



The Status of Native Americans in Science and Engineering

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The Status of Native Americans in Science and Engineering

Native Americans¹ are a diverse group, encompassing 562 federally recognized tribes in the United States - including 225 village groups in Alaska². Looking at 2000 U.S. Census Bureau data, as a group, their estimated median age is 28.7 years, about 7 years younger than the median for the population as a whole (35.3)³. While the proportion of Native Americans has risen in the 20th 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 American Indians and Alaskan Natives 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 19th century, American Indians/Alaskan Natives grew rapidly from about 237,000 people in 1900 to 4.1 million or about 1.5% of the total population by April 1, 2000, according to data from the Census Bureau. The 4.1 million number included 2.5 million people, or 0.9%, who reported only the single race category of American Indian and Alaskan Native as well as 1.6 million people, or 0.6%, who reported the racial category of American Indian and Alaskan Native in combination with one or more other races.

The American Indian and Alaskan Native 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 American in the United States. Using the race category of Native American alone in 2000, this population increased by 26% between 1990 and 2000. If the Native American race category alone or in combination population is used, the percentage increase is 110%. Thus, from 1990 to 2000, the range for the increase in the American Indian and Alaskan Native population ranged from 26% to 110%. In comparison, the total population grew by 13% from 248.7 million in 1990 to 281.4 million in 2000.⁴ While American Indians are located throughout the United States, as of April 2000, California and Oklahoma combined included about 25% of the total population.⁵

Educational Attainment

New data derived from Census 2000 show that 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 (52.4%), but lower than for the other racial groups as well as the total population as shown in the following figure. This improved rate of high school completion, coupled with the large proportion of Native Americans

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

² U.S. Bureau of Indian Affairs, personal communication, February 5, 2003.

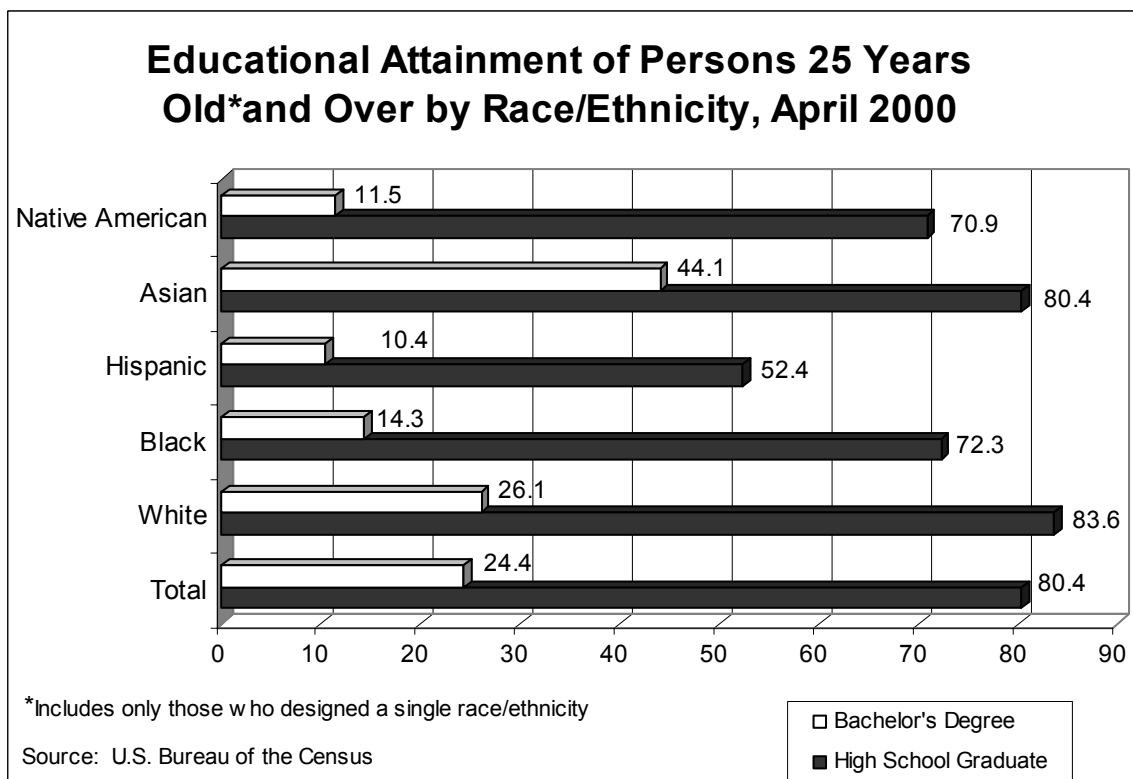
³ U.S. Census Bureau, Census Bureau Facts for Features, CB02-FF.17, October 21, 2002

⁴ U.S. Census Bureau, *The American Indian and Alaska Native Population: 2000*, Census 2000 Brief, C2KBR/01-15, February 2002.

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

under the age of 18, suggests that an increasing number of American Indians and Alaskan Natives will be eligible for college enrollment in the coming years.

Differences in degree attainment exist at the bachelor's level and higher, with 26% of the total population having attained a bachelor's degree or higher 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.



Precollege Education

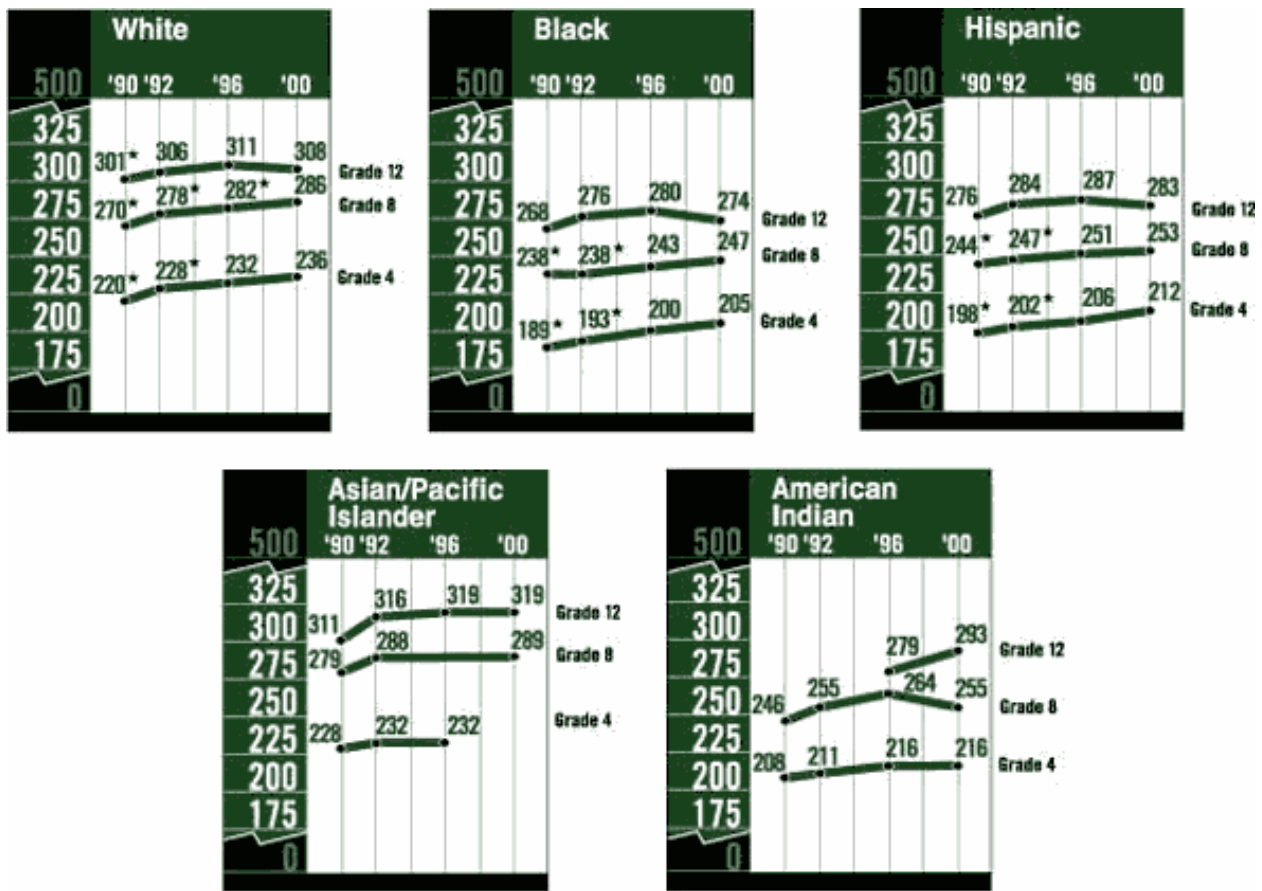
More and more students are taking math and science courses in high school. Although substantial differences in course taking by racial/ethnic groups remain, the gap with whites and Asians has lessened with the percentages of American Indian, Black, and Hispanic students taking basic and advanced mathematics courses more than doubling between 1982 and 1998. For example, in 1982, nearly 11% of American Indian high school graduates had taken algebra II. By 1998, 47% had taken this course. However, by 1998, only 6.2% of Native American high school graduates had taken calculus, which is comparable to the 6.6% of African Americans and 6.2% of Hispanics who had done so. Only 0.6% of American Indians had taken AP calculus⁶ compared to 3.4% of African Americans and 3.7% of Hispanics.

⁶ 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.

In addition to taking more mathematics courses, Americans Indians, Blacks and Hispanics are taking more science classes than they took in the past. The number of American Indian high school graduates who had taken a course in chemistry nearly doubled with about 47% taking such a course in 1998 compared to 26% in 1982. Similarly, 8% of American Indian high school graduates took a physics course in 1982 compared to 16% who took the course in 1998. As with AP calculus courses, less than 1% of Native American high school graduates have taken AP/honors courses in either chemistry or physics.⁷ 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, American Indians out-perform both blacks and Hispanics on the NAEP mathematics tests as shown below.

Average NAEP Mathematics Scale Scores by Race/Ethnicity: 1990-2000⁸



★ Significantly different from 2000.

NOTE: Sample size was insufficient to permit a reliable estimate for grade 12 American Indian students in 1990 and 1992. Special analyses raised concerns about the accuracy and precision of national grade 8 Asian/Pacific Islander results in 1996, and grade 4 Asian/Pacific Islander results in 2000. As a result, they are omitted from these figures.

⁷ 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.

⁸ National Center for Education Statistics, Assessment of Educational Progress (NAEP), 1990, 1992, 1996, and 2000.

The increasing academic preparedness of high school graduates was reinforced by results of the 2002 SAT. According to the College Board, 87% of the 1.075 million SAT takers reported at least three years of natural science study in high school, up from 78% 10 years ago, and 96% took three or more years of mathematics.

The strong SAT math score gains were evident for almost all racial/ethnic groups in the decade 1992-2002. Overall, the verbal SAT score for American Indians/Alaskan Natives increased 7 points over the 1992-2002 period, while the math SAT score increased 12 points. This was a greater increase than for African Americans and Hispanics, but still less than Asians and whites 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 (7,506 out of 1,075,213 in 2002) is a highly filtered group and represents a very small proportion of the total number of students taking the SAT tests.

SAT Average Scores by Racial/Ethnic Group, 1992-2002

Racial/Ethnic Group	Verbal			Math		
	1992	2000	2002	1992	2000	2002
American Indian, Alaskan Native	472	482	479	471	481	483
African American, Black	428	434	430	419	426	427
Mexican American	449	453	446	457	460	457
Puerto Rican	442	456	455	438	451	451
Other Hispanic/Latino	459	461	458	463	467	464
White	519	528	527	515	530	523
Asian, Pacific Islander	487	499	501	551	565	569
All College-bound Seniors	500	505	504	501	514	516

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.

Higher Education

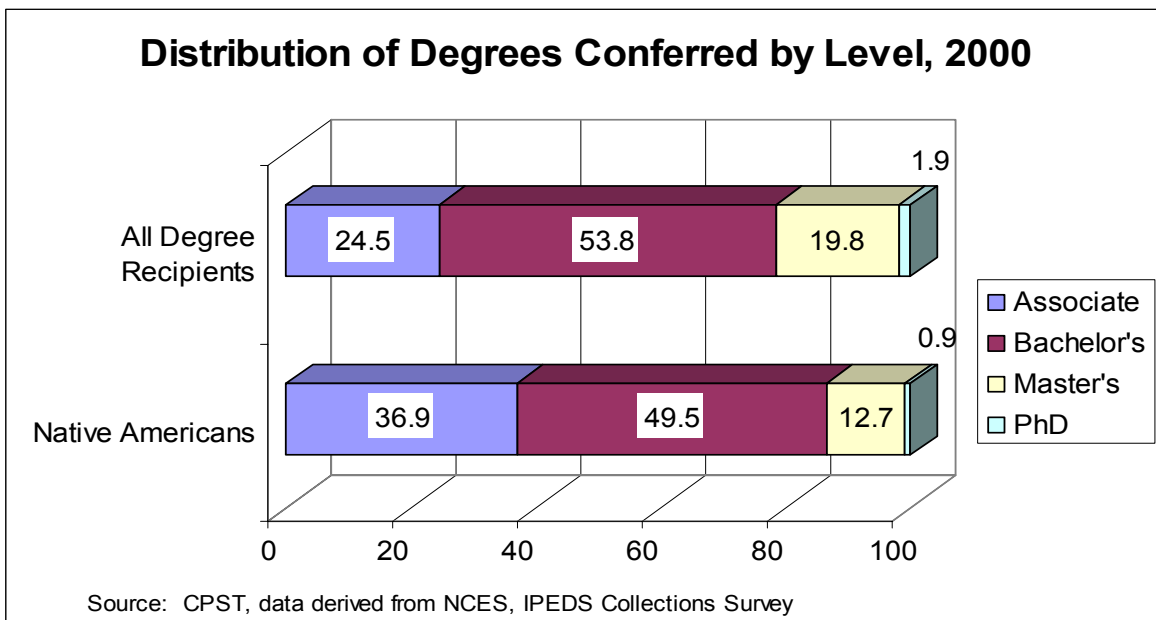
With the high school completion rate for Native Americans improving, coupled with the large proportion of Native Americans who are younger than the overall population, it is no surprise that the number of Native Americans enrolled as undergraduates also is increasing. Overall, the number of Native Americans enrolled as undergraduates increased 71% growing from 77,900 in 1980 to 133,300 in 1999, but still Native Americans only represented slightly over 1% of the total undergraduate enrollment in 1999.

While Native American enrollment at four-year institutions increased at a higher rate (92%) than at two-year institutions (75%) from 1980 to 1999, they are still more likely to be enrolled in two-

year institutions. In 1999, Native Americans represented 1.3% of the total enrollment in two-year institutions and 1.0% in four-year institutions.⁹

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 2000, Native Americans composed 1.6% of all Americans 20 to 24 years old, the age range when college graduation typically occurs.¹⁰ 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 2000.

Of the 17,596 American Indian and Alaskan Native degree recipients in 1999-00, 36.9% received associate degrees, 49.5% received bachelor's degrees, 12.7% received master's degrees, and 0.9% received doctorates. For the total population, a total of 2,304,672 degrees were awarded – 24.5% associate, 53.7% bachelor's, 19.8% master's, and 1.9% doctorates.



Native American students are just as likely to earn degrees in science and engineering fields as other underrepresented ethnic/racial groups. In 2000, 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.¹¹

⁹ National Center for Education Statistics, *Digest of Education Statistics*, 2001, p. 241

¹⁰ U.S. Census Bureau, Summary File 3

¹¹ National Science Foundation, *Science and Engineering Degrees by Race/Ethnicity of Recipients: 1991-2000*, NSF 02-329, August 2002

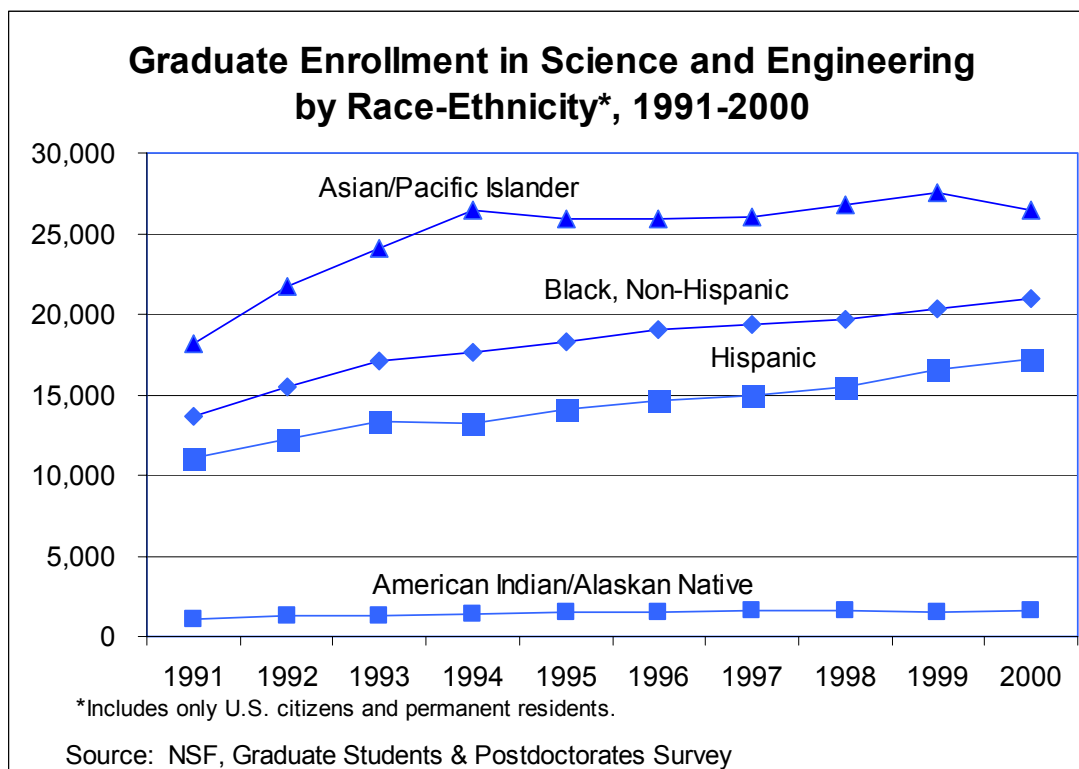
Percent of Bachelor's Degrees Awarded by Major Field and Race/Ethnicity, 2000

Field	All U.S. Citizens & Permanent Residents	Native Americans	African Americans	Hispanics	Asians
Engineering	4.5	3.9	2.9	4.6	9.1
Physical Sciences	1.5	1.3	1.1	1.2	2.1
Math Sciences	1.0	0.8	0.9	0.7	1.3
Computer Science	2.8	2.0	3.2	2.3	7.0
Biological Science	5.2	4.5	4.6	5.0	10.6
Agricultural Science	1.5	2.3	0.4	0.7	0.6
Social Sciences	10.7	12.1	11.7	11.3	11.6
Psychology	6.0	6.1	7.3	7.0	5.6
All S&E	33.2	33.0	32.1	32.8	47.9
Non-S&E	66.8	67.0	67.9	67.2	52.1

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.

After peaking in 1993, graduate enrollment in science and engineering (S&E) declined over 11% from 1993 through 2000 for all U.S. citizens and permanent residents. However, graduate enrollment in science and engineering by Native Americans increased about 23% during this same time period (from 1,309 to 1,604). However, Native Americans were still only 0.5% of U.S. citizens and permanent residents enrolled in science and engineering graduate programs in 2000.



Native Americans were more likely to be enrolled in graduate programs in the social sciences and psychology. In 2000, 57% of Native American S&E graduate students were enrolled in either the social sciences or psychology, but only 15% in engineering and 5% in computer sciences.

Overall, American Indians and Alaskan Natives earned 61% more master's degrees in 2000 than they did in 1991. In 1991, they earned 200 master's degrees in science and engineering; in 2000, they earned 340. As was true at the bachelor's level, over half (51%) 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 dropped for the sixth consecutive year reaching 16,262 in 2001. The number of Native Americans earning doctorates is extremely small. Over the past six years, the number of S&E doctorates earned by Native Americans increased for the first four years, and has dropped over the last two. In 2001, a total of 151 PhDs were earned by Native Americans, less than half (49% or 74) were in science and engineering, and half 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%)¹² 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, 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 American Indians as a group constituted 24% of the U.S. population but only 7% of the total S&E workforce in 1999.¹³

One bright spot is that the percentage (although quite small) of American Indian/Alaskan Natives who are full-time instructional faculty and staff in four-year institutions more than doubled between 1992 and fall 1998. In 1998, American Indian/Alaskan Native represented 0.7% of full-time

¹² U.S. Census Bureau, *Demographic Trends in the 20th Century*, CENSR-4, November 2002, A-51.

¹³ 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.

faculty, compared to 0.3 percent in 1992. The proportion varied from 0.3% in the natural sciences to 1.6% in business.¹⁴

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 20th 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. 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 American Indians and Alaskan Natives will be eligible for college enrollment in the coming years.

However, these high school graduates face a multitude of risk factors that threaten their ability to enroll in a postsecondary institution and complete a degree. Factors such as insufficient math and science courses, delayed course enrollment, part-time attendance, financial dependence, and having family obligations may contribute to American Indians and Alaskan Natives not completing their higher education degrees. Some progress is evident, but much remains to be done. It is imperative for the nation to work on lessening these risk factors to cut down the barriers that prevent underrepresented groups, including Native Americans, from considering careers in science and engineering. In order to prosper, our nation must take advantage of all its people, particularly those who have not fully participated in the past.

¹⁴ National Center for Education Statistics, Education Statistics Quarterly, "The Gender and Racial/Ethnic Composition of Postsecondary Instructional Faculty and Staff: 1992-98.