The Status of Native Americans in Science and Engineering

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Native Americans[2] are a diverse group, encompassing 556 federally recognized tribes in the United States—including close to 200 village groups in Alaska—and more than 250 languages and dialects[3]. Looking at August 2000 U.S. Census Bureau data, as a group, the estimated median age of Native Americans is 27.8 years, about 8 years younger than the median for the population as a whole[4]. While the proportion of Native Americans has risen in the 20th century, they comprise only a fraction of the total U.S. population (less than 1%), and as such represent even a smaller proportion of the population 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 slightly less than 2 million in 1990, to an estimated 2.4 million by August 1, 2000, according to data from the Census Bureau. The American Indian and Alaska Native resident population has grown more rapidly than the nation's population as a whole during the last decade—17.9% versus 10.7% between April 1, 1990 and August 1, 2000.[5] Located throughout the United States, as of July 1, 1999, over a third were concentrated in just three states—California, Oklahoma, and Arizona[6].

Educational Attainment

The latest available data, derived from the 1990 Census, shows that from 1980 to 1990, the percentage of Native Americans 25 years and older who had completed high school increased from 56% to nearly 66%. This was a higher rate of high school completion than for Hispanics (50%) and African Americans (63%), but lower than for the total population, 75% (Figure 1). 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 American Indians and Alaska Natives will be eligible for college enrollment in the coming years.

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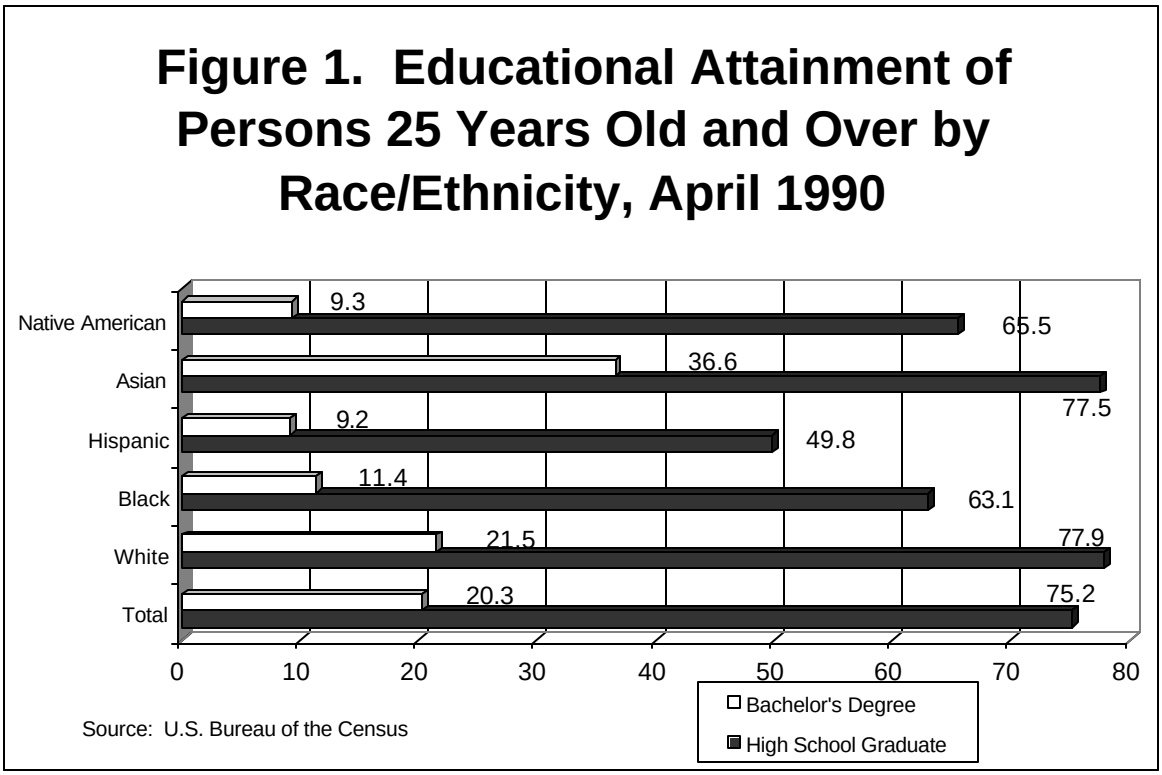
[1] http://www.cpst.org
[2] For the purposes of this paper, Native Americans refers to American Indians and Alaskan Natives.
[3] U.S. Census Bureau, Census Bureau Facts for Features, American Indian Heritage Month: November 1-30, CB99-FF.14, October 21, 1999.
[4] U.S. Census Bureau, Census Bureau Facts for Features, CB00-FF.13, October 23, 2000
[5] U.S. Census Bureau, Census Bureau Facts for Features, CB00-FF.13, October 23, 2000
[6] U.S. Census Bureau, Census Bureau Facts for Features, CB00-FF.13, October 23, 2000

Differences in degree attainment exist at the bachelor's level and higher, with 20% of the total population having attained a bachelor's degree or higher compared with 9% of the Native American population in 1990, as shown in Figure 1.



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 and 0.6% had taken AP calculus[7].

In addition to taking more mathematics courses, American 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 26% taking such a course in 1982 compared to 47% in 1998. 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

[7] U.S. Department of Education, NCES, The Condition of Education: 1996 and the "1998 High School Transcript Study."

chemistry or physics.[8] More work must be done to make certain that Advanced Placement Courses are available for all students.

The increasing academic preparedness of high school graduates was reinforced by results of the 2000 SAT. According to the College Board, a record 88% of the 1.26 million SAT takers reported at least three years of natural science study in high school, up from 78% 10 years ago. In the 1990s, Native American, African American and Mexican American students experienced the greatest increase in college preparatory coursework.

After increasing 18 points from 1990 to 1999, the average verbal SAT for Native Americans dropped two points to 482 in 2000. The average math score increased 13 points between 1990 and 1999, but remained the same in 2000. Despite these gains, the yearly averages for Native Americans are still below the yearly averages for all college-bound seniors for both verbal and math, but above other underrepresented minority groups as shown in Table 1.

Table 1. SAT Averages Between 1990 and 2000 by Racial/Ethnic Group

	Verbal			Math		
Racial/Ethnic Group	**1990**	**1999**	**2000**	**1990**	**1999**	**2000**
American Indian, Alaskan Native	466	484	482	468	481	481
African American, Black	428	434	434	419	422	426
Mexican American	457	453	453	460	456	460
Puerto Rican	435	455	456	437	448	451
Hispanic/Latino	459	463	461	464	464	467
White	519	527	528	515	528	530
Asian, Pacific Islander	483	498	499	546	560	565
All College-bound Seniors	**500**	**505**	**505**	**501**	**511**	**514**

Source: The College Board

Efforts must continue to increase the availability of rigorous courses, including Advanced Placement Courses, especially in inner cities, in remote rural areas, and for Native Americans and other underrepresented groups who have traditionally not had the opportunity to take these courses. These more rigorous math and science courses serve as entry points 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 is also increasing. Overall, the number of Native Americans enrolled as undergraduates increased 63% from 77,900 in 1980 to 127,200 in 1997. Yet, Native Americans still only represented slightly over 1% of the total undergraduate enrollment in 1997.

[8] U.S. Department of Education, NCES, The Condition of Education: 1996 and the "1998 High School Transcript Study."

While Native American enrollment at four-year institutions increased at a higher rate (93%) than at two-year institutions (44%) from 1980 to 1997, they are still more likely to be enrolled in two-year institutions. In 1997, Native Americans represented 1.2% of the total enrollment in two-year institutions and only 0.8% 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. By 1997, Native Americans composed 1% of all Americans between 20 and 24 years old, the ages when college graduation typically occurs. Native Americans matched this population representation only in their share of associate degrees (1.1%). At all other degree levels, they did not attain a share of degrees equal to their share of the population.

Of the 15,433 American Indian and Alaskan Native degree recipients in 1996-97, 38.4% received associate degrees, 48% received bachelor's degrees, 12.5% received master's degrees and 1.1% received doctorates. For the total population, a total of 2,191,919 degrees were awarded—25.7% associate, 53.3% bachelor's, 18.9% master's and 2.1% doctorates.

Native American students are just as likely to earn degrees in science and engineering fields as other ethnic and racial groups. In 1997, 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 their baccalaureate degrees in a science or engineering field. Like the total degree recipients, Native Americans earned about two-thirds of their degrees in non-science and engineering fields (Table 2)[10].

Table 2. Percent of Bachelor's Degrees Awarded by Major Field, 1997

Field	Native Americans	All Recipients
Engineering	3.6	5.0
Physical Sciences	1.4	1.7
Math Sciences	0.8	1.1
Computer Science	1.3	2.0
Biological Science	4.7	5.5
Agricultural Science	2.0	1.5
Social Sciences	12.7	11.1
Psychology	6.9	6.4
Non-S&E	66.6	65.7

Source: National Science Foundation

[9] National Center for Education Statistics, *Digest of Education Statistics, 1999*, p. 234
[10] National Science Foundation, *Science and Engineering Degrees by Race/Ethnicity of Recipients: 1989-97*, NSF 00-311, February 2000

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, they earn a decreasing percentage of master's and doctorates in each of these fields.

After peaking in 1993, graduate enrollment in science and engineering (S&E) has declined over 8% from 1993 through 1998 for all U.S. citizens and permanent residents. In 1993, there were 1,309 Native Americans enrolled in graduate science and engineering programs; in 1998, there were 1,614—an increase of 23.3%—but still Native Americans were only 0.5% of U.S. citizens and permanent residents enrolled in science and engineering graduate programs in 1998.

Native Americans were more likely to be enrolled in graduate programs in the social sciences and psychology. In 1998, 52% of Native American S&E graduate students were enrolled in either the social sciences or psychology, but only 15% in engineering and 6% in computer sciences.

Overall, American Indians and Alaskan Natives earned 70% more master's degrees in 1997 than they did in 1989. In 1989, they earned 209 master's degrees in science and engineering; in 1997, they earned 332. As was true at the bachelor's level, over half (55%) of the S&E degrees were awarded in social sciences and psychology.

The number of doctorates awarded in science and engineering to U.S. citizens and permanent residents dropped for the second year in a row reaching 18,125 in 1998. The number of Native Americans earning doctorates is extremely small. In 1998, they earned 189 PhDs, about half (96) in science and engineering fields. Forty-five percent of those S&E doctorates were in psychology and the social sciences.

Any number of factors may account for why Native Americans, as well as other underrepresented groups, are not studying science and engineering in greater numbers. In 1990, for each race and ethnic group, rural children had the highest poverty rates and Native Americans are unique in that roughly half of their population lives outside of metropolitan areas, while only about 20% of other populations do. Poverty is a major determinant of the quality of education received by children. That quality, in turn, is a major determinant of interest 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 are employed in the traditional science and engineering occupations, only about 10,000 (0.3%) are Native Americans. This proportion does not change appreciably across the degree levels, and does not vary much by occupation. 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 salaries of 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. Increased high school graduation rates, coupled with the age distribution of this population, suggest 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. 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 citizens, particularly those who have not fully participated in the past.