



# The Status of Native Americans in Science and Engineering

.....

Eleanor L. Babco  
Executive Director  
Commission on Professionals in Science and Technology

Prepared for the National Academy of Engineering  
Workshop on Engineering Studies at the Tribal Colleges

March 15, 2005

Commission on Professionals in Science and Technology  
1200 New York Avenue, NW, Suite 390  
Washington, DC 20005  
Tel: (202) 326-7080  
Fax: (202) 842-1603  
info@cpst.org  
<http://www.cpst.org>

# The Status of Native Americans in Science and Engineering

Prepared for the National Academy of Engineering  
Workshop on Engineering Studies at the Tribal Colleges  
March 15, 2005

Eleanor L. Babco,  
Executive Director  
Commission on Professionals in Science and Technology

## Introduction

Native Americans<sup>1</sup> are a diverse group, encompassing 562 federally recognized tribes in the United States, including 225 village groups in Alaska<sup>2</sup>. Looking at data from the U.S. Census Bureau for 2003, as a group, their estimated median age is 28.9 years, 7 years younger than the median for the population as a whole (35.9)<sup>3</sup>. While the proportion of Native Americans has risen in the 20<sup>th</sup> century, they comprise only a fraction of the total U.S. population (about 1.5%) and represent even a smaller proportion of those being educated and working in science and engineering. However, if our nation is to continue to prosper, it is important that all people are encouraged and allowed to participate fully in science and engineering. This paper will examine the status of Native Americans as they move along the educational pipeline, and prepare for careers in science and engineering.

## Population

Following a period of major reductions in numbers in the 19<sup>th</sup> century, Native Americans grew rapidly from about 237,000 people in 1900 to 4.4 million or about 1.5% of the total population by July 1, 2003, according to estimates from the Census Bureau. The 4.4 million number included 2.8 million people, or .96%, who reported only the single race category of American Indian and Alaskan Native as well as 1.6 million people, or .5%, who reported the racial category of American Indian and Alaskan Native in combination with one or more other races.

The Native American resident population grew much more rapidly than the nation's population as a whole during the last decade. Because of changes made to the question on race for Census 2000, there are two ways to present this change in the total number of Native Americans in the United States. Using the race category of Native American alone in 2000, this population increased by 26% between 1990 and 2000 and another 4.6% between 2000 and July 2003. In comparison, the total population grew by 13% from 248.7 million in 1990 to 281.4 million in 2000, and another 3.2% from 2000 to 2003.<sup>4</sup> While Native Americans are located throughout the United States, as of April 2000, California and Oklahoma combined included about 25% of the total population.<sup>5</sup>

---

<sup>1</sup> For the purposes of this paper, Native Americans refer to American Indians and Alaskan Natives.

<sup>2</sup> U.S. Bureau of Indian Affairs, <http://www.doi.gov/bureau-indian-affairs>.

<sup>3</sup> U.S. Census Bureau, <http://www.census.gov/popest/national/asrh/>.

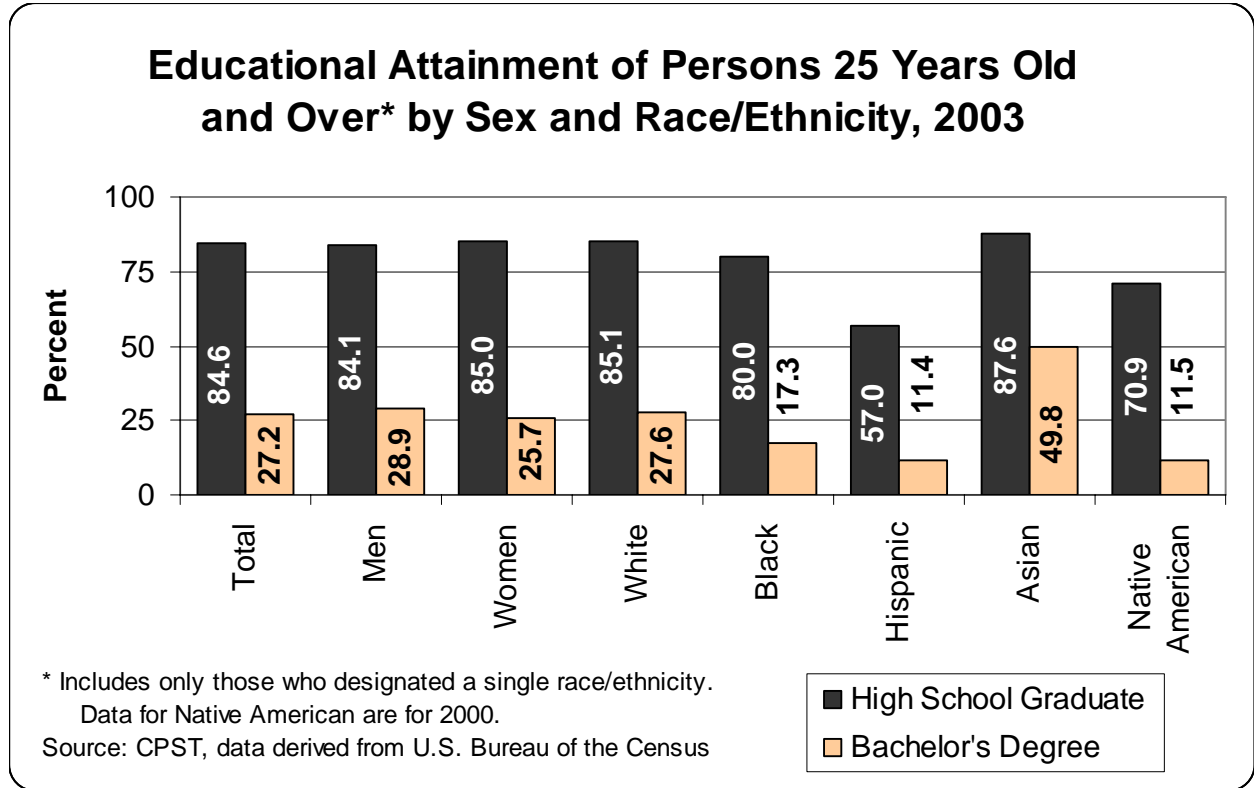
<sup>4</sup> Ibid.

<sup>5</sup> U.S. Census Bureau, The American Indian and Alaska Native Population: 2000, Census 2000 Brief, C2KBR/01-15, February 2002.

**Educational Attainment**

Data derived from the U.S. Census Bureau show that the U.S. population is becoming more educated, but significant differences in educational attainment with regard to sex, race and ethnicity remain. From 1990 to 2000, the percentage of Native Americans 25 years and older who had completed high school increased from almost 66% to nearly 71%. This was a higher rate of high school completion than for Hispanics (57.0%), but lower than for the other racial groups as shown in the following figure. This improved rate of high school completion, coupled with the large proportion of Native Americans under the age of 18, suggests that an increasing number of Native Americans will be eligible for college enrollment in the coming years.

Differences in degree attainment exist at the bachelor's level and higher, with 27% of the total population having attained a bachelor's degree or higher in 2003 compared with only 11.5% of the Native American population in 2000, as shown in the same figure. These data show that Native Americans in 2000 had the next to lowest rate of college attendance based on the population. Hispanics had the lowest.<sup>6</sup>



<sup>6</sup> U.S. Census Bureau, <http://www.census.gov/population/socdemo/education/cps2003/tab10-02.xls>. Internet Release data, June 29, 2004. Data to be released in *Current Population Report, P20-550*.

## **Precollege Education**

More and more students are taking math and science courses in high school. Although substantial differences in course taking by racial/ethnic groups remain, the gap with whites and Asians has lessened with the percentages of Native American, Black, and Hispanic students taking basic and advanced mathematics courses increasing dramatically between 1982 and 2000. For example, in 1982, nearly 11% of Native American high school graduates had taken algebra II. By 2000, 60% had taken this course. However, by 2000, only 2.4% of Native American high school graduates had taken calculus compared to 4.7% of African Americans, 5.6% of Hispanics, 12.5% of whites and 30.8% of Asians who had done so. Only 1.7% of Native Americans had taken AP calculus compared to 2.6% of African Americans, 3.6% of Hispanics, 8.4% of whites and 24% of Asians.<sup>7</sup>

In addition to taking more mathematics courses, Native Americans, Blacks and Hispanics are taking more science classes than they took in the past. The number of Native American high school graduates who had taken a course in chemistry nearly doubled with about 44% taking such a course in 2000 compared to 26% in 1982. Similarly, 8% of Native American high school graduates took a physics course in 1982 compared to 17.5% who took the course in 2000. As with AP calculus courses, less than 1% (0.5%) of Native American high school graduates have taken AP/honors courses in physics and only 1.7% have taken honors courses in chemistry.<sup>8</sup> More work must be done to make certain that advanced placement courses are available for all students.

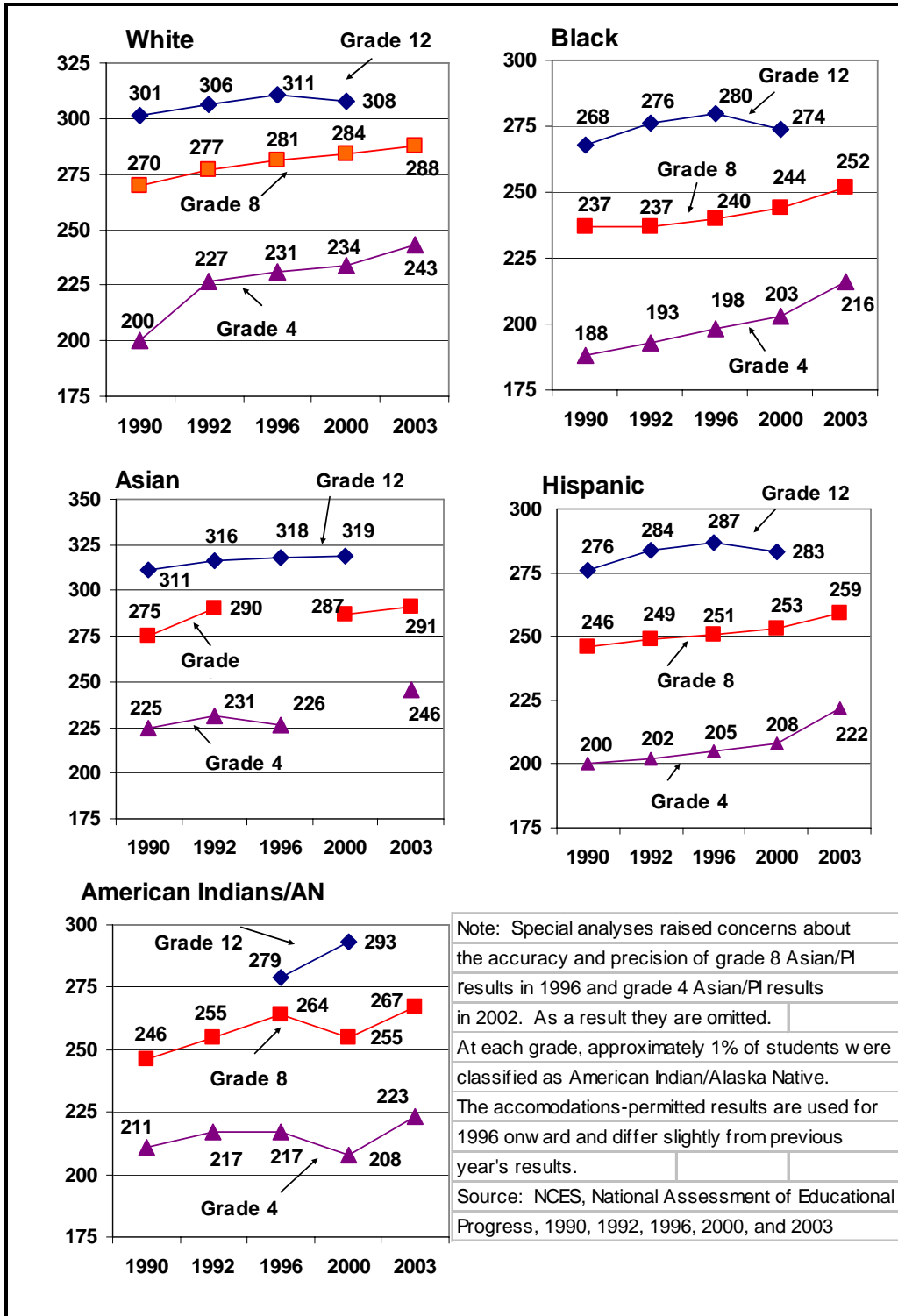
However, despite the increased course-taking by all racial/ethnic groups, Asians and whites continue to perform better on the national mathematics assessment tests. However, Native American 4<sup>th</sup> and 8<sup>th</sup> graders out-perform both blacks and Hispanics on the NAEP mathematics tests, as seen in the chart on the following page. For example, at grade 4 in 2003, on a scale of 0 to 500, Asians and whites had average scores of 246 and 243 respectively, compared to 223 for Native Americans, 222 for Hispanics and 216 for African Americans. At grade 8, the appropriate scores were 291 for Asians, 288 for whites, 267 for Native Americans, 259 for Hispanics and 252 for Blacks. It should be noted that Native Americans had the highest scores at both Grade 4 and Grade 8 among the underrepresented groups. However, in the 2003 national sample at grade 4, there were 190,122 students who took the tests – 60% were white, 18% were Hispanics, 17% were black, 4% were Asian and only 1% were Native Americans. At grade 8, there were 153,174 students who took the tests – 63% were white, 16% were black, 15% were Hispanics, 4% Asian American and 1% Native American. So this is not a complete census – it is a sample survey.

---

<sup>7</sup> U.S. Department of Education, NCES, Digest of Education Statistics, 2003, p. 164.

<sup>8</sup> U.S. Department of Education, NCES, The Condition of Education: 1996 and the “1998 High School Transcript Study,” as reported in NSF’s *Science & Engineering Indicators – 2002*, p. 1-23.

**Average NAEP Mathematics Scale Scores by Race/Ethnicity: 1990-2003<sup>9</sup>**



<sup>9</sup> National Center for Education Statistics, Assessment of Educational Progress (NAEP), 1990, 1992, 1996, 2000 and 2003.

The increasing academic preparedness of high school graduates was reinforced by results of the 2004 SAT. According to the College Board, 89% of the 1.419 million SAT takers reported at least three years of natural science study in high school, up from 78% 12 years ago and 96% took three or more years of mathematics. However, the gap in course-taking patterns for minority students remains. For example, among 2004 SAT takers, only 13% of African American, 14% of Puerto Rican, 18% of Mexican Americans and other Hispanics and 19% of Native Americans took calculus during high school compared to 27% of white students and 43% of Asian American students. However, during the past decade (1994-2004), Native Americans showed the greatest gain, going from 12% of all students taking calculus in 1994 to 19% in 2004, followed by white students who gained 5 percentage points.

The strong SAT math score gains were evident for almost all racial/ethnic groups in the decade 1994-2004. Overall, the verbal SAT score for Native Americans increased 10 points over the 1994-2004 period, while the math SAT score increased 18 points. This was a greater increase than African Americans and Mexican Americans, but considerably less than the gain by Asian Americans as shown in the following table. It is important to note that Native Americans have low college attendance rates. Therefore, the number of Native American students taking the SAT tests (8,219 out of 1,419,007 in 2004) is a highly filtered group and represents a very small proportion of the total number of students taking the SAT tests.

**SAT Scores by Racial/Ethnic Group, 1994 to 2004**

Racial/Ethnic Group	Verbal			Math		
	1994	2000	2004	1994	2000	2004
American Indian, Alaskan Native	473	482	483	470	481	488
African American, Black	428	434	430	421	426	427
Mexican American	448	453	451	458	460	458
Puerto Rican	444	456	457	442	451	452
Other Hispanic/Latino	460	461	461	464	467	465
White	520	528	528	519	530	531
Asian, Pacific Islander	489	499	507	553	565	577
<b>All College-bound Seniors</b>	<b>499</b>	<b>505</b>	<b>508</b>	<b>504</b>	<b>514</b>	<b>518</b>

Source: The College Board

Efforts must continue to increase the availability of rigorous courses, including the Advanced Placement Courses, especially in inner cities, in remote rural areas, and for those underrepresented groups, including Native Americans, who have traditionally not had the opportunity to take these courses. For it is these more rigorous math and science course that are the entry point to careers in science and engineering.

### **Undergraduate Education**

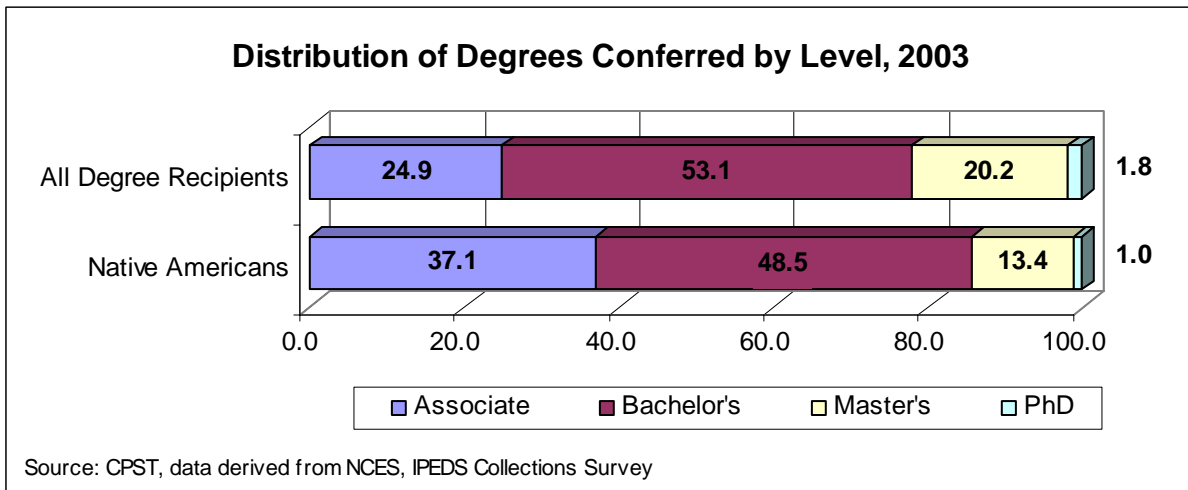
With the high school completion rate for Native Americans improving, coupled with the large proportion of Native Americans who are younger than the overall population, it is no surprise that the number of Native Americans enrolled as undergraduates also is increasing. Overall, the number of

Native Americans enrolled as undergraduates increased 86% growing from 77,900 in 1980 to 144,800 in 2001, but still Native Americans only represented slightly over 1% of the total undergraduate enrollment in 2001.

While Native American enrollment at four-year institutions increased at a higher rate (117%) than at two-year institutions (66%) from 1980 to 2001, they are still more likely to be enrolled in two-year institutions. In 2001, Native Americans represented 1.3% of the total enrollment in two-year institutions and .8% in four-year institutions.<sup>10</sup>

Native American increases in degree attainment do not yet match their enrollment proportion. Attainment increases have also failed to keep pace with Native American population growth. In 2002, Native Americans comprised 1.2% of all Americans 20 to 24 years old, the age range when college graduation typically occurs.<sup>11</sup> Native Americans did not attain a share of degrees equal to their share of the population age 20 to 24 at any degree level in 2002.

Of the 19,207 Native Americans degree recipients in 2002-03 (not including the first professional degrees), 37.1% received associate degrees, 48.5% received bachelor's degrees, 13.4% received master's degrees and 1.0% received doctorates. For the total population, a total of 2,540,084 degrees were awarded – 24.9% associate, 53.1% bachelor's, 20.2% master's and 1.8% doctorates.



Native American students are just as likely to earn degrees in science and engineering fields as other underrepresented ethnic/racial groups. In 2002, at the bachelor's level, about a third of all degrees awarded were in science and engineering fields for Native Americans, Blacks, Hispanics, and whites. The only exception was Asians, who earned nearly half of all their baccalaureates in a science or engineering field.<sup>12</sup>

<sup>10</sup> National Center for Education Statistics, *Digest of Education Statistics*, 2003, Table 210.

<sup>11</sup> U.S. Census Bureau, Summary File 3

<sup>12</sup> National Science Foundation, personal communication, Joan Burrelli, Division of Science Resources Statistics, 2005.

**Percent of Bachelor's Degrees Awarded by Major Field and Race/Ethnicity, 2002**

Field	All U.S. Citizens & Permanent Residents	Native Americans	African Americans	Hispanics	Asians
Engineering	4.5	3.6	2.7	4.3	9.0
Physical Sciences*	1.4	1.3	1.0	1.1	1.6
Math Sciences	0.9	0.7	0.8	0.7	1.3
Computer Science	3.6	2.6	4.5	2.9	9.1
Biological Science	4.8	4.7	4.2	4.6	9.1
Agricultural Science	1.4	1.8	0.4	0.7	0.5
Social Sciences	9.1	9.6	10.9	10.1	11.3
Psychology	6.0	6.3	7.0	7.0	5.4
All S&E	31.6	30.5	31.3	31.4	47.3
Non-S&E	68.4	69.5	68.7	68.6	52.7

\*Includes earth/atmospheric sciences

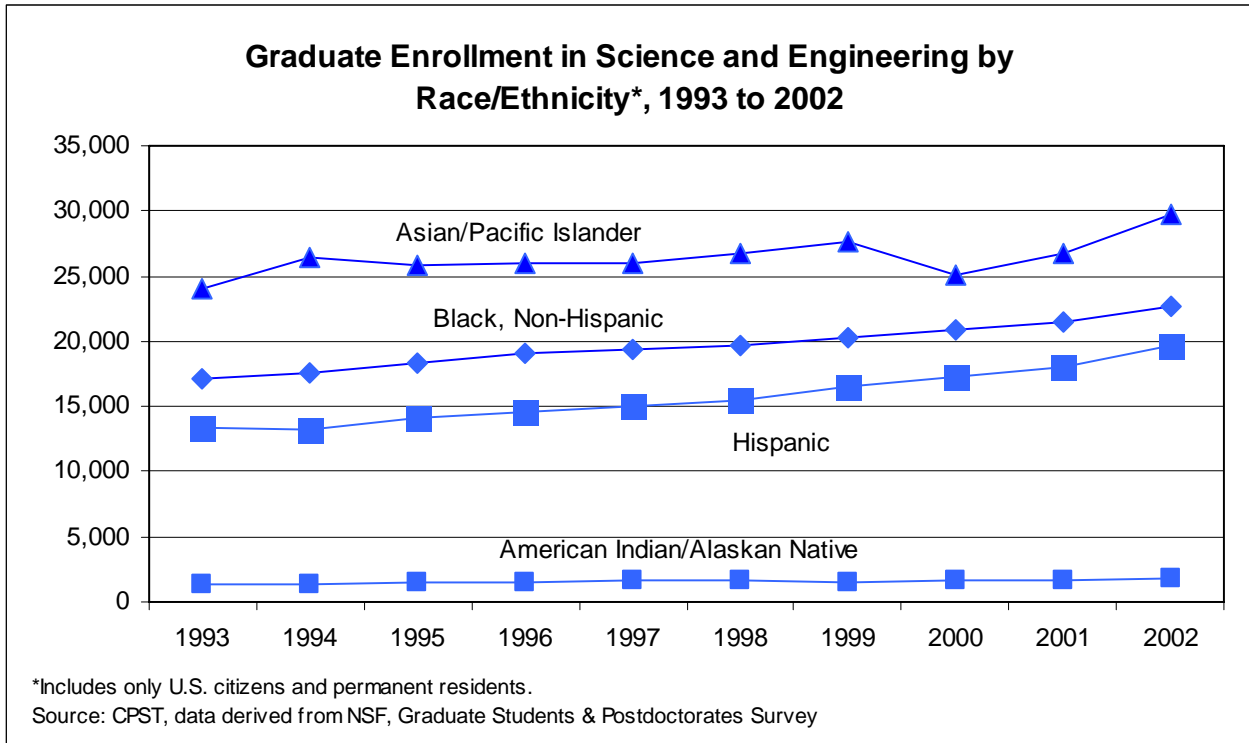
Source: CPST, data derived from National Science Foundation

Like the other underrepresented minorities, Native Americans are better represented in the social and behavioral sciences than in the physical sciences or engineering, and again, like other underrepresented minority students, Native Americans earn a decreasing percent of master's and doctorates in each of these science and engineering fields compared to white and Asian students.

### Graduate Education

After declining from 1993 through 2000, graduate enrollment in science and engineering (S&E) reached a new peak of nearly 455,400 students in fall 2002. Graduate enrollment in 2002 grew in all major S&E fields, with engineering and mathematical sciences leading in percentage gains – both more than 9% over 2001. Over the past decade, enrollment of minority students in graduate S&E programs has grown faster than enrollment of white students. Specifically, graduate enrollment in science and engineering by Native Americans increased 33% (from 1,309 to 1,736), as seen in the chart on the following page. However, Native Americans were still only 0.6% of U.S. citizens and permanent residents enrolled in science and engineering graduate programs in 2002.

Like members of other underrepresented minority groups, Native Americans were more likely to be enrolled in graduate programs in the social sciences and psychology. In 2002, 54% of Native American S&E graduate students were enrolled in social sciences or psychology, but only 14% in engineering, 12% in biological sciences, and 5% each in computer and physical sciences.



In 2002, Native Americans earned more than twice as many the master's degrees in science and engineering as they did in 1991. In 1991, they earned 200 master's degrees in science and engineering; in 2002, they earned 420. As was true at the bachelor's level, over half (58%) of the S&E degrees were awarded in the social sciences and psychology.

The number of doctorates awarded in science and engineering to U.S. citizens and permanent residents finally turned upward in 2003, after dropping for eight consecutive years to 5,669 in 2003. The number of Native Americans earning doctorates in any field is extremely small. Over the past decade (1994-2003), the number of S&E doctorates earned by Native Americans ranged from a high of 114 in 1999 to a low of 64 in 1994. In 2003, a total of 136 PhDs were earned by Native Americans, but more than half (53% or 72) were in science and engineering, and more than half (53%) of those doctorates in S&E were in psychology and the social sciences.

There may be any number of factors why Native Americans, as well as other underrepresented groups, are not studying science and engineering in greater numbers. In 2000, for each race and ethnic group, rural children had the highest poverty rates and Native Americans are unique in that over half of their population (57.4%)<sup>13</sup> lives outside of metropolitan areas, while only about 20% of whites and 10% or less of African American and Asian populations do. Poverty is a major determinant of the quality of education received by children, and that quality, in turn, a major determinant of interest in and participation in science and engineering careers. One factor may be that Native American students are not exposed to enough rigorous math and science courses that allow them to consider careers in science and engineering. Another factor may be that Native American women are more likely than men to earn bachelor's degrees, and like women of other racial or ethnic groups, are less likely to choose science and engineering as college majors.

## **The Science and Engineering Labor Force**

Of the 3.4 million scientists and engineers who were employed in the traditional science and engineering occupations in 1999, only about 10,000 (0.3%) were Native Americans. This proportion did not change appreciably across the degree levels, and did not vary much by occupation. With the exception of Asians, all minorities make up a small portion of scientists and engineers in the U.S. Eleven percent of scientists and engineers in 1999 were Asian, although they constituted about 4% of the U.S. population. African Americans, Hispanics and Native Americans as a group constituted 24% of the U.S. population but only 7% of the total S&E workforce in 1999.<sup>14</sup>

One bright spot is that the percentage (although quite small) of Native Americans who are full-time instructional faculty and staff in four-year institutions more than doubled between 1992 and fall 1998. In 1998, Native Americans represented 0.7% of full-time faculty, compared to 0.3 percent in 1992. The proportion varied from 0.3% in the natural sciences to 1.6% in business.<sup>15</sup>

However, if we look at tenured/tenure track faculty in 2001-02 in the top 50 departments of science and engineering as Donna Nelson<sup>16</sup>, a chemistry professor at the University of Oklahoma, did, we find that Native Americans comprise only about 0.1% of the total faculty – 26 out of a total 22,208. And if you look at Native American women in academia in these top 50 departments, we find only four – none a full professor.

Overall, about one in four Native American scientists and engineers are women, although the proportion does vary by occupation. Salaries for Native American scientists and engineers, like other underrepresented minority groups in science and engineering, are lower than for white non-Hispanic and Asian scientists and engineers, regardless of occupation.

## **Summary and Conclusions**

The Native American population has experienced tremendous growth in the 20<sup>th</sup> century; and levels of educational attainment have risen. Native Americans, however, continue to earn salaries lower than the national average and to have higher poverty rates than the overall population. While salaries for Native American scientists and engineers are lower than their white colleagues in science and engineering, some of that disparity can be attributed to career choice, and data from Census 2000, finds that 26% of Native Americans are below the poverty level, compared to 9% of whites and 12% of Asian Americans. At the same time, this population has a higher concentration of people under the age of 24 than the overall population. The higher high school graduation rates, coupled with the age distribution of this population suggests that increasing numbers of Native Americans will be eligible for college enrollment in the coming years.

---

<sup>13</sup> U.S. Census Bureau, *Demographic Trends in the 20<sup>th</sup> Century*, CENSR-4, November 2002, A-51.

<sup>14</sup> The S&E fields in which African Americans, Hispanics and American Indians earn their degree influence participation in the S&E labor force. African Americans, Hispanics and American Indians are disproportionately likely to earn degrees in social sciences and to be employed in social service occupations, such as social worker and clinical psychologists, which are defined by NSF as non-S&E occupations.

<sup>15</sup> National Center for Education Statistics, *Education Statistics Quarterly*, "The Gender and Racial/Ethnic Composition of Postsecondary Instructional Faculty and Staff: 1992-98."

<sup>16</sup> Nelson, Donna and Diana Rogers, *A National Analysis of Diversity in Science and Engineering Faculties at Research Universities*, 2004.