

2. To Identify Problems Which Contribute to the Relatively Small Number of Minority Students Pursuing Careers in Physics and Engineering

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The problems and their identification associated with the topic of this talk are wide and varied. The most important problems, as I see them, stem from the roots of our educational system--the elementary and secondary education of minority students. Although educators have been maligned concerning their sensitivity (or lack of) towards minority groups, recognition must be made of those educators astute enough to recognize an educational system for every man.

John Dewey at the turn of this century offered his fellow educators insights which, up to now, have been largely ignored. I would like to share with you one of his ideas that capture, what I believe, to be the essence of education for multicultural people:

"The places, the ethnic traditions, the clashing values, the social and economic strivings which constitute the lives of pupils on the streets, on the playgrounds, and in the homes which make up school neighborhoods are educational media. . . Learning, then, is viewed as creative reconstruction of experience, the cultural milieu of which students are living as the raw material, the medium, upon which intelligence is exercised.

In the cultural approach to educational work, there exists one of the more promising frontiers for American education. "

Although this statement is 70 years old, the American educational system still considers culturally based education as one of its "frontiers." Testifying before the Senate Select Committee on Equal Educational Opportunity, one Mexican-American leader expressed his view of the educational inequities experienced by Chicanos:

" . . . the Mexican-American has a lower educational level than either Black or Anglo, the highest dropout rate, and the highest illiteracy rate. These truths stand as massive indictments against the present educational system. As well, they are indictments of either negligent or intended homicide against a minority group. In essence, what this system has done is to smother the soul and spirit of an entire people. "¹

Considering then that hundreds of thousands of young Chicanos and other minority children are being denied full participation in our society each year, and that loss of self-concept is an everyday occurrence, and with the dropout rates for national-origin children increasing at a rate ten times greater than for their Anglo counterparts, the time for commitment and action is long overdue.

Although little data are available concerning specific reasons for so few Chicanos entering the scientific and professional fields, a discussion of the general educational problems of Chicanos as they rise through elementary and secondary grades would be enlightening.

The Elementary-School Experience

Many of the following comments will be concerned with the educational difficulties encountered by Chicano students of the Southwest. Slightly more than two million Spanish-surnamed pupils attend public elementary and secondary schools in the continental United States.² This represents almost 5% of the Nation's total enrollment in public schools. Almost 70% of the Spanish-surnamed students are found in the five Southwestern states of Arizona, California, Colorado, New Mexico, and Texas. The 1972 U. S. Commission on Civil Rights report "Mexican-American Educational Study" has isolated many of the educational problems confronted by Chicano students.

1. Recalling John Dewey's earlier statement, I should point out that the study has found that the school systems in the Southwest have virtually ignored the tradition and cultural richness of Chicano students.

2. It was also determined that the policies and programs adopted by the school systems have discouraged full participation of minorities in the benefits of the educational process. In fact, the programs and policies employ such practices as denying the Chicano student the right to use his first language, Spanish, cultural pride, and support of his community.

"The suppression of the Spanish language is the most overt area of cultural exclusion."³

In the past educators have felt that being bilingual undermines the educational process. Recently, however, a study⁴ has shown that the acculturation process and assimilation of a second language (that of the majority) is accentuated if the minority is allowed to use their native language. Where this is not allowed the gap between these cultural groups have widened.

Social psychologists today recognize the necessity for acceptance of minority languages as a basis for educational growth⁵ and development of self-esteem.

The most potent method of developing self-esteem is by acceptance of the vernacular of the minority student. In "A Theory of Human Motivation" by Maslow, he emphasizes that "Satisfaction of the self-esteem needs leads to feeling of self-confidence, worth, strength, capacity, and adequacy of being useful and necessary in the world."⁶ Yet, despite this evidence, over one-third of the schools surveyed in the U. S. Commission on Civil Rights report "The Excluded Student" admitted to discouraging Spanish in the classroom. Enforcement of such a "No Spanish Rule" varied from school to school. The range of discouragement went from admonition to corporal punishment.⁷ Cleavens has found that

"Neglect of the native language or worse still, its suppression, is damaging to the morale of the student, and results in rebellion against, or apathy toward the educational process. Especially in the beginning years of school, but later as well, facility in using verbal symbols is essential for facility of thinking."⁸

3. Studies of the demographic characteristics and ethnic isolation of Chicano students and professional staff of the Southwest have also shown that:

(a) "Public school pupils of this ethnic group are severely isolated by school districts and by schools within individual districts.

(b) For the most part, Mexican-Americans are underrepresented on school and district professional staffs and on boards of education, i. e. , they constitute a substantially lower proportion of both staff and board membership than they do of enrollment.

(c) The majority of Mexican-American staff and school board members are found in predominantly Mexican-American schools of districts. "⁹

4. Another failure of the schools of the Southwest is the lack of involving the Chicano students as active participants in the classroom to the same extent as Anglo children. In fact, "combining all types of approving or accepting behavior, the (elementary and secondary) teachers respond positively to Anglos about 40% more than they do Chicano students. "¹⁰ This is true even for Chicano teachers. This exclusion takes its toll on the attitudes and achievement of Chicano pupils. Without the benefit of adequate language programs, many Chicanos fall behind academically in the early school years and are never able to catch up. The omission of their culture, values, and familiar experiences from the design of the educational program causes many Chicano pupils to feel that the school is an alien environment with little relevance to them. These early school experiences of Chicanos thus set in motion the cycle of lowered interest, decreased participation, poor academic performance, and lowered self-esteem which is so difficult to break in the later school years. The schools bear major responsibility for this cycle of educational failure.

The Secondary School Experience (College Preparation)

Those Chicano students making it through the insensitive elementary school program still face huge hurdles to their educational, and professional, success. It has often been said that the educational system is a second home to its students and, in fact, the teachers become replacement parents during the student's tenure in the system. While this doesn't need to be disputed, for the minority student the parental attitude towards higher education is highly important to consider.

It is well accepted that in order for a high rate of success to occur in the educational system there must exist large and positive influences outside the system, particularly from the family. From many interviews with minority students and their families, it is evident that a majority of Chicano students grow up in environments that both discourage and stifle attainment of higher education. Borrowing data from Black studies which I feel are highly relevant for Chicanos and other minorities, Bond¹¹ found that the family is a decisive influence in producing people of unusual academic ability from an underprivileged population. That is, if the parents are educated (i. e. , white-collar workers) then their children will more than likely attain equivalent or higher educational and professional status. If the parents are uneducated (i. e. , having a high school education or less) then their children will get little encouragement or approval for educational development. Arguments concerning the need for college education of minorities and the knowledge that in American life a college degree, in great measure, increases the probability of vocational permanence, economic sufficiency, and increased opportunity for advancement and personal growth have had little effect on many Chicano parents.

Even if there is motivation, students' education (in particular, science education) is often inadequate. Studies in the Southwestern states have shown that Chicanos had fewer of the facilities

that seem closely related to academic achievement, such as science and language laboratories. Further, well-trained, experienced teachers are in short supply and usually can and do elect to work in the better-equipped schools, which are attended by the children of the affluent. Other studies have shown that as much as 40% of entering college freshmen (Chicano) had taken no previous science course and that the average of previous science experience was 1.1 year.¹²

In terms of actual performance the Chicano student compares very unfavorably with peers of other cultures. (See Table 1.) Such comparisons as given in this table much be viewed in perspective. Lawrence B. Glick in La Raza: Forgotten Americans states that "Although

Table 1. Grade Level Equivalents Derived From National Means for Reading, Verbal, and Mathematics Test Scores, by Grade and Race.

	Reading						
	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
National	6.0	7.0	8.0	9.0	10.0	11.0	12.0
White	6.7	7.7	8.7	9.8	10.8	11.7	12.6
Oriental American	5.8	6.9	8.0	9.1	9.9	10.7	11.6
American Indian	4.6	5.6	6.6	7.6	8.3	9.0	9.9
Mexican American	4.2	5.5	6.3	7.3	8.1	8.9	9.9
Puerto Rican	3.3	4.4	5.5	6.6	7.5	8.4	9.3
Black	3.7	5.3	6.1	6.9	7.7	8.4	9.2

	Verbal						
	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
National	6.0	7.0	8.0	9.0	10.0	11.0	12.0
White	6.6	7.6	8.6	9.9	10.8	11.7	12.6
Oriental American	5.8	6.9	7.9	9.0	9.9	10.9	11.8
American Indian	4.9	5.9	6.8	7.8	8.3	8.9	9.6
Mexican American	4.8	5.6	6.6	7.6	8.2	8.8	9.7
Puerto Rican	3.8	4.9	5.9	7.0	7.8	8.5	9.4
Black	4.6	5.4	6.2	7.1	7.6	8.2	8.8

	Mathematics						
	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
National	6.0	7.0	8.0	9.0	10.0	11.0	12.0
White	6.7	7.7	8.7	10.3	11.3	12.3	13.0
Oriental American	5.8	7.1	8.3	10.0	11.0	12.0	13.0
American Indian	4.6	5.5	6.5	7.5	8.1	8.5	9.0
Mexican American	4.3	5.4	6.4	7.4	7.9	8.4	8.9
Puerto Rican	3.6	4.6	5.6	6.5	7.1	7.7	8.2
Black	4.2	5.1	6.0	6.9	7.1	7.3	7.5

^aSource: Okada, Tetsuo et al., Dynamics of Achievement: A Study of Differential Growth of Achievement Over Time. Tech. Note No. 53, National Center for Educational Statistics, Office of Education, U. S. HEW: January 1968.

gerrymandering of school districts to create or maintain educational segregation is no longer common, the residential concentrations of Spanish-speaking have served to return these pupils to the depressed economic milieu from which they came. Culturally and linguistically handicapped, these children are tested and classified by Anglo standards, shunted into the nonacademic vocational-school environment and, at best, face a limited economic future."¹³

" . . . once the child has been classified as below a certain I. Q. level or mentally retarded, the schools then set the schedule to service this type of student, and the schedule will usually encompass vocational or industrial arts training,

so that in fact, they are segregating this particular ethnic group of Mexican-Americans into an economic group which is in fact a vocational type of worker-laborer who is not afforded the opportunities of higher education. "14

In a report submitted to this same congressional hearing, it was alleged that some counselors tend to guide Spanish-speaking children into vocational study believing this to be a "realistic"15 course of action. Similarly, in a survey of the Denver public schools, it was reported that counselors assume all too frequently that Spanish-speaking pupils will probably not go to college and therefore provide a minimum of guidance. 16

Considering family influences, poor teacher training and inadequate counseling, what effect do they have on minority involvement in higher education? "While Mexican-Americans constitute 17.2% of the elementary and secondary enrollment in the five Southwestern states in 1968, they comprised only 5.6% of the college undergraduate enrollment. . . 1970 college enrollment statistics indicate only a very minute increase in minority representatives on Southwestern college campuses. "17 (See Table 2.)

A comparison of the holding power of precollege and college institutions show the tremendous losses occurring in educational opportunities for both Blacks and Chicanos. (See Figure 1.)

In other words, the Chicano's chance of dropping out of school before the 12th grade is 1.4 times greater than that of the Anglo student. Part of this dropout problem has to do with age. Commission Survey statistics reveal that at all grade levels for which data were collected, a large proportion of Chicano students throughout the Southwest and in each of the five states are two or more years overage (considered severely overaged) for their grade level. This means fewer would be willing to extend their educational opportunities since a high percentage of these "overage" Chicanos being graduated from high school will be married and starting families. Economically, higher education is out of reach.

In summary, we know that a variety of factors influence a person's development and determine whether he will become a productive member of society and realize the full potential of his abilities. Of these, the experience a child has in school is among the most important. For minority-group children, the experience afforded them by the schools often is of critical importance in shaping the future course of their lives. For these children, the schools should represent the opportunity to intervene in the cycle of failure and rejection which is so often their fate. In order to fulfill such a function, the schools must first enable the minority children to succeed in the school environment. Schools should concentrate on analyzing their role in the development of a pluralistic society. By recognizing and permitting the student's cultural characteristics to become operating features in the learning environment, it is believed that cultural pride and self-confidence will be advanced. Jose Cardenas contends that there is no way that you can make an Anglo-Saxon out of a Mexican-American. With this in mind, the underlying objectives in the ideal educational system for Chicanos must then include the following: (1) Use of the first language of the student in order to facilitate cognitive development; (2) Inclusion of instructional content and activities related to the native language and other cultural characteristics of the student; (3) Instilling in students a favorable attitude toward people with different cultural practices; (4) Developing inservice training in bilingual and multicultural education for

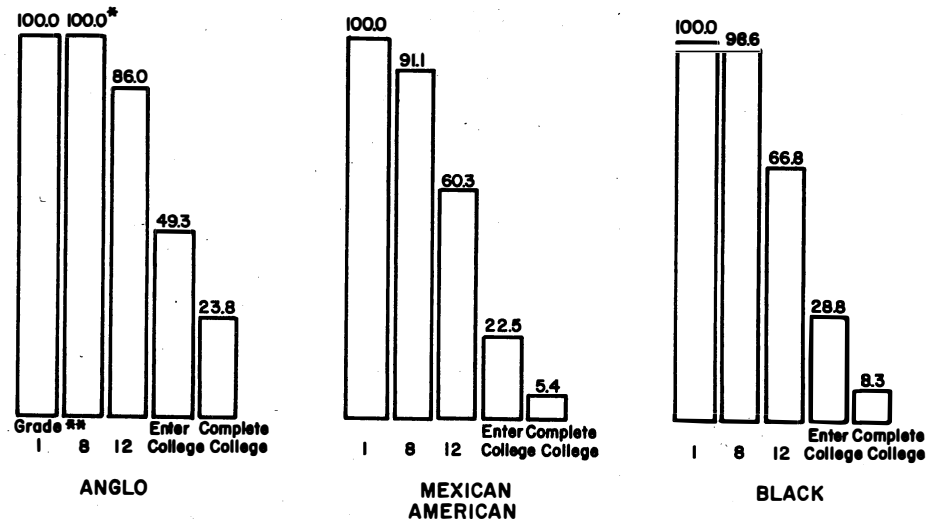
Table 2. Undergraduate College Enrollment by State and Ethnic Group.

	Arizona		California		Colorado		New Mexico		Texas		Southwest	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1970 ^a												
Anglo	53,738	87.6	477,641	82.3	73,758	90.4	22,168	76.1	242,456	83.5	869,761	83.4
Mexican-												
American	4,252	6.9	35,902	6.2	4,284	5.2	5,564	19.1	22,131	7.6	72,133	6.9
Black	1,274	2.1	33,317	5.7	1,853	2.3	565	1.9	22,343	7.7	59,352	5.7
Indian	1,382	2.3	5,441	0.9	736	0.9	613	2.1	1,876	0.6	10,039	1.0
Oriental	675	1.1	27,758	4.8	980	1.2	207	0.7	1,467	0.5	31,087	3.0
TOTAL	61,321	100.0	580,059	99.9	81,641	100.0	29,117	99.9	290,264	99.9	1,042,372	100.0
1968 ^b												
Anglo	46,212	89.0	487,137	84.5	66,365	92.4	22,481	78.0	237,661	83.4	859,856	84.8
Mexican-												
American	3,565	6.9	31,858	5.5	2,709	3.8	5,053	17.5	21,071	7.4	64,256	6.3
Black	877	1.7	32,314	5.6	1,053	1.5	518	1.8	21,291	7.5	56,053	5.5
Indian	849	1.6	2,917	0.5	708	1.0	532	1.8	2,972	1.0	7,978	0.8
Oriental	441	0.8	21,937	3.8	1,036	1.4	241	0.8	1,805	0.6	25,460	2.5
TOTAL	51,944	100.0	576,163	99.9	71,871	100.1	28,825	100.0	284,800	99.9	1,013,603	99.9

^aSource: Fall 1970 Survey of Institutions, U. S. Department of Health, Education, and Welfare, Office for Civil Rights.

^bSource: U. S. Department of Health, Education, and Welfare, Undergraduate Enrollment by Ethnic Group in Federally Funded Institutions of Higher Education, Fall 1968.

School Holding Power Rates for each Ethnic Group - Five Southwestern States



* Holding power rates are approximate estimates based on questionnaire data modified by information from U. S. Bureau of the Census and HEW. Consequently, rates are not to be interpreted as representing exact percentage of students retained. In this instance, a rate of 100 percent holding power for Anglos at grade 8 does not mean that no Anglo student whatsoever has left school between grades 1 and 8, but rather that nearly all students remain through that grade.

** The figures for each grade represent the percent of students remaining after 7 months of the school year; therefore, they are an approximation of those who complete that school year. For the 12th grade enrollment, estimates suggest that less than 1 percent of those enrolled on March 31st would fail to graduate from high school.

facilities; (5) Extension of bilingual and multicultural instruction for all students in the school system. Since its ultimate goal is cultural pluralism, bilingual-bicultural education is the bridge which leads from the assimilation posture of years past to a stance where every individual has a right to maintain and enhance his identity through his culture and languages.

ENDNOTES

- ¹ Mario Obledo, Director, Mexican American Legal Defense Fund, "Hearings before the Select Committee on Equal Educational Opportunity of the U. S. Senate, Part 4: Mexican American Education." Washington, D. C., August 1970, p. 2519.
- ² U. S. Commission on Civil Rights, Report I: Ethnic Isolation of Mexican Americans in the Public Schools of the Southwest. April, 1971.
- ³ U. S. Commission on Civil Rights, Report III: The Excluded Student-Educational Practices Affecting Mexican Americans in the Southwest. May, 1972.
- ⁴ Sam Frank Cheavens, Vernacular Languages in Education. (Unpublished doctoral dissertation, University of Texas, 1957), pp. 516-517.
- ⁵ W. E. Lambert and Elizabeth Peal, "The Relation of Bilingualism to Intelligence," Psychological Monographs, General and Applied, No. 546, 76, 27, 1962.
- ⁶ A. H. Maslow, Motivation and Personality (Harper & Brothers, N. Y., 1954).
- ⁷ See endnote 3.
- ⁸ See endnote 4, p. 51.
- ⁹ See endnote 2.
- ¹⁰ U. S. Commission on Civil Rights, Report V: Mexican American Education Study - Differences in Teacher Interaction with Mexican American and Anglo Students, March 1973.
- ¹¹ H. M. Bond, Black American Scholars: A Study of their Beginning (Balamp, Detroit, 1972).
- ¹² A. D. Franklin, Physics for Educationally Disadvantaged Students, Am. J. Phys. 41, 3 (1973).
- ¹³ Julian Samora, ed. La Raza: Forgotten Americans (University of Notre Dame Press, 1966), p. 99.
- ¹⁴ "Hearings Before the Select Subcommittee on Education of the Committee on Education and Labor," August 12, 1963, p. 14.
- ¹⁵ Ibid., p. 65.
- ¹⁶ "Report and Recommendation to the Board of Education, School District Number One," Denver Colorado, March 1, 1964, p. 34.
- ¹⁷ U. S. Commission on Civil Rights, Report II: The Unfinished Education, October 1971.