicine (M.D.)	15,442	10,255	792
Optometry (O.D.)	1,275	815	49
Osteopathic Medicine (D.O.)	2,722	2,064	93
Pharmacy (Pharm.D.)	8,221	5,076	319
Podiatry, Podiatric Medicine	382	237	31
Veterinary Medicine (D.V.M.)	2,228	2,003	86
Chiropractic Medicine	2,730	2,129	125
Naturopathic Medicine	165	141	6
Law (LL.B. or J.D.)	40,209	31,087	2,430
Theology (Divinity)	5,332	3,869	140
TOTAL	83,041	60,379	4,273

Percent of professional doctorates by major (2003-04)

Major Field of Study	U.S, Total Doctorates Total	White Non Hispanic	Latina/o Hispanic	TOTAL (Check)
Dentistry (D.D.S. or D.M.D.)	4,335	62.4%	4.7%	67.1%
Medicine (M.D.)	15,442	66.4%	5.1%	71.5%
Optometry(O.D.)	1,275	63.9%	3.8%	67.7%
Osteopathic Medicine (D.O.)	2,722	75.8%	3.4%	79.2%
Pharmacy (Pharm.D.)	8,221	61.7%	3.9%	65.6%
Podiatry, Podiatric Medicine	382	62.0%	8.1%	70.1%
Veterinary Medicine (D.V.M.)	2,228	89.9%	3.9%	93.8%
Chiropractic Medicine	2,730	78.0%	4.6%	82.6%
Naturopathic Medicine	165	85.5%	3.6%	89.1%
Law (LL.B. or J.D.)	40,209	77.3%	6.0%	83.3%
Theology (Divinity)	5,332	72.6%	2.6%	75.2%
TOTAL	83,041	72.7%	5.1%	77.8%
TOTAL No.	83,041	60,379	4,273	64,652

Source: US Department of Education Data. "2003-04 Integrated Postsecondary Education Data System" (IPEDS)

Number of First-professional doctorates by Gender, White & Hispanic, and major field of study: 2003-04

	Male			Female		
	U.S. Total	White, non-Hispanic	Latino	U.S. Total	White, non-Hispanic	Latina
Dentistry (D.D.S. or D.M.D.)	2,532	1,732	98	1,803	971	104
Medicine (M.D.)	8,273	5,697	397	7,169	4,558	395
Optometry (O.D.)	543	379	15	732	436	34
Osteopathic Medicine (D.O.)	1,567	1,210	50	1,155	854	43
Pharmacy (Pharm.D.)	2,711	1,752	111	5,510	3,324	208
Podiatry, Podiatric Medicine	221	148	15	161	89	16
Veterinary Medicine (D.V.M.)	569	520	23	1,659	1,483	63
Chiropractic Medicine	1,868	1,475	95	862	654	30
Naturopathic Medicine	42	35	0	123	106	6
Law (LL.B. or J.D.)	20,332	16,503	1,161	19,877	14,584	1,269
Theology (Divinity)	3,511	2,543	115	1,821	1,326	25
Total	42169	31994	2080	40872	28385	2193

Source: Table 271, US Department of Education Data. "2003-04 " Integrated Postsecondary Education Data System" (IPEDS)

INSPIRATION

What it takes to become a scientist.

Lesson 1. According to a report of the National Academies of Science, students who are proficient in science:
1. Know, use, and interpret scientific explanations of the natural world;
2. Generate and evaluate scientific evidence and explanations;
3. Understand the nature and development of scientific knowledge; and
4. Participate productively in scientific practices and discourse.

The process of achieving proficiency in science involves all four strands: advances in one strand support and advance those in another.

Source: Taking Science to School: Learning and Teaching Science in Grades K-8, National Academies Press, forthcoming 2007.
http://books.nap.edu/openbook.php?record_id=11625&page=1

Lesson 2. Take note that environment can affect motivation, but true success in science builds-upon facing challenges directly, *cara-a-cara*, face-to-face.

Sure, there are a large number of schools that have poor facilities and high concentrations of Latino students. There are Latino students from low-income households and communities with limited resources. But, Latino conditions can be faced squarely with knowing that *cada cabeza es un mundo*.

Latino education can be fun and profound. Not all scientists were born to riches or the most ideal conditions at home and school.

Sure, we know that Latinos succeed where opportunities support their vision and capabilities. And, Latinos perform at higher levels when they receive their fair share of resources and opportunities.

More importantly, Latinos succeed when they take the higher ground; have positive outlooks and attitudes about learning and studying hard.

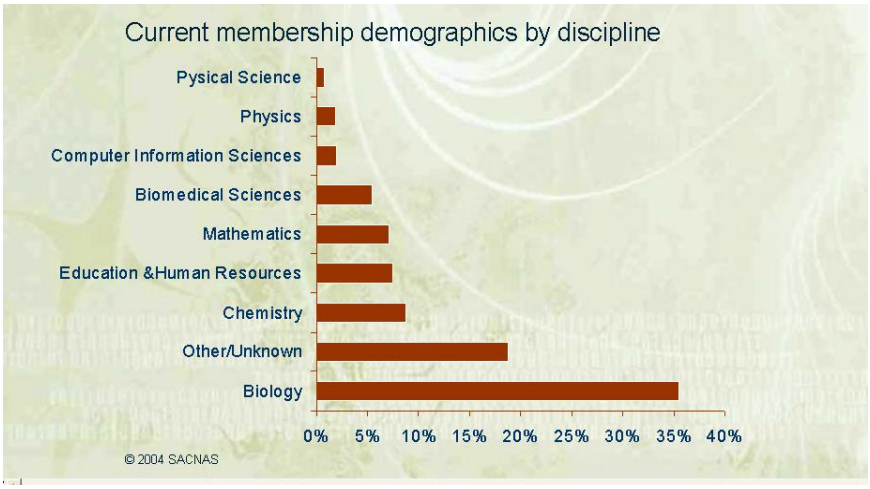
Lesson 3. Get organized and/or join a professional society that promotes science and mentoring.

Take, for example, the Society for Advancement of Chicanos/Latinos and Native Americans in Science (SACNAS). Founded in the mid-1970's with a relatively small number of Latino scientists, this organization of volunteers became a national leader in

promoting, mentoring, and advancing Native American and Latino doctorates and careers in science. The first SACNAS national conference was held in 1978 and yearly mentoring conferences have been held since 1987. Since then SACNAS has been the nation's foremost organization promoting science education, leadership, and careers at the highest professional levels. SACNAS conferences have drawn an average attendance of approximately 2,300 students and professors. All talented individuals, most the first in their family to attend college and hardly a one without challenges at home. In 2005, SACNAS received the Presidential Award for Engineering, Mathematics and Science Mentoring (PAESMEM).

SACNAS has also won recognition for biographies on-line of distinguished scientists of Native American and Latino origin: http://www2.sacnas.org/biography/default.asp. As noted by its creator:
"As you read these biographies, you will see that these scientists and engineers are intimately involved, not only in scientific matters, but in helping set policy for this country."

SACNAS has members in the National Academies and the support from several entities of the National Institutes of Health, the National Science Foundation, the U.S. Department of Energy, and the National Security Agency. Its membership is composed primarily of undergraduates in science programs from across the United States. Recent data on membership and interests have shown increasing numbers joining this supportive organization



Lesson 4. Promote and admire Latino successes. Achievements build ideas and dreams for others.
Take, for example, the champions of Carl Hayden Community High School, Arizona, and their creation “Stinky.”

Long considered an underperforming, inner-city school of Latinos, Carl Hayden Community High School beat MIT and the rest of the competition with a robot they

named “Stinky.” They made Stinky out of PVC pipes and off-the-shelf computer parts and tested it in a local pool, then won competitive events, including a national championship in 2005. According to the Washington Post, "Stinky's creators didn't look all that impressive, either -- four teenage guys in baggy pants and sneakers, all of them illegal Mexican immigrants attending Carl Hayden High School in funky West Phoenix." In fact, the team won other awards.

- Judges choice for best ROV
- Elegance in Design Award
- 1st Place in the Technical Writing
- 1st place overall in the competition (compilation of many diff. points from diff. parts of the comp.)

See more at:
http://www.phxhs.k12.az.us/education/components/scrapbook/default.php?sectiondetailid=42009&sc_id=1128473338
For Stinky Video:
http://www.phxhs.k12.az.us/education/components/scrapbook/default.php?sectiondetailid=41828&sc_id=1173231515

Lesson 5. Read and learn about the experiences of Latinos who have scored big in science, Latinos who come from various backgrounds and serve community too.

For example, Albert V. Baez, a noted physicist who was the father of folksingers Joan Baez and the late Mimi Farina, died of natural causes on March 20, 2007, in Redwood City, California. He was 94. He reportedly combined personal and professional roles as scientist, environmentalist, teacher and humanitarian. Born in Puebla, Mexico, and reared in Brooklyn, Mr. Baez was a distinguished academic with a bachelor's degree in mathematics from Drew University, a master's in math from Syracuse University and a doctorate in physics from Stanford University, he taught physics at Drew, Harvard, the University of California-Berkeley, the University of Redlands and Stanford, among others. While studying at Stanford, he co-invented the X-ray reflection microscope, which is still used for medical purposes and to take X-ray pictures of galaxies. While stationed in Paris for UNESCO, he served as director of science teaching from 1961-67, creating teaching programs for high-school-level students in physics, chemistry, biology and mathematics. He collaborated on more than 100 science films for the Encyclopedia Britannica Educational Corp.

For example, Nobel Laureates Severo Ochoa, recipient of the Nobel Prize in Physiology and Medicine in 1959.

Severo Ochoa was born in Luarca, Spain, on September 24, 1905. After a start at the Universities of Madrid and Oxford, he went to the Washington University School of Medicine, St. Louis, in 1941. In 1942 he was appointed at the New York University School of Medicine and there subsequently became leading scientist of enzymatic processes in biological oxidation and synthesis and the transfer of energy. In 1956 he became an American citizen. Severo Ochoa died on November 1, 1993.

For example, Luis Walter Alvarez, recipient of the Nobel Prize for Physics in 1968. Dr. Alvarez was born on June 13, 1911, in San Francisco, California. He studied chemistry and math at the University of Chicago and became a physicist at the Radiation Laboratory of the University of California where he built a hydrogen bubble chamber, with which he discovered that atoms and other particles when traveling through liquid hydrogen leave a track of bubbles. Using bubble chambers Alvarez's team discovered many new atomic particles. In 1968, Alvarez received the Nobel Prize for Physics. The Nobel description of his important work and discoveries in physics was the longest in the prize's history. He died on August 31, 1988, but established a legacy in physics as well as a prominent core of American scientists.

Lesson 6. Heed the wisdom of those who know and value the other lessons.

For example, Professor Martin Chemers, PhD (UCSC):

"Successful science careers demand high levels of ability both in the scientific inquiry process and in scientific leadership and teamwork.

Scientific inquiry skills can be thought of as the ability to initiate, design, and carry out research studies by applying a body of scientific tools and procedures to address a new research question. This includes the development of the research question, hypotheses, research methods, and measures, as well as data collection, analysis, and reporting.

Scientific leadership and teamwork includes establishing and communicating vision, developing and using resources (including personal strengths, group members' strengths, and resources from the environment), developing and implementing action plans, and leading and participating in group processes such as decision-making and delegation. Thus scientific teamwork skills can be thought of as the ability to plan, administer, and carry out a research project as a leader or responsible team member.

Source: AScILS/COSMOS leadership training, 2006, University of California, Santa Cruz. AScILS refers to Assessing Science Inquiry and Leadership Skills, a project that aims to understand the effects of science support program activities on success among science and engineering university and high school students. Funded by NIGMS/NIH.

OPPORTUNITIES

NSF Opportunities

(Source: Olsen, 2006: http://www.nsf.gov/news/speeches/olsen/06/ko061208_cgs/sld008.jsp.)

Part of NSF's mission is to educate an S&E workforce to meet changing times. This means being capable of quickly absorbing new knowledge, and adapting to new and advanced technologies.

To this end, NSF has named "learning" as one of the agency's four major investment priorities in its newly released strategic plan. I brought copies, too, because I'm a good bureaucrat, and we do that.

To implement this priority of "learning," NSF has more than 40 programs specifically designed to improve STEM education. Many of these are administered through NSF's Education and Human Resources Directorate.

Graduate student support is one such broader impact. Almost 85 percent, or 23,000, of graduate students directly supported by NSF are performing research as part of research projects, centers, or facilities awards. The other 15 percent of NSF-supported graduate students receive stipends or salaries through some of your favorite programs.

Collectively, these programs have a comprehensive reach--from training the individual to catalyzing institutional change, and from infusing classrooms with research to global networking.

NSF Graduate Research Fellowships (GRF) support graduate students conducting science, engineering, math, or interdisciplinary research--the newest category added for 2007 awards.

According to Olsen, NSF has supported more than 40,000 GRF fellows since 1952. More than 20 former graduate research fellows have gone on to win Nobel Prizes. One of Google's co-founders, Sergey Brin, was supported by a GRF.

The Integrative Graduate Education and Research Traineeship program, or IGERT, supports the development of novel, interdisciplinary graduate education programs for Ph.D. students. Over 1,400 students are supported each year. IGERT projects also include strategies for recruitment and retention; career development opportunities such as industry internships; and dissemination plans for successful graduate education activities. NSF expects to support 20 awards each year, and each award can be up to $3 million over a five-year period. Since 1998, more than 10,000 graduates have received IGERT support.

The NSF Graduate Teaching Fellows in the K-12 Education program, or GK-12, support STEM graduate students for two years as part of larger partnerships between local school districts and graduate institutions. By placing graduate students directly in K-12 classrooms, the teachers and students are exposed to science while the graduate students enhance their teaching and communication skills.

Annually, the program supports 25 partnerships. It offers non-renewable five-year awards for up to $600,000 per year. Since 1999, GK-12 has provided support for more than 5,000 graduate students.

NIH Opportunities

The National Institutes of Health have a long history of addressing the serious under representation of African Americans, Hispanics, Native Americans, and Pacific Islanders in biomedical research. Some 79 programs serve populations from community college students to postdoctoral fellows.
Despite some gains, the current output is small - 108 blacks, 175 Hispanics, and 11 Native Americans earned biological Ph.D.s in 2003; a 7.3% share of the total number of degrees awarded. Yet, these groups represent 25% of the general population.
Clifton Poodry, PhD, directs several programs, including the MBRS program, at the National Institute of General Medical Science (NIGMS). He is concerned that NIH needs a doubling of minority Ph.D.s every 8 years to shift the curve to where it should be. (See: *Science* 20 January 2006, Jeffrey Mervis, Vol. 311. no. 5759, pp. 328 – 329)..

Since 1972 the MBRS Program has offered support to minority-serving institutions (MSIs) with 50% or more student enrollment from individuals underrepresented in biomedical and behavioral sciences in order to increase the numbers of individuals who pursue Ph.D. research training and are professionally engaged in and occupy positions of leadership in these fields. The Hispanic-serving institutions (HSIs) that have received MBRS funding include associates, baccalaureate, masters, and Ph.D.-granting institutions and medical and health professional schools.

The original MBRS program coupled student development with research. In 1998 the MBRS Program was refocused into two separate components—one for student development and another for research support. (See the background documents related to this change at http://www.nigms.nih.gov/News/Reports/score.htm and http://www.nigms.nih.gov/News/Meetings/MinorityBiomedicalResearchSupportFocusGroup.htm).

The MBRS Program that currently supports undergraduate and graduate student development at HSIs is the Research Initiative for Scientific Enhancement (RISE). The other MBRS program for MSIs, Support of Competitive Research (SCORE), supports faculty research.

An indirect way of gauging the impact of the MBRS RISE Program is through anecdotal information. For example, MORE includes "success stories" in the justification narratives of our annual Congressional justification (see http://www.nigms.nih.gov/About/Budget/CJs/). MORE has also featured many of its participants in the *Minority Programs Update* (see the archived print issues at http://www.nigms.nih.gov/Publications/MPU.htm), as well as in the booklet *Profiles of Excellence* developed in celebration of MORE's 30th anniversary.

ACKNOWLEDGEMENTS

We thank Susan T. Hill, Senior Science Resources Analyst, Science and Engineering Education and Human Resources Program (EDU) of the Division of Science Resources Studies (SRS) for her sources of data. For the interested researcher, be forewarned that there are hundreds of tables, graphs, and charts on-line at NSF. It's easy to get lost in the trees without seeing the forest. Dr. Hill has been a helpful guide to both forest and trees. In addition, we thank Susan Athey for references to data and information at the National Institute for General Medical Science (NIGMS), which also coordinates the MARC, MBRS and RISE programs for under-represented minority students.

We also thank the President of AAHHE, Dr. Loui Olivas. Also, our appreciation to Dr. Adolfo G. De Los Santos for several references.

DATA

Our report is developed primarily from data provided by the NSF Division of Science Resources Statistics and its annual report entitled: *Science and Engineering Doctorate Awards.* This data comes from the Survey of Earned Doctorates (SED) for academic year 2005 (July 2004 to June 2005).

The SED are published annually in Doctorate Recipients from United States Universities: Summary Report (NAS/NRC 1968–98, NORC 1998–2002), which covers doctorates in all specialty fields, and in Science and Engineering Doctorate Awards, which focuses primarily on science and engineering doctorates.

Recent Summary Reports are available at http://www.norc.uchicago.edu/issues/docdata.htm. The Science and Engineering Doctorate Awards series (NSF 1997–2002) is available on the NSF website at http://www.nsf.gov/statistics/doctorates/.

The SED, in turn, is sponsored by six federal agencies: the National Science Foundation, the National Institutes of Health, the U.S. Department of Education, the U.S. Department of Agriculture, the National Endowment for the Humanities, and the National Aeronautics and Space Administration. Additional data are available in the interagency report *Doctorate Recipients from U.S. Universities: Summary Report 2005*. The full set of detailed tables from this survey is posted at http://www.nsf.gov/statistics/doctorates/. And the most recent information on trends is *S&E Doctorates Hit All-time High in 2005* (NSF 07-301 | November 2006), found at http://www.nsf.gov/statistics/infbrief/nsf07301/.

In addition**,** NSF's WebCASPAR database provides a large body of statistical data resources for science and engineering at U.S. academic institutions at http://webcaspar.nsf.gov/includes/checkJavascriptAbility2.jsp;jsessionid=19E1106F9CE17419FD939B37958347E4?submitted=1).

We also refer the reader to this special report: U.S. Doctorates in the 20th Century, which documents the history of U.S. doctoral education from its beginnings in 1861 through 1999. See: http://www.nsf.gov/statistics/nsf06319/. This report shows when race and ethnicity were factored into the nation's data. Finally the publications of the President's Commission on Science and Technology: http://www.ostp.gov/PCAST/pcast.html.

GLOSSARY

Science generally refers to the physical sciences (chemistry, physics, astronomy), earth, atmospheric & ocean sciences, mathematics physical sciences, computer sciences, biological & agricultural sciences, psychology and social sciences. Engineering generally refers to chemical, civil, electrical, mechanical and other engineering. NSF data comes largely from the Survey of Earned Doctorates (SED) and distinguishes between science and engineering doctorates with the following categories:

NSF/SRS Categories for Doctorates in S&E

Sciences
- Physical sciences
  - Chemistry
  - Physics and astronomy
  - Other physical sciences
- Earth, atmospheric, & ocean sciences
- Mathematics
- Computer sciences
- Biological & agricultural sciences
  - Biological sciences
  - Agricultural sciences
- Psychology
- Social sciences

Engineering
- Chemical
- Civil
- Electrical
- Mechanical
- Other engineering

Source: NSF Table 1/SRS Survey of Earned Doctorates

Other agencies may classify the fields differently. The major difference between NSF's classification and those of other agencies is the exclusion of health fields from the S&E rubric; NSF places health fields within the non-S&E group, along with education, humanities, and professional fields. Other agencies include health fields with biological and agricultural sciences under the heading "life sciences" or with biological sciences alone under the heading "biomedical sciences."

Survey of Earned Doctorates (SED) has 280 fields on the SED Specialties List grouped under the following headings: agricultural sciences, biological sciences, computer and information sciences, education, engineering, health sciences, humanities (subdivided into history, letters, foreign languages and literature, and other humanities), mathematics, physical sciences (subdivided into astronomy, atmospheric science and meteorology, chemistry, geological and related sciences, physics, and miscellaneous physical sciences), professional fields (subdivided into business management and administrative services, communications, and other professional fields), psychology, and social sciences. The same list is used for reporting baccalaureate and master's degree fields as well as postdoctoral study and employment fields.

Note: Since 1997 the National Opinion Research Center of the University of Chicago has administered the SED for the sponsoring federal agencies.

The SED survey form and Specialties List can be found in appendix D of the annual Doctorate Recipients from United States Universities: Summary Report (NORC 1998–2002), which is available at http://www.norc.uchicago.edu/issues/docdata.htm/. Also see: http://www.nsf.gov/statistics/nsf06319/appc.cfm/

Carnegie Classification. A system of classification of postsecondary institutions established by the Carnegie Foundation for the Advancement of Teaching.

A majority of the doctorate-granting institutions are classified as Research (126) or Doctoral (109) institutions, and they account for the vast majority of doctorates awarded in the United States. In 1990–99, **Research I institutions** conferred 68.3 percent of all doctorates; **Research II institutions**, 11.5 percent; **Doctoral I** institutions, 10.6 percent; and **Doctoral II** institutions, 4.4 percent. Although a substantial number of doctorate-granting institutions fall into the **"other"** Carnegie categories, together they awarded 5.3 percent of all doctorates in the 1990s; these institutions were aggregated and presented as the "other" Carnegie group in this report.

Citizenship status. Most citizenship data are presented as reported by the doctorate recipients or as provided by the institutions that granted the doctorates.

Doctorate-granting institution. Any postsecondary institution in the United States that awards research doctorates (as defined below) and is accredited by an agency recognized by the Secretary of the U.S. Department of Education is a doctorate-granting institution.

Currently there are about 400 doctorate-granting institutions. The number can fluctuate from year to year for various reasons: (1) additional institutions become doctorate-granting, (2) some institutions with small programs do not award doctorates every year, and (3) a few institutions eliminate their doctoral programs altogether.

Doctorate Records File (DRF) reflects the first degree earned by the individual at each level, as applicable: first baccalaureate, first master's degree, first professional doctorate, and first research doctorate. Survey forms for any subsequent research doctorates are retained but are not entered into the DRF.

Field of doctorate. Field is the specialty field of doctoral degree as reported by the doctorate recipient or obtained from the institution's commencement program or graduation list.

Race/ethnicity. The SED race/ethnicity question has undergone several revisions. In 1980 the item was done in two ways: (1) the Hispanic category was subdivided into "Puerto Rican," "Mexican," and "other Hispanic" to provide more detail for users of the racial/ethnic data; and (2) respondents were asked to check only one race/ethnicity category. In 1982 the item was recast as two questions to capture ethnicity and race separately. Since then, respondents have been asked to indicate whether or not they are Hispanic and then check one of four race categories (American Indian/Alaskan Native, Asian/Pacific Islander, black, or white). Hispanics can be of any race.

Research doctorate. A research doctorate is any doctoral degree that (1) requires the completion of a dissertation or equivalent project of original work (e.g., musical composition) and (2) is not exclusively intended as a degree for the practice of a profession.

Not included in this definition are professional doctorates: Doctor of Medicine (M.D.), Doctor of Dental Surgery (D.D.S.), Doctor of Veterinary Medicine (D.V.M.), Doctor of Osteopathy (O.D.), Doctor of Pharmacy (Pharm.D.), Doctor of Psychology (Psy.D.), Juris Doctor (J.D.), and other similar degrees.

Year of doctorate. The Survey of Earned Doctorates (SED) collects data for the academic year, which begins on 1 July of one calendar year and ends on 30 June of the next year. Academic years are identified in reports by the calendar year in which they end. For example, data reported as 1999 include all graduations from 1 July 1998 through 30 June 1999. Graduations that took place in the last six months of calendar year 1999 were part of the 2000 SED and are not included in this report.

The annual numbers of doctorates reported in the results of the IPEDS Completions Survey are slightly higher than those in the SED. Differences can be attributed largely to the inclusion of non-research doctorates, primarily in the fields of theology and education, in the Completions Survey.

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