

PRESENTATION OF GOAL 4

1. Problems Related to the Retention of Undergraduates  
and Graduates in the Physics and Engineering Fields

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Why should we worry whether Chicanos get into scientific or engineering professions? To parallel Adolph Wilburn in a Science (June 1974) article on "Careers in Science and Engineering for Black Americans," low participation of Chicanos in scientific and technical positions limits their access to a significant number of well-paying, relatively stable jobs. Their problems that might be ameliorated by science and technology would enjoy greater national priority if the ratio of Chicano scientists and engineers to non-Chicanos were higher. Also, if the numbers were higher, the Chicano frame of reference would be better represented in scientific and technical advisory bodies that often deal with matters impinging directly on the lives of minorities. Obviously, greater participation of Chicanos in the scientific and technical domains should help to achieve more equitable distribution of responsibility, power, wealth, and status in the United States. As it is, the median family income in households where the head reported Spanish as his mother tongue was approximately \$5,500 as compared with \$8,000 for other origin people in the U. S. (see Table 1).

Table 1. Income of Families With Persons 3 to 18 Years Old  
In Households By Mother Tongue: November 1969.<sup>a</sup>

| Family Income                         | Total  | Mother Tongue |         |       | Not Reported |
|---------------------------------------|--------|---------------|---------|-------|--------------|
|                                       |        | English       | Spanish | Other |              |
| Total persons 3 to 18 years . . . . . |        |               |         |       |              |
| thousands . . . . .                   | 63,456 | 59,588        | 2,050   | 1,249 | 568          |
| Percent . . . . .                     | 100.0  | 93.9          | 3.2     | 2.0   | 0.9          |
| Percent by income . . . . .           | 100.0  | 100.0         | 100.0   | 100.0 | 100.0        |
| Under \$3,000                         | 7.9    | 7.7           | 17.1    | 7.1   | 3.9          |
| Less than \$1,000                     | 1.2    | 1.2           | 1.9     | 1.8   | 0.9          |
| \$1,000 to \$1,999                    | 2.6    | 2.5           | 6.0     | 1.8   | 1.1          |
| \$2,000 to \$2,999                    | 4.1    | 4.0           | 9.2     | 3.4   | 2.0          |
| \$3,000 to \$3,999                    | 5.7    | 5.5           | 12.7    | 7.1   | 5.4          |
| \$4,000 to \$5,999                    | 14.4   | 13.9          | 29.6    | 16.1  | 10.9         |
| \$6,000 to \$9,999                    | 32.5   | 32.8          | 24.9    | 32.4  | 26.1         |
| \$10,000 or more                      | 33.5   | 34.5          | 7.8     | 26.6  | 32.2         |
| Not reported                          | 6.0    | 5.7           | 7.9     | 10.7  | 21.4         |

<sup>a</sup>Source: Current Population Reports. Population Characteristics. U. S. Department of Commerce/Bureau of the Census. Persons of Spanish Origin in the United States: November 1969.

In the 1970 National Register of Scientific and Technical Personnel, there were reported 270,000 American-born and 32,900 foreign-born scientists in this country. Of the total foreign-born scientists, 14,300 hold Ph.D.'s. In comparison, there are only about 900 Black, 100 native-born Spanish-surnamed Ph.D.'s, and less than 20 Native American Ph.D.'s in science.

Overall, racial and ethnic minorities (Blacks, Chicanos, Native Americans, and Puerto Ricans) comprise 16% of the U. S. population, 7% of the enrollment in higher education, 5% of the yearly baccalaureate output from college, 3% of the graduate school enrollment, and 1% of the annual output of doctorates. Why?

1. Lack of role models is one answer. Obviously, with so few Chicano scientists, the effect of the role model is meager. Also, administrative work often claims well-trained Chicano scientists and engineers, causing early termination to their scientific and technical careers. Often, in academia, Ph.D. minorities get pressured into deanship roles or, in industry, they get involved with EEO activities early in their careers.

To increase the effect of role models, more Chicanos in science and engineering will have to be trained and retained in scientific and technical roles at existing centers of excellence (that is, institutions that attract the bulk of the federal funds for academic science). In order to contribute to and benefit from science, more Chicanos must become full members of the social network of science and become distributed throughout the hierarchy.

2. Educational attitudes need to be changed. At the present time, many educators feel Chicanos are high-risk students and treat them with preconceived ideas about their academic abilities. Typically, educators treat the bilingualism of Chicanos as a disadvantage to be corrected, not as a vehicle for further academic achievement.

Compensatory programs by their very definition sanction approaches designed to act upon the typical learner in order to make him compatible with the essence of existing institutional programs. The tragic thing about this is that they put the burden for change squarely on the student's shoulders rather than the school.

Compensatory programs in the school are more often than not federally funded and, as such, do not have the permanency of the normal programs which are locally funded. This appears to be one of the major reasons for the relative lack of institutional commitment toward these programs. That is, many of the programs are run as appendages to the permanent structure and can easily be removed when federal funds are no longer forthcoming.

The lack of commitment on the part of local institutions has brought many complaints from federal administrators who seek effective and genuine influence toward positive changes. Despite some success, the overall track record of compensatory programs is disappointing. Ivan Illich states that between 1965 and 1968 over 3 billion dollars were spent in the schools throughout the nation without bringing significant improvement.<sup>1</sup> This lack of adequate programs has, in turn, become a source of deep frustration for those communities supporting the schools.<sup>2</sup> This is not meant to imply that special programs be discontinued, but rather to emphasize the need for development of sensitive educational programs for minority groups that become the core of the educational experience of all students.

3. A third problem area is economics. As was pointed out in my earlier talk, Chicano students are generally overage when compared with the national average at grade levels beyond the sixth grade. At Highlands University and other schools having large numbers of minority students, Chicanos have already started families, committing part of their time to obtaining supporting income. There are many Chicano graduate students who must also be part-time in

academia and therefore take as much as twice the national average time for obtaining their terminal graduate degrees. Thus, some able Chicano students will leave the educational system or fail to enter solely for financial reasons.

The economic profiles of the Chicanos hoping to go to college differ markedly from their Anglo counterparts. As pointed out earlier, those children of college age live in families who earn less than \$6,000/year. It is estimated that only 15% of entering college freshman of Mexican-American families earn more than the \$6,000/year figure. In fact, more than 90% of the Chicanos at Highlands qualify for financial support. Supplementing their income implies that for Chicano students, time-consuming courses such as science labs or computer science would be economically difficult to justify.

Those Chicano families that are considered middle-class economically and who have benefited from higher education tend to motivate their children to do the same. Often, however, these families find it financially difficult to come up with the \$5,000/year necessary to send an undergraduate to institutions of scientific excellence. "We cannot afford to waste the abilities of individuals who have shown that they can profit from graduate education by allowing them to drop out for financial reasons." Efforts "must be made to get able students who failed to enter graduate school for financial reasons to reconsider."

4. Since 1970, when the glut of scientists and engineers became obvious, the economic and professional attractiveness of science and engineering professions have been counteracted by the discouraging information in the press concerning job availability--for both minority and non-minority students. The sudden release of large numbers of scientists and engineers from jobs, seemingly stable, occur daily. Loss of support from federal sources due to this loss of post-graduate opportunities and hence, graduate-student enrollment, is as disturbing to the Chicano as any other student. And again, the employment rate for Chicanos in these professional positions is so close to zero as to be nonexistent in most communities.

High priority should be placed on developing and utilizing existing minority talent in science and engineering. Programs geared to identifying those minority students showing promise in these areas should be encouraged. Financial assistance to Chicano students already enrolled in the sciences and engineering at the graduate level can help them complete their work within a reasonable time. As Wilburn has pointed out: "The immediate goal need not be to attain for minority groups qualitative and quantitative parity with nonminority groups in the sciences and engineering. The first task might be to make sure that ethnic minorities understand enough about the nature of the various aspects of scientific and technical education and employment to enable those among them with interest and ability to also understand that they have access to scientific and technical occupations.

The major thrust of a national effort should be to make the development, conservation, and effective utilization of minority citizens' scientific and engineering talents an integral part of a comprehensive national manpower policy."<sup>4</sup> The critical point to underline is the matter of policy. The EEO programs across the nation are doing some of this work but are still considered appendages. When federal support wanes, these programs will die unless they are assimilated as an ever-present reality by our educational, technological, and scientific societies.

ENDNOTES

<sup>1</sup>Ivan Illich, Deschooling Society (New York, 1971).

<sup>2</sup>Adelaide Jablansky, "Status Report on Compensatory Education," Information Retrieval Center for the Disadvantaged, Horace-Mann-Lincoln Institute, Teachers College, VII (Winterspring, 1971).

<sup>3</sup>Adolph Wilburn, Careers in Science and Engineering for Black Americans, Science (June, 1974).

<sup>4</sup>Ibid.