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ABSTRACT

The Border College Consortium (BCC), formed by six Texas, California, and Arizona community colleges along the United States and Mexico border, used a survey to derive a profile of its mathematics and science students. The profile revealed that both Hispanic and White students had difficulties with word problems and study habits, wanted mathematics study to be applied to everyday life, and wanted more patience and understanding from teachers. Hispanics, not so well prepared as Whites by high school science and mathematics courses, tended to enroll in remedial courses and to want more tutorial assistance and self-paced courses. White males were the best prepared group in science; White females had less difficulty with proper study habits. Females voiced more fear of science and mathematics. The survey resulted in recommendations regarding reassessment of course and career prerequisites, BCC-public school links, increased parent participation, and staff development. Funded by the Ford Foundation, the BCC initiated the Mathematics Intervention Project (MIP) model to increase Hispanic mathematics participation. The MIP featured a multifaceted approach to faculty, counselors, parents, and students; close college collaboration; pilot projects linking BCC schools and local school districts; and binational collaboration. Currently, MIP maintains exemplary mathematics programs as resources for other BCC institutions. (SB)

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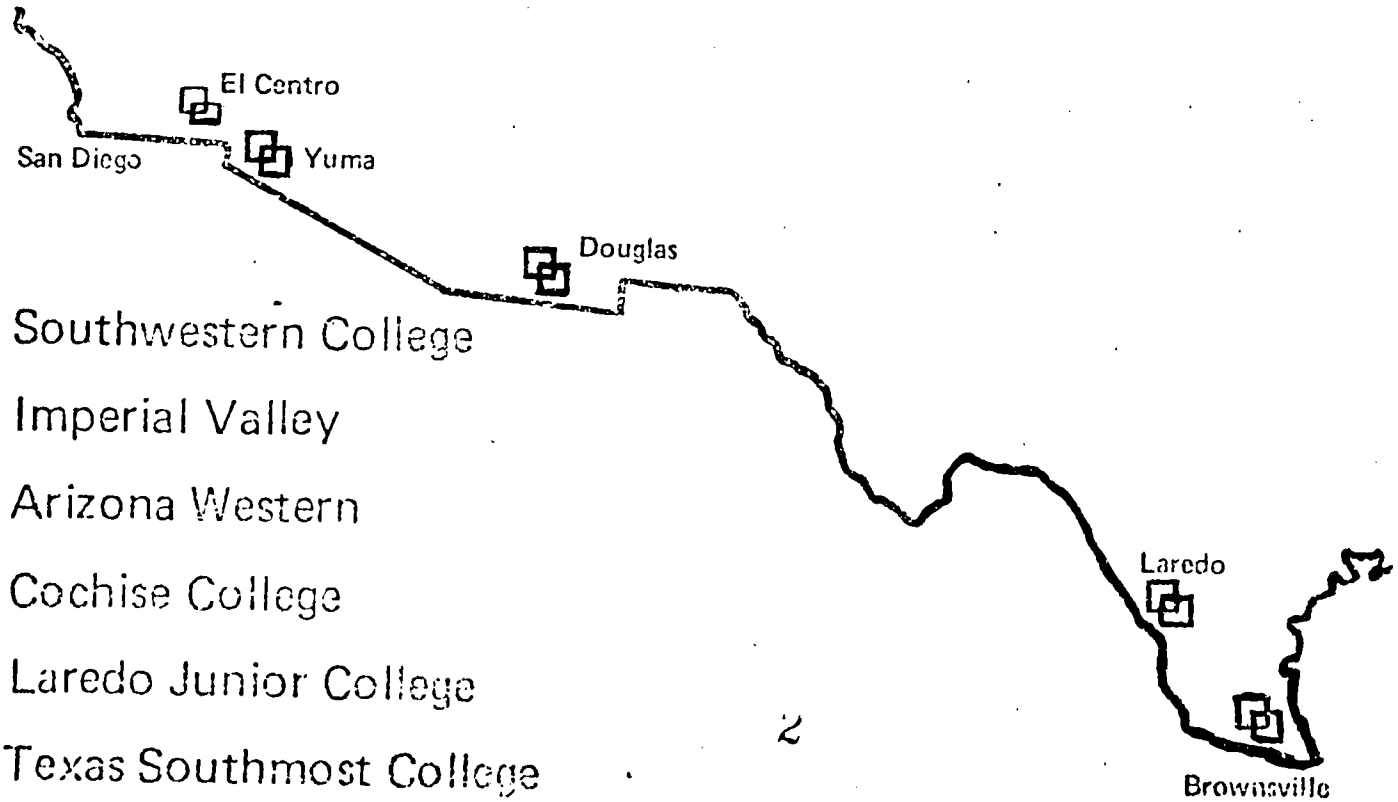

MATHEMATICS EDUCATION FOR HISPANIC STUDENTS IN THE BORDER COLLEGE CONSORTIUM

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A Note of Thanks...

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Finally, my sincere gratitude goes to the BCC Board of Directors and Project Consultants for their guidance and leadership in promoting the success of this most worthwhile Project.

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BACKGROUND OF THE BORDER COLLEGE CONSORTIUM

Colleges and Mission

The Border College Consortium (BCC) is comprised of six community colleges located in border communities along the 2000 mile U.S./Mexico border region. The institutions which comprise the BCC are: 1) Southwestern College, Chula Vista, California; 2) Imperial Valley College, Imperial, California; 3) Arizona Western College, Yuma, Arizona; 4) Cochise College, Douglas, Arizona; 5) Laredo Junior College, Laredo, Texas; and 6) Texas Southmost College, Brownsville, Texas.

The mission of the Border College Consortium is to provide assistance to the member institutions in their efforts to improve the total post-secondary educational experience of Hispanic and other non-traditional students so that they may in turn develop the knowledge and skills necessary to identify and solve the social and economic ills which affect the U.S./Mexico border region.

Demographic, Geographic and Economic Conditions in the Border

The three states (California, Arizona and Texas) and the communities in which the BCC institutions are located have demographic, geographic and economic importance which carries significant implications for these post-secondary educational sectors.

Demographic Characteristics. California, Arizona and Texas (along with New Mexico and Colorado) are places of residence for 60% of the United States' Hispanic, mostly Mexican population (Estrada, 1983). Due to high fertility rates and continuous immigration, the growth of the Hispanic/Spanish origin population is expected to continue. In the future,

community colleges can be expected to accommodate this sizeable pool of students, as these institutions have traditionally served high concentrations of minority students (Astin, 1983; Olivas, 1979; Kaufman, Doleman and Bowser, 1983).

Geographic Isolation. Except for Southwestern College located in close proximity to the San Diego metropolitan area, all other BCC institutions remain geographically isolated from urban areas. Therefore, the community colleges in these cities represent the major educational and cultural focal points for the mostly rural student populations they serve. Further, it must be emphasized that although the BCC institutions are separated by geographical distance, this has not posed a major obstacle for the accomplishment of Consortium goals. Over the years, the BCC institutions have created a successful and impressive record of educational accomplishments through collaborative resource sharing, documentation and information dissemination. Utilizing a consortium organizational framework, the six community colleges have a collection of expertise, data and effective educational programs designed specifically for Hispanic students.

Socio-Economic Conditions. Nationally, the educational levels of Hispanics remain among the lowest, with Latinos having the higher proportion of persons without a high school degree. Further, Hispanics have the smallest proportion of persons with at least a college degree (Estrada, 1983). An examination of poverty rates for the Spanish surnamed population in the six community counties where BCC institutions are located indicate that poverty rates for this group went from a low 21.1% in Yuma County, Arizona, to a high of 49.7% in Cameron, Texas. The recent devaluation of the Mexican peso has exacerbated the depressed socio-economic condition of U.S./Mexico border regions. Laredo, Texas,

with a 27 percent unemployment rate and Imperial County, California, with a 37.9% unemployment, remain in the category of the most severely depressed areas in the nation.

Implications for BCC Institutions

The increasing growth of the Hispanic population in California, Arizona and Texas where the six BCC institutions are located mandate a well-conceived, institutional response to the educational needs of this student group. In the 1979-80 academic year, the BCC institutions reported a composite student enrollment of approximately 41,500 students, 65.9% of which were Mexican American. Projections for the future suggest a Mexican American student enrollment ranging from a low of 70% to a high of 90% in the six BCC institutions. These projections are highly significant because they indicate that: 1) the Border College Consortium colleges represent the primary post-secondary educational systems capable of meeting these student needs, and 2) educational programs and activities must address the gravity of the problems faced by Mexican American students. The BCC recognizes and welcomes the challenge of serving its culturally-rich, nationally significant Hispanic student population. The BCC considers the need to address the participation and performance of Hispanics in math and science-related courses as a crucial educational imperative.

INTRODUCTION

The current focus on improving the quality of American education spotlights the critical need to educate students to enter math and science-related academic programs and careers. The mathematics training of minorities and women is particularly crucial, given the persistent under-representation of these groups in these important academic career fields. Because the majority of the U.S. Hispanic population is clustered in the five Southwestern States of California, Arizona, Colorado, New Mexico and Texas, the six Border College Consortium institutions located in three of these five key states (California, Arizona and Texas) play a crucial role in educating this fast-growing student cohort.

College enrollment data indicates that, for the most part, access to higher education for Hispanics is through the "open door" two-year community college (Garcia, 1980; Olivas, 1979). Some of the reasons Mexican Americans cite for choosing to attend two-year colleges are proximity to home, open admissions, convenience and low cost (Olivas, 1980; Rendon, 1982). For Hispanics, it appears that the community college is an institution of convenience which enables them to stay close to their families, work and earn a needed salary and experience a first "taste" of academia.

Unfortunately, many Hispanics and low SES students leave high schools with experiential, psychological and language deficits associated with poverty and other socio-economic conditions. Typical

characteristics of this group are low college entrance exam scores, poor writing, math and speaking skills, content deficiencies, weak study habits, poor self images, diffused goals, and unsuccessful learning experiences (Cohen, 1980; de los Santos, 1980; Friedlander, 1979). As such, it is not surprising that achievement data gathered in five learning areas (social studies, science, mathematics, career and occupational development and reading) demonstrates that Hispanic student achievement is consistently below the achievement of the total national age population and of white students (National Assessment of Educational Progress: 1971-75).

The disproportionate enrollments of Hispanic students in community colleges have significant implications for BCC institutions which collectively serve approximately 66% Hispanic, mostly Mexican American students. In the near future, no other minority group will register more increased population growth in the Southwest than Hispanics (Conrad, 1983; Estrada, 1983). The dominant Hispanic presence at these institutions dictates that the colleges plan, implement and assess educational programs designed to increase the retention levels and transfer patterns of this group. The need to educate Hispanic students to enter math and science-related careers is especially important. According to the Final Report of the Commission on the Higher Education of Minorities (1982) the field categories in which Hispanics and other minorities) are most severely under-represented are engineering, biological science, physical science and mathematics. Minority women face the double bind of racism and sexism in pursuing science and engineering careers as evidenced by data which indicates that while these women are 10 percent of the U.S. population, they are less than 1 percent of the

Ph.D. scientists and engineers (Malcom & Hall, 1983). The degree progress of Hispanic women indicates that in 1980, undergraduate enrollment of Hispanic females was 3.9 percent of all students in the physical sciences. At the graduate level, Hispanic women were 0.6 percent of the bioscience majors, 0.1 percent of engineering and 0.3 percent in the physical sciences (Malcom & Hall, 1983). National Science Board (1982) data also documents disparate achievement levels between ethnic groups citing a 15 percentage point difference in the mathematics achievement scores of 17 year old Hispanics and whites in 1973 and 1978. Serious consequences of this restricted eduation include the perpetuation of low student achievement levels in math and science and the reduction of individual opportunities to pursue careers which require specific math and science competencies.

Monograph Objectives

Like other community colleges whicl enroll large numbers of minority students, the BCC institutions face the difficult challenge of determining the variables affecting this abysmal under-representation of Hispanic students in science and mathematics. Further, these institutions bear the important responsibility to create the necessary academic and student support services which are critical to Hispanic student educational achievement and persistence. Thus, the objective of this monograph is two-fold: 1) to present the BCC acquired student data regarding Hispanic student demographic characteristics. prior math preparation levels, problems experienced in math and science courses and student suggestions for what teachers and counselors can do to help student enter and succeed in math and science-related programs and careers, and 2) to exhibit exemplary mathematics intervention strategies developed at BCC institutions

designed to increase the participation and retention levels of Hispanic students.

The first objective was accomplished through the administration and tabulation of a survey of students in math and science courses in the six BCC institutions. The second objective was made possible through careful planning and assessment of institution and student needs in an effort to accomplish the objectives of a Mathematics Intervention Program model developed for use in the six colleges. The study's data and math projects discussed in this monograph were made possible through a Ford Foundation two-year grant awarded to the Border College Consortium to implement a mathematics intervention program designed to assist Hispanic students to participate and succeed in math and science career fields.

Methodology

A project undertaken by all BCC institutions was the administration and tabulation of a Student Survey of students in math and science courses. (See Appendix A and B). The objective of the Student Survey was to derive a descriptive profile of math and science students including: 1) student background information; information about math and science courses, i.e., problems experienced in math and science, reasons for math avoidance, etc., and 2) student suggestions for what teachers and counselors could do to help students enter and succeed in math and science courses and careers.

The information derived from the Student Survey represents a first attempt to compile a comprehensive set of data from math and science students in six border community colleges in Texas, Arizona and California. In essence, the data may be said to provide a descriptive profile of math and science Hispanic, white, black, oriental, Native American and foreign community college students in three major Southwestern states. This comprehensive data set is an invaluable aid to help faculty, counselors and administrators determine math and science needs from a student perspective and to help the college staff use these findings to develop or revise educational programs and curricula.

Methodology. The Student Survey was pre-tested with a minimum of 25 math students in each of the six consortium colleges in the Fall of 1982. After the pre-test, survey items were revised or deleted as necessary. Once a final draft of the questionnaire was completed, a

stratified random sample of students in the six BCC colleges was taken by class type in math and science according to the following categories:

1. Remedial/Developmental - these are courses which provide basic skills preparation in math or science and are mostly non-transferrable courses.

2. General - these are courses in math or science which are considered mostly for "regular" college credit and are usually transferrable.

3. Health - these are courses in math or science which are usually taken by students who are in a health related curriculum and are usually transferrable.

The survey was administered to all math and science students in classes which were randomly selected from the above class type categories. Using this method, it was possible to sample freshmen and sophomores, part-time and full-time students, day and night students as well as students with varying levels of math preparation in math and science. A total of 2276 surveys from the six BCC institutions were used in final statistical tabulations. Surveys were tabulated in each BCC institution. Final tabulations and descriptive statistical analysis were conducted by the principal investigator.

The total number of students sampled by institutions is as follows: 1) Southwestern College, N=395; 2) Imperial Valley College, N=336; 3) Arizona Western College, N=264; 4) Cochise College, N=319, 5) Laredo Junior College, N=470; 6) Texas Southmost College, N=492. Differences in sample sizes attributable to varying levels of enrollments in math and science courses. The sample size from each institution represents an estimated 20% random sample. Compositely, the ethnic breakdown of the acquired sample is as follows:

Ethnic Category	Number	Percent
Hispanic	1311	57.6
Whites	712	31.3
Orientals	81	3.6
Foreign	73	3.2
Blacks	51	2.2
Native Americans	48	2.1

Since Hispanics and whites represent 88.9% of the sample and likewise comprise the majority of student enrollment at the six BCC institutions, the descriptive statistics presented in this report will focus on these two groups. Selective data comparing all ethnic groups is included in the appendices.

Research Findings

What were the characteristics of the students sampled?

Of the students sampled, 53% of the Hispanic and 50% of the Whites were freshmen; 47% of the Hispanic and 50% of the Whites were sophomores. Over 70% of the Hispanic and White students were enrolled in college on a full-time basis. Over 60% of the students were enrolled in day courses. Male students comprised 48% of the Hispanic group and 49% of the Whites; Hispanic females accounted for 52% of the sample, while White females accounted for 51%. Hispanic students were a bit younger than Whites. The mean age for Hispanics was 22, for Whites, 24. Parents of Hispanic students completed less years of schooling than White students' parents. Table 1 indicates that while most White parents graduated from high school, Hispanic parents did not. Table 2 indicates that White students (55%) comprised a greater portion of those graduating from high school at the top and second quarters than Hispanics (45%). On the other hand, Table 3 demonstrates that Whites earned slightly more (38%) A's and B's in math high school courses than Hispanic students (36%). As expected, Table 4 shows that Hispanic parents used Spanish as a dominant language in the family household, while Hispanic students used English.

Who provided the most encouragement to students to enter a math or science field before college enrollment?

Interestingly, parents of both Hispanic and White students appear to be the most significant influence agents of course taking behavior prior to community college enrollments as evidenced by Table 5. Other significant influence agents appear to be friends and high school and college counselors.

What are the problems experienced by students in their math courses?

Table 6 indicates that the most significant problem experienced by Hispanics and Whites in their math courses was difficulty solving word problems. Similarly, both groups reported difficulty developing proper study habits and utilizing time as the second major problem. Other problems experienced in math courses include receiving inadequate explanations, interpreting symbols and formulas, perceiving a math deficiency, i.e., "I am not good in math," and wanting to know how math applies to every day life. Interestingly, less than 10% of the Hispanics believed that they had problems understanding English explanations. Also, less than 10% of both groups reported a fear of math.

What degree of high school math preparation did student receive?

When community college math and science students reported the math courses they had taken in high school, it was possible to discern whether a student had received little or no prior math preparation. Presently enrolled Hispanic community college math students received less of a mathematics high school preparation than their White counterparts. Table 7 shows that only 28% of the Hispanic math students received a good high school math preparation, compared to 43% of the White math students. On the other hand, comparisons of currently enrolled community college science students showed less math preparation disparities between Hispanic and White students. Nonetheless, White science students still reported a better math high school preparation (42%) than Hispanic science students (33%).

What type of math courses are students enrolling in at the community college?

Table 8 indicates that considerably more Hispanic students (49%) than Whites (38%) are enrolled in developmental community college

courses. Less variances between the ethnic groups are noted in general and health math course enrollments.

Table 9 shows that more Hispanic students are enrolled in science developmental courses (15%) than white students (10%). On the other hand, more white students (18%) are enrolled in health-related science courses than Hispanic students (8%).

Why do students avoid career fields requiring an extensive math background?

One important question in the student survey asked students if their present major required the equivalent of a higher level math course. The students who answered no were asked why they avoided selecting career fields requiring an extensive math background, and the results are portrayed in Table 10. Most Hispanic students (78%) indicated they disliked math or had no interest in it. Further, 60% of the Hispanics believed "they were not good in math," and 30% indicated they had received no encouragement to pursue a math-related career. It was appalling to note that some students felt or had been told their degree program required no math, especially when they indicated fields such as nursing and business as their majors.

What problems do students experience in their science courses?

Table 11 demonstrates that the most significant problem experienced by Hispanic and whites in their science careers was trouble reading and understanding the science book and the vocabulary used in science books. Up to 28% of the Hispanic students felt science courses required too much time and 20% found the courses too difficult. Only 5% of the Hispanics reported problems with English explanations; only 7% reported a fear of science and 27% reported no difficulties with their science courses.

What do students suggest community college teachers do to help students succeed in math and science courses?

As indicated by Table 12, the most important suggestion provided by both Hispanics and white students is that teachers be more patient and understanding. Hispanics reported needing more outside class contact, tutorial assistance, and self-paced courses than whites. Both groups wanted to see the application of math to every day life, more examples, better books and handouts and interesting classes.

What did students suggest community college counselors could do to help students succeed in math and science courses?

By far, both ethnic groups reported that counselors needed to have more contact with students as evidenced by Table 13. Informing students about career opportunities in math and science-related courses was second in importance. Third was help with proper course selection and visits to high schools followed by wanting technical career information. Over half of the sample wanted assistance in developing study skills and 46% wanted assistance in overcoming math fear. One third of the sample indicated women should receive more encouragement to enter these fields.

SEX DIFFERENCES

Specific items from the Student Survey were selected to ascertain sex differences as follows:

1. Grades earned in high school math courses, by sex

Females, Hispanic (37%) and White (40%), appear to have earned slightly more A's and B's than White or Hispanic males (35%) as evidenced by Table 14. White females earned slightly more (40%) A's and B's than Hispanic females (37%). Overall, Hispanic males and females seem to perform at par with Whites of both sexes.

2. Encouragement to enter a math or science field, by sex

Again, parents appear to be the main sources of prior encouragement to enter a math or science field for both sexes and ethnic groups, as evidenced by Table 15.

3. Degree of high school science preparation, by sex

Table 16 indicates that White male science students received a better science preparation (34%) than Hispanic males (26%). Hispanic female students (35%) appear to have a better science preparation than Hispanic males (26%). Conversely, White male students (34%) had a slightly better science preparation than females (32%).

4. Degree of high school math preparation, by sex

Table 17 indicates that Hispanic males and females received a similar math preparation. However, White males and females had a better high school math preparation than Hispanics of both sexes; 49% of White males compared to 31% of Hispanic males had a good math preparation and 39% of White females compared to 31% of

Hispanic females had a good math preparation. Further, White males (49%) had a better high school math preparation than White females (39%).

5. Problems experienced in math courses, by sex

For both ethnic groups, solving word problems and difficulty developing proper study habits and utilizing time appear to be the major problems experienced as evidenced by Table 18. The only exception occurred in White females who reported less difficulty utilizing study time than all other students. Hispanic and White females report more fear of math and more difficulty interpreting symbols and formulas than males of both ethnic groups.

6. Problems experienced in science courses, by sex

Table 19 indicates that slightly more Hispanic and White females report a fear of science rather than males of both sexes. Similarly, more Hispanic and White females report finding science courses difficult and finding difficulties reading science books than males of both sexes. White females have less problems adjusting to time demands of science courses than all other students. Both sexes and ethnic groups report few problems with English explanations. Overall, White males have less problems with science courses than all other students.

CONCLUSIONS AND RECOMMENDATIONS

Although a number of similarities exist between Hispanics and Whites in terms of prior encouragement received to enter a math or science-related field and types of problems experienced in math and science courses, there are several differences which merit attention.

First, the precedent of going to college for educational and career advancement is clearly not present in Hispanic families. The average Hispanic parents did not even graduate from high school, while the average White parents did. There is an old, popular adage that says, "Education begins in the home." Although few would dispute the wisdom of that adage, it is evident that some homes provide more education than others. These disparities in familial educational attainment are linked to socio-economic factors (particularly poverty) which plaque members of minority and other disadvantaged groups. It is no leap of logic to assume that differences in educational attainment existing between Hispanics and Whites persist due to very early barriers related to family socio-economic status. Yet, Hispanic parents recognize the value of a good education and can and do provide the necessary encouragement to their children to enter math and science-related careers. Although Hispanic parents tend to use Spanish as a dominant language in the home, this was not a problem in college, as few Hispanics indicated they had problems understanding English explanations.

Since Hispanic students as a group obtain a poorer high school math preparation than Whites, and graduate with lower high school rank, it is not surprising that more Hispanics are enrolled in developmental math and science courses. It is also not surprising that more White students than Hispanics are enrolled in health-related courses of study demanding a good command of math skills like nursing and medical technologies.

Hispanic students who avoid careers requiring extensive math backgrounds do so because they dislike math, have no interest, percieve a math deficiency or receive no encouragement. To help them learn math, Hispanic students suggested more outside class contact with teachers, tutorial assistance, demonstrations of math applications to life, more examples, better books and handouts, and interesting classes. Patient, understanding teachers were valued highly by Hispanics and Whites. Both ethnic groups reported they would like counselors to have more contact with them. Further, the students wanted counselors to provide information regarding career opportunities, proper course selection, study skill development, and math fear/anxiety.

Overall, White males receive a better math preparation and experience fewer problems with math and science courses than all other students. Hispanic and White females report more fear of math, difficulty interpreting symbols and formulas, fear of science, and difficulties with science courses than males of both ethnic groups. These reported

fears and difficulties incite interest because in terms of grades in math courses females of both sexes performed at par with males of both sexes. White females report less difficulty developing proper study habits and utilizing time than all other students.

RECOMMENDATIONS

1. Immediate attention should be given to the most critical problems experienced by Hispanics and Whites. These include: 1) solving word problems, 2) developing proper study habits and utilizing time, 3) interpreting symbols and formulas, 4) understanding how math applies to modern life, 5) understanding science vocabulary, and 6) reading difficult science books.

2. Further study is needed to determine why students are experiencing difficulties solving word problems. One is quickly tempted to say Hispanics have language problems. However, few Hispanics reported problems understanding English explanations, and Whites appear to have the same problem. Obviously, word problems require sophisticated critical thinking skills, logic and interpretion of the written word. These could be the barriers which preclude student success in math courses. If this proves to be true, it will be necessary to develop curricula and strategies to teach these important skills.

3. It was appalling to note that many students in nursing, business and related majors reported not taking math because they were informed that math was not needed in

these careers. The importance of a solid math foundation which can open the door to numerous careers needs to be communicated to students. Faculty in all content areas should re-assess their course requirements to determine if a math preparation has been inadvertently deleted.

4. Literacy skills appear to be important contributors to success in math and science-related careers. Reading and writing skills can aid students in solving math and science problems, and understanding vocabulary. These skills should be emphasized at every stage of a student's educational career.

5. Linkages between community colleges and public school systems should be established beginning no later than junior high school to effectively deal with academic, psychological and socio-economic barriers which preclude educational success at very early stages in a child's development.

6. Parents in this and other studies appear as major influence agents in encouraging their children's course taking behavior. Hispanic parents, most of whom have no high school diploma, could do a better job at encouraging their children if they had appropriate information. Efforts should be made to provide information to parents about college courses and the importance of math for future careers.

7. Women need encouragement and motivation to pursue math and science-related careers. This study provided evidence that although women did earn good grades in math, they still perceived fear, anxiety and inadequacy in this

field. The representation of women in math and science-related careers needs to be improved.

8. Faculty, counselor and administrator development programs need to be established to assist these individuals in preparing students to achieve success and participate in math and science-related careers.

9. Internship programs where minority students could apply their knowledge of math and science could be invaluable in terms of adding hands-on experience. Today, simply having a degree is not enough. Actual working experience could make the difference for a minority student seeking a job in a math field.

10. An interface between faculty and counselors needs to be developed. Working together, these individuals could complement and reinforce each other's goals. For example, counselors could help faculty in areas such as math fear and anxiety, academic and career counseling, and study skill development. In turn, faculty could provide counselors with student information so that counselors may do a better job at counseling and advisement.

The next section of this monograph includes specific activities that were implemented to address some of the issues presented through a Math Intervention Project funded by the Ford Foundation.

TABLE 1

Mean Number of School Years Completed By
Hispanic and White Parents

Parents	Hispanic	Parents	White, Non-Hispanic
	Mean Years		Mean Years
Mother, N=1231	9	Mother, N=686	12
Father, N=1180	9	Father, N=669	13

CHART 1 Mean Number of School Years Completed by Hispanic and White Parents

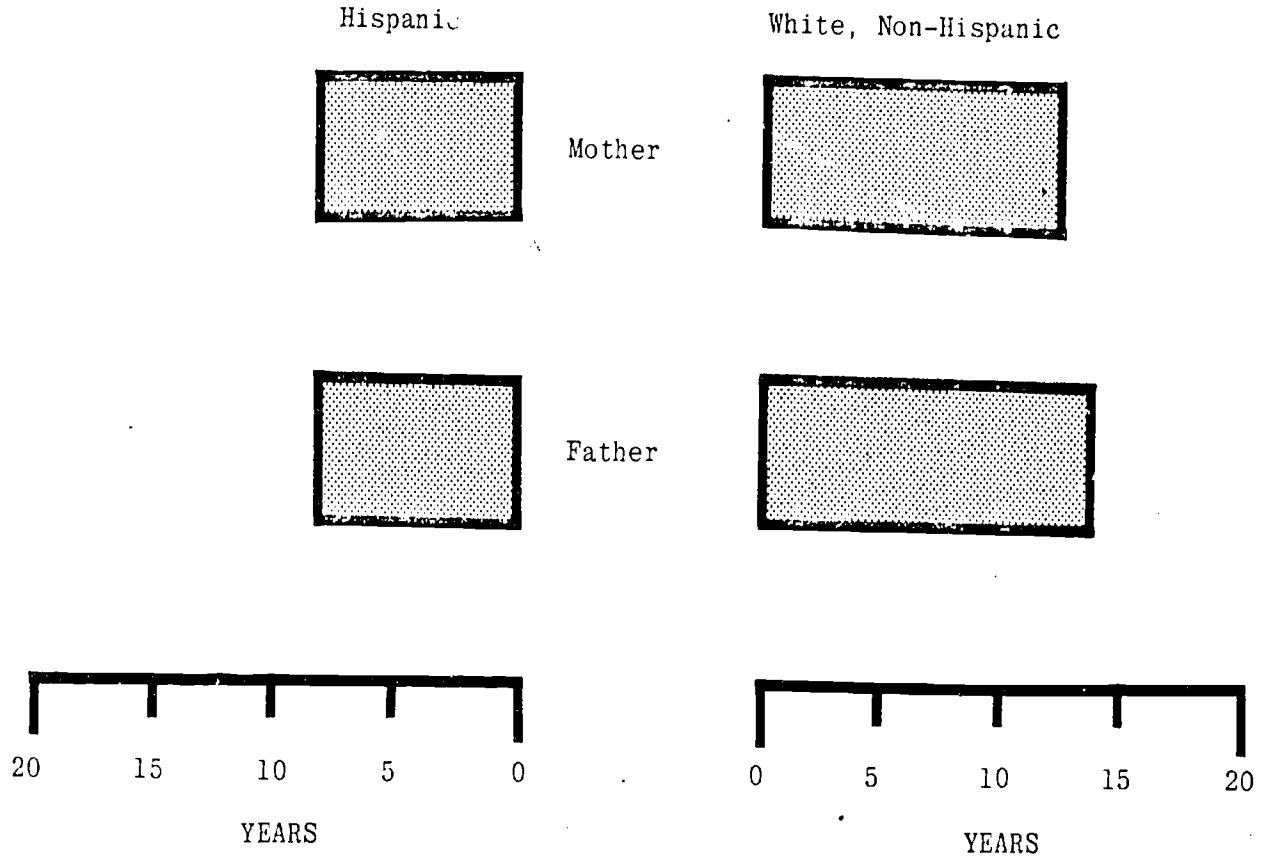

TABLE 2

Academic Rank at High School Graduation
For Hispanics and Whites

	Number	Percent*
Hispanics	1261	101
Top Quarter	227	18
Second Quarter	310	25
Third Quarter	603	48
Fourth Quarter	33	3
GED Graduate	59	5
No Graduation	29	2
Whites	702	100
Top Quarter	186	26
Second Quarter	201	29
Third Quarter	216	31
Fourth Quarter	31	4
GED Graduate	43	6
No Graduation	25	4

* Numbers may not add up to 100 because of rounding.

CHART 2 Academic Rank at High School Graduation
For Hispanics and Whites

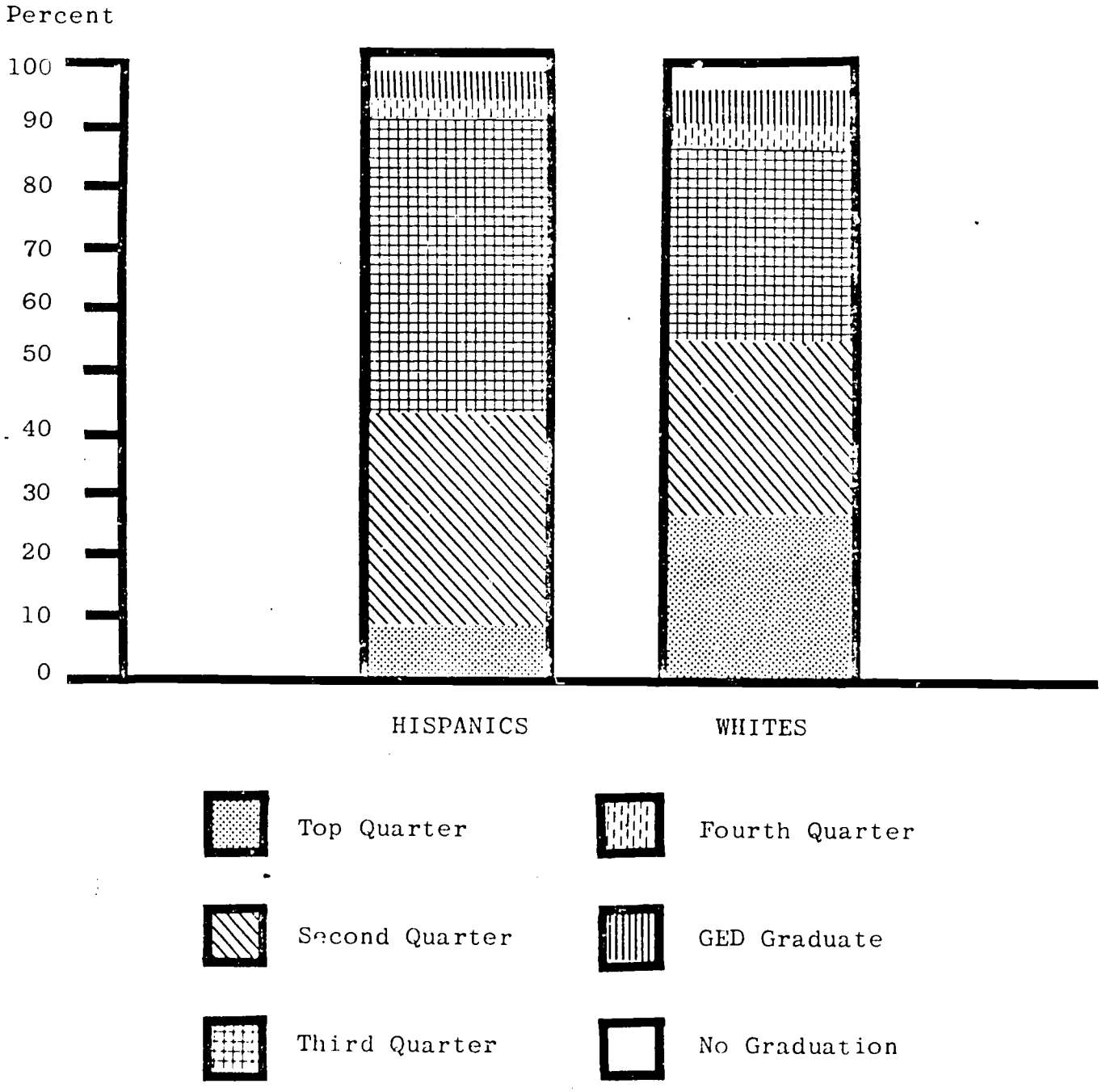

TABLE 3

Grades Earned by Hispanics and Whites
in Math High School Courses

	Number	Percent*
Hispanics.....	1288	99
A's and B's.....	469	36
B's and C's.....	571	44
C's and D's.....	234	18
D's and F's.....	14	1
Whites.....	700	99
A's and B's.....	268	38
B's and C's.....	260	37
C's and D's.....	155	22
D's and F's.....	17	2

* Numbers may not add up to 100 because of rounding.

CHART 3 Grades Earned by Hispanics and Whites in Math High School Courses

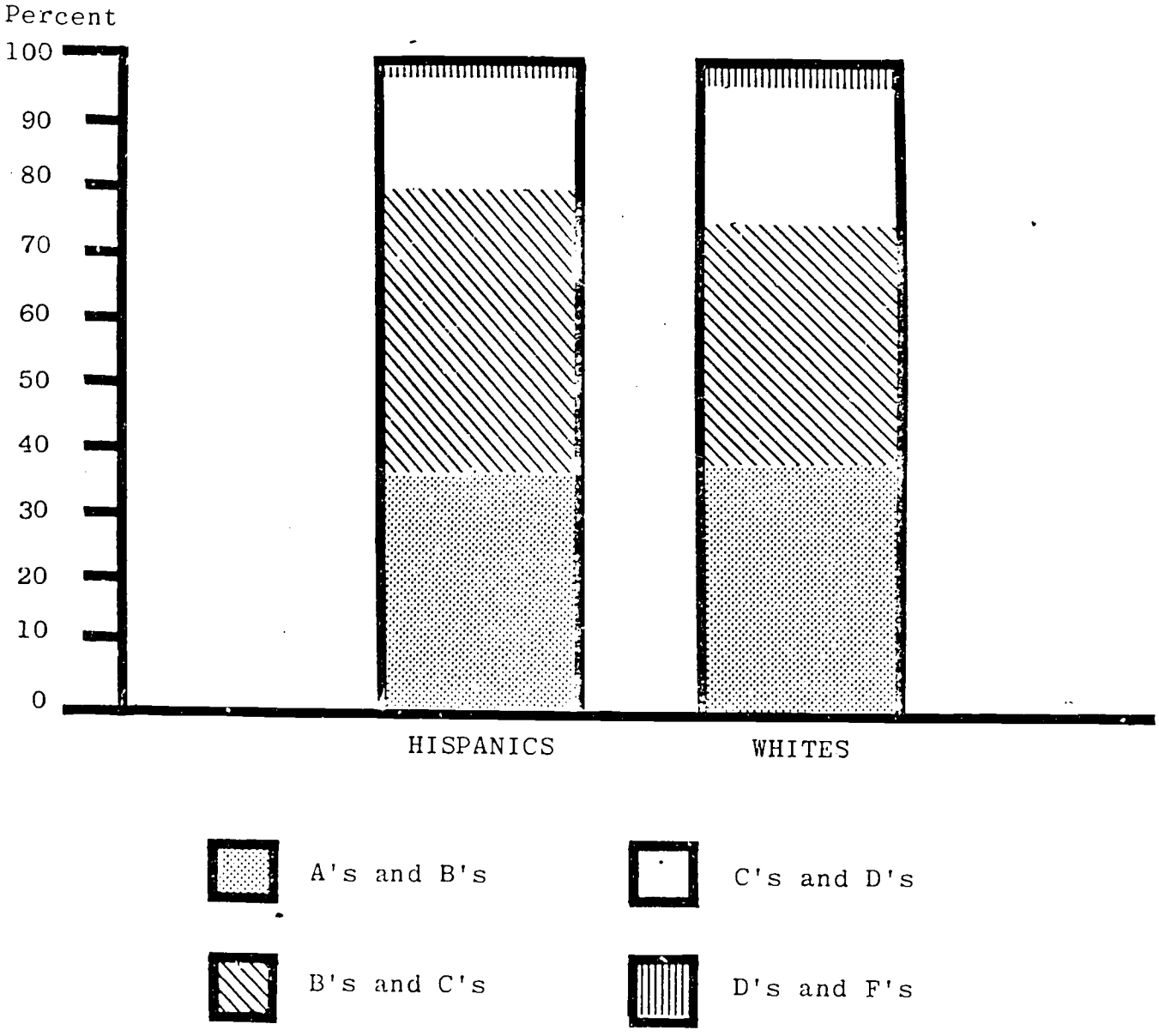

TABLE 4

Language Spoken in Hispanic Student Households

Family Member	Number	Percent*
Student.....	1297	100
English.....	709	55
Spanish.....	473	36
English/Spanish.....	112	9
Mother.....	1217	101
English.....	339	28
Spanish.....	810	67
English/Spanish.....	67	6
Father.....	1114	100
English.....	334	30
Spanish.....	709	64
English/Spanish.....	66	6

* Numbers may not add up to 100 because of rounding.

CHART 4 Language Spoken in Hispanic Student Households

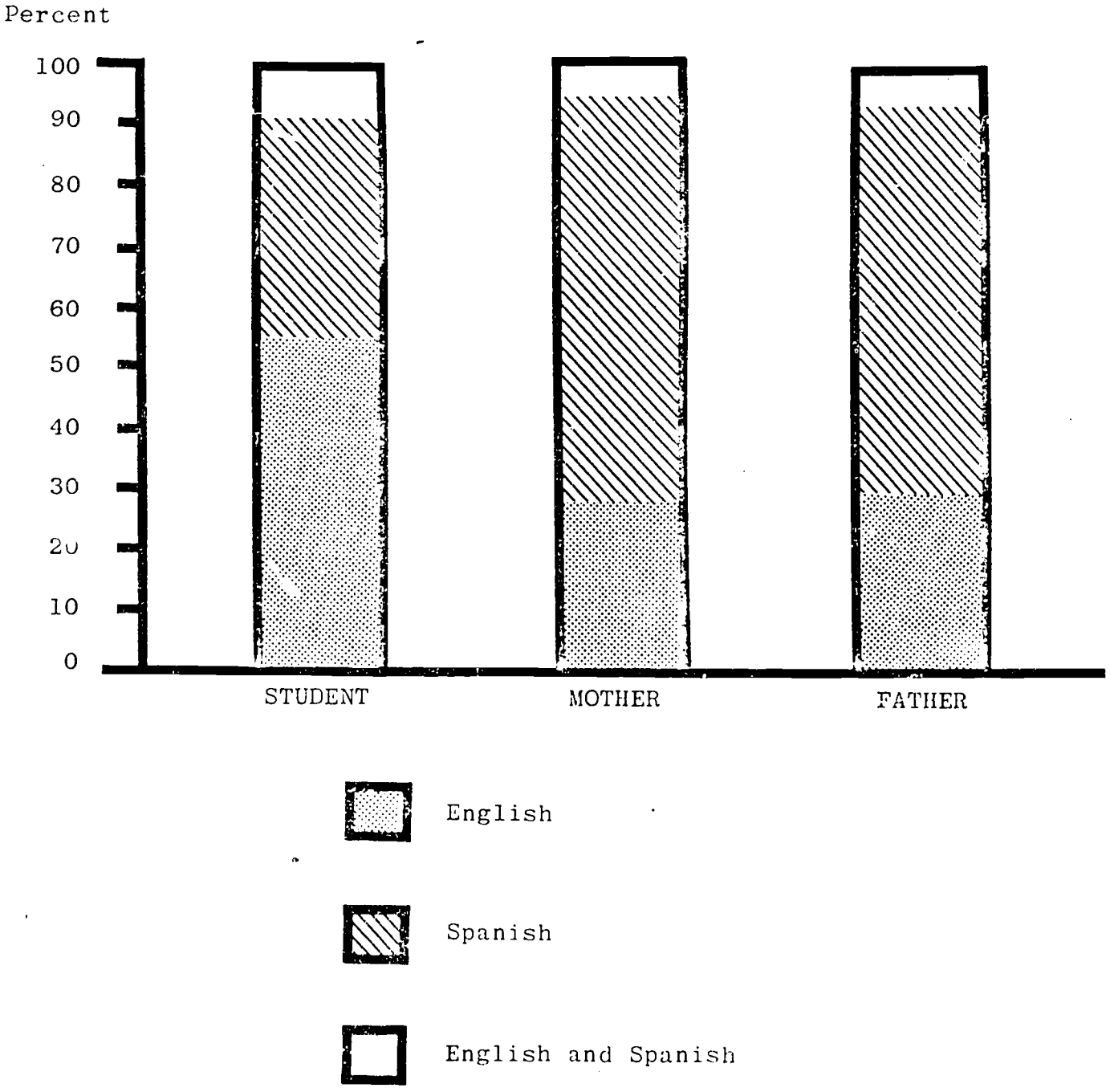

TABLE 5

Individuals Who Encouraged Hispanic and White Students to Enter a Math or Science Field

Encouraging Individuals	Hispanics			Whites		
	N	Yes	Percent	N	Yes	Percen
High School Teachers	1176	525	45	649	248	38
High School Counselors	1180	529	45	637	225	35
Parents	1196	587	57	662	369	56
Friends	1185	557	47	629	217	34
College Faculty	1126	337	30	625	173	28
College Counselors	1189	639	53	646	257	40

5 INDIVIDUALS WHO ENCOURAGED HISPANIC AND WHITE STUDENTS TO ENTER A MATH OR SCIENCE FIELD

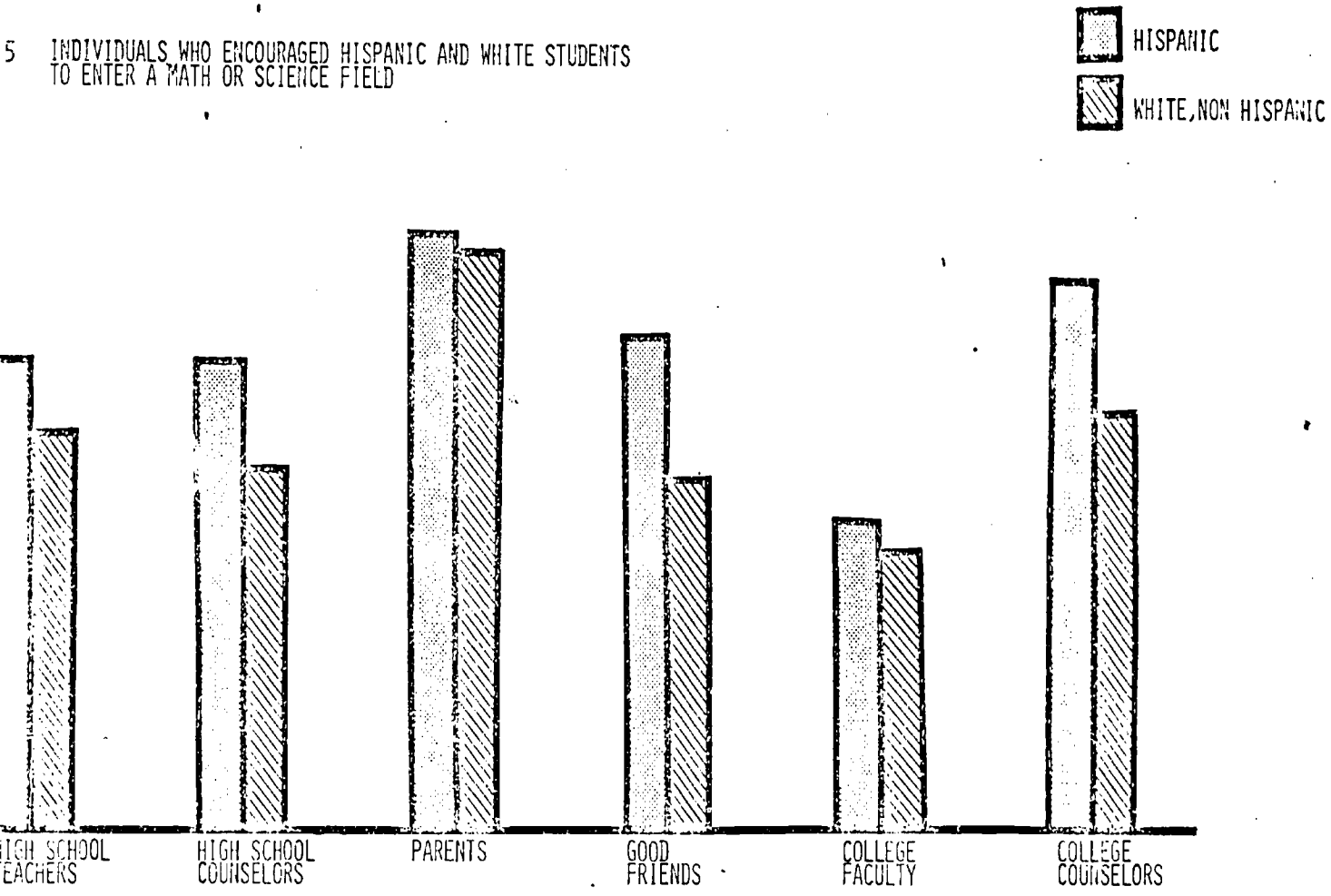

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TABLE 6

Problems Experienced by Hispanic and White Students in their Math Courses *

Type of Problem	Hispanic, N=664		White, N=298	
	N	Percent	N	Percent
Word Problems	363	55	159	53
Fear of Math	61	9	28	9
Symbols and Formulas	117	18	44	15
Find Math Boring	86	13	47	16
Perceive Math Deficiency	102	15	71	24
Study Habits/ Time	294	44	116	39
Receive Inadequate Explanation	188	28	74	25
Math Application	104	16	39	13
Difficult Textbook	39	6	15	5
English Explanation	31	5	5	2

* Students could make multiple responses.

T 6 Problems Experienced by Hispanic and White Students In Their Math Courses

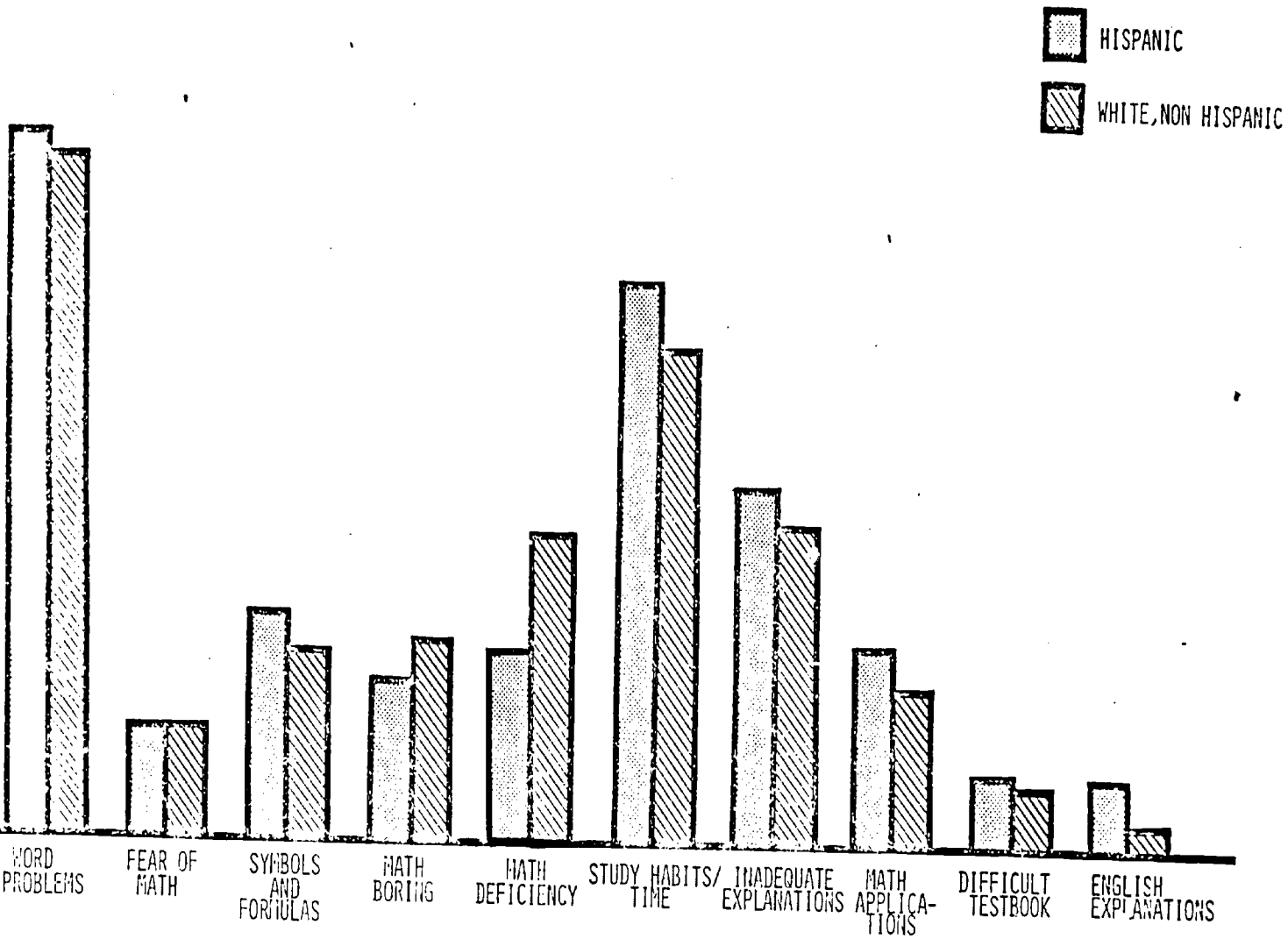


TABLE 7

Degree of High School Math Preparation
Received by Hispanics and Whites
In Math and Science Courses[1]

Students	Little/No Preparation[2]		Some Preparation[3]		Good Preparation[4]	
	Number	Percent	Number	Percent	Number	Percent
Hispanic Math Students N=643	202	31	258	40	183	28
White Math Students N=292	51	17	115	39	126	43
Hispanic Science Students N=602	124	21	227	46	201	33
White Science Students N=381	75	20	145	38	161	42

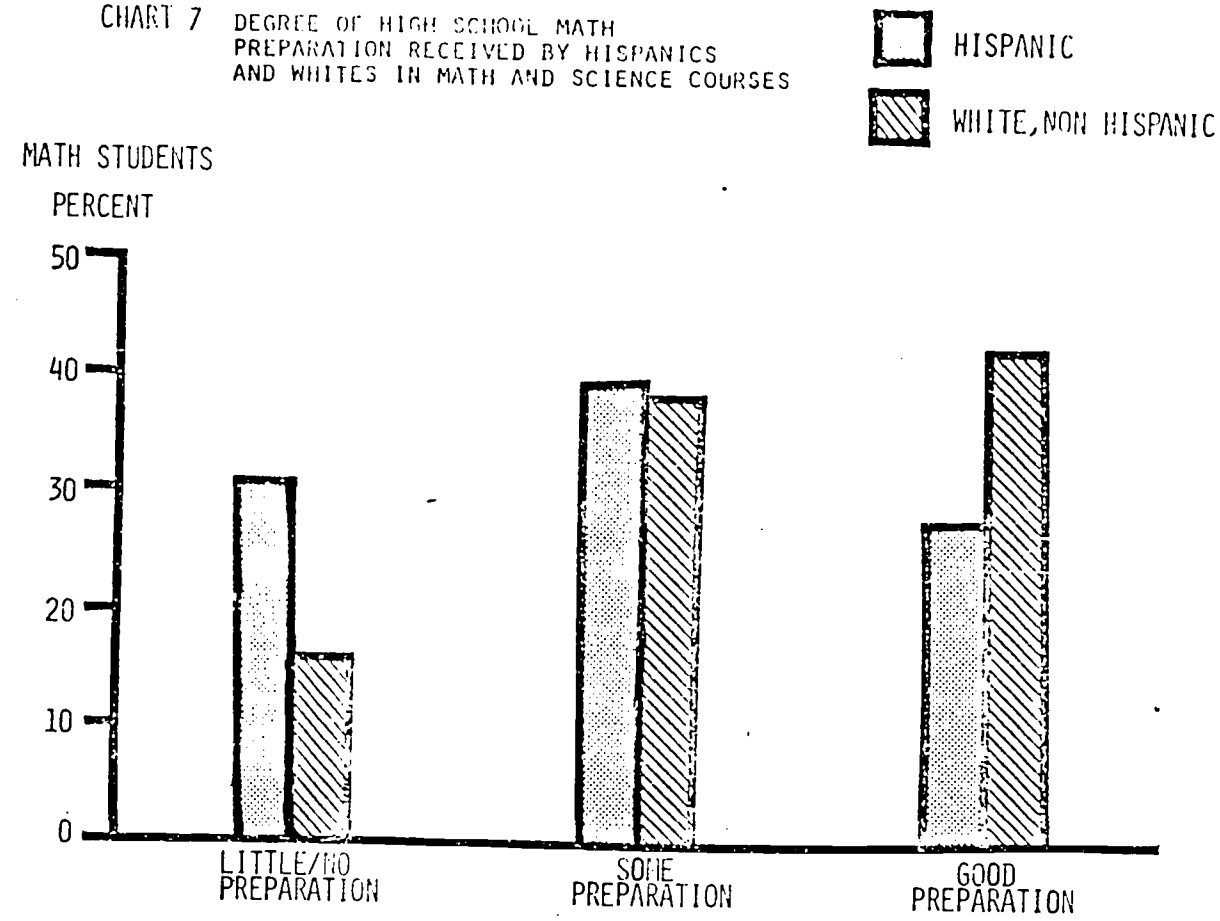
[1]The degree of math preparation was determined only for students who indicated they had taken math courses in high school.

[2]Student took up to and including Introduction to Algebra.

[3]Student took up to and including first year of Algebra and Geometry.

[4]Student took up to and including Advanced Algebra, Algebra 2 and Higher Level courses.

CHART 7 DEGREE OF HIGH SCHOOL MATH PREPARATION RECEIVED BY HISPANICS AND WHITES IN MATH AND SCIENCE COURSES



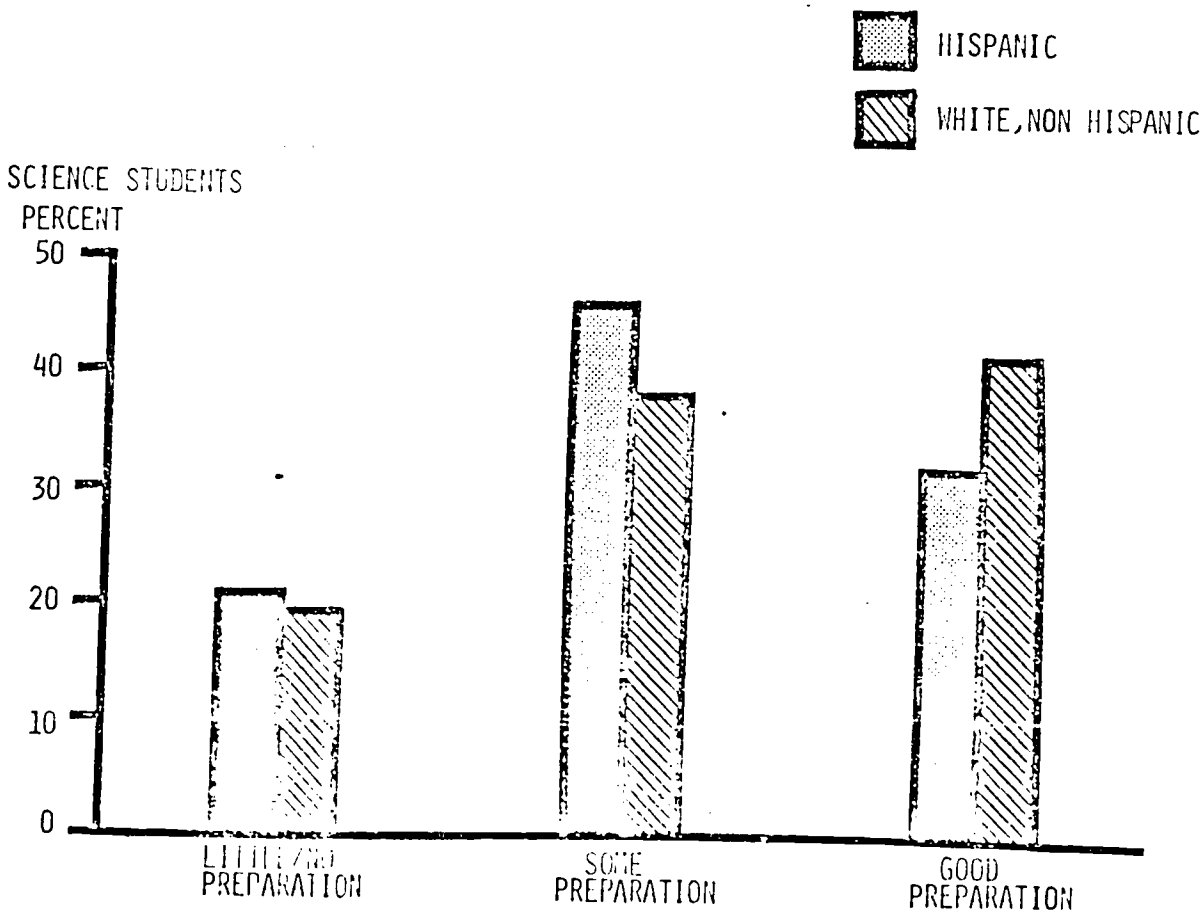


TABLE 8

Type of Math Courses Taken by Hispanic and White Students[1]

Course Type	Hispanic, N=1026		White, Non-Hispanic, N=55	
	Number	Percent	Number	Percent
Developmental	504	49	213	38
General	675	66	366	66
Health	66	6	46	8

[1]Totals vary because students could list multiple courses in each course type category.

CHART 8 Type of Math Courses Taken by Hispanic and White Students

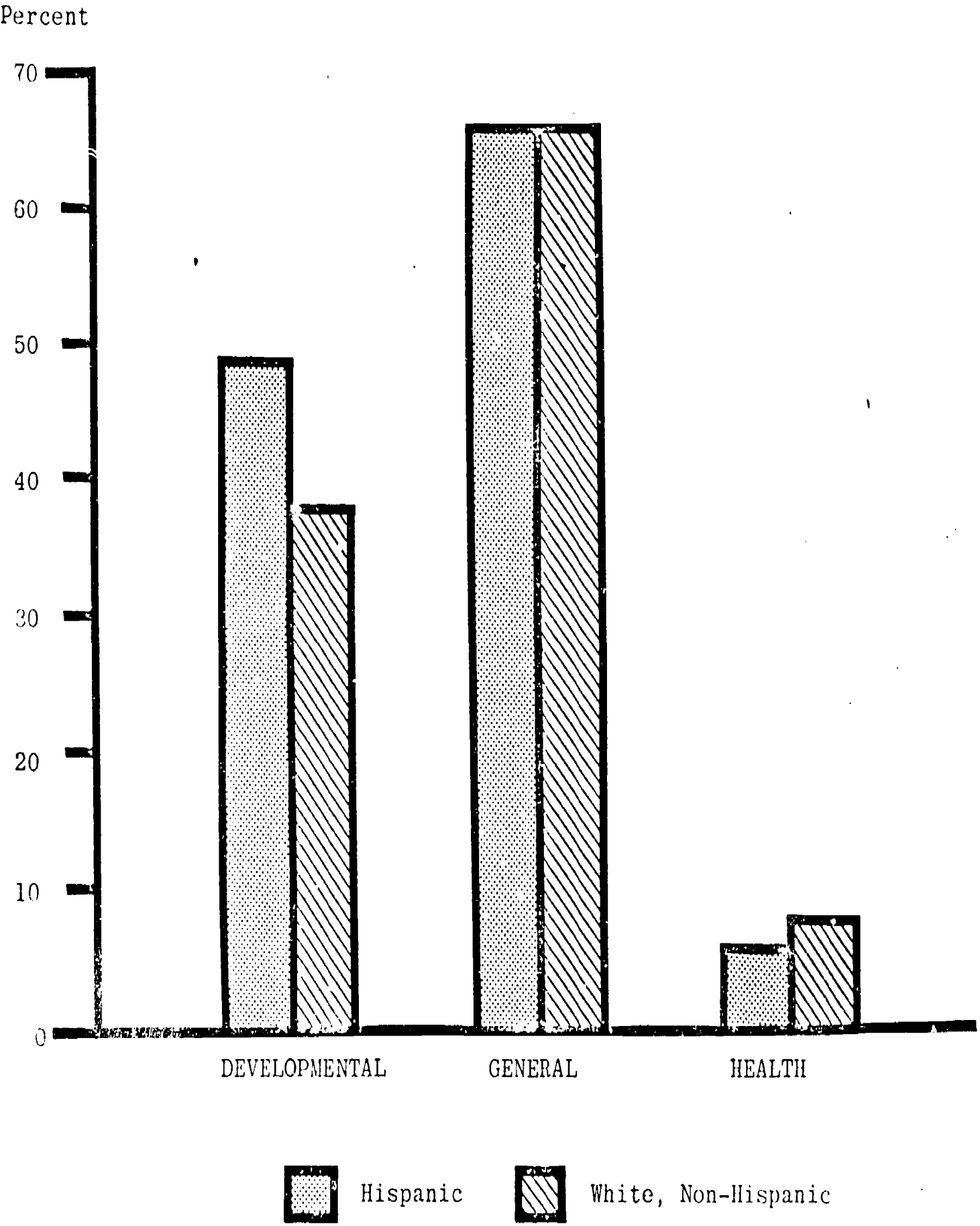


TABLE 9

Type of Science Courses Taken by Hispanic and White Students[1]

Course Type	Hispanic, N=897		White, Non-Hispanic, N=517	
	Number	Percent	Number	Percent
Developmental	138	15	53	10
General	775	86	427	83
Health	72	8	93	18

[1]Totals vary because students could list multiple courses in each type category.

CHART 9 Type of Science Courses Taken by Hispanic and White Students

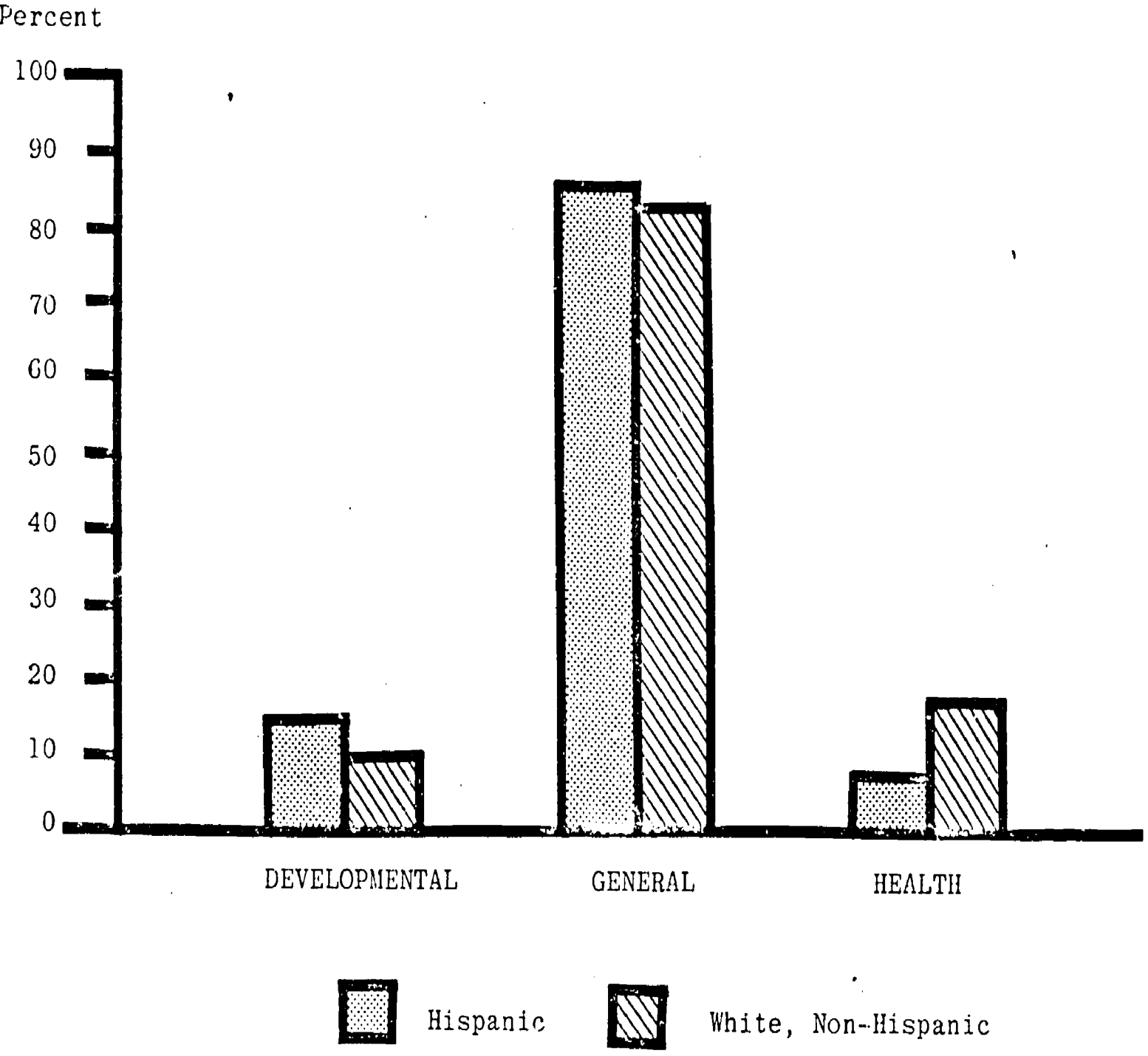


TABLE 10

Reasons Given by Hispanic and White Students for Avoiding Career Fields Requiring An Extensive Math Background[1]

Reason for Math Avoidance	Hispanic, N=226		White, N=166	
	N	Percent	N	Percent
Perceive Math Deficiency	135	60	53	32
Fear of Math	54	24	16	10
No Encouragement	68	30	24	14
Dislike Math/ No Interest	176	78	45	27
Need Extra Help	39	17	8	5
Math Careers Too Long	26	12	7	4
Math Not Required	24	11	14	8

[1]Students could make multiple responses.

NOTE. Responses are indicated only for students who indicated that they avoided a career field which requires an extensive math background.

CHART 10 REASONS GIVEN BY HISPANIC AND WHITE STUDENTS FOR AVOIDING CAREER FIELDS REQUIRING AN EXTENSIVE MATH BACKGROUND

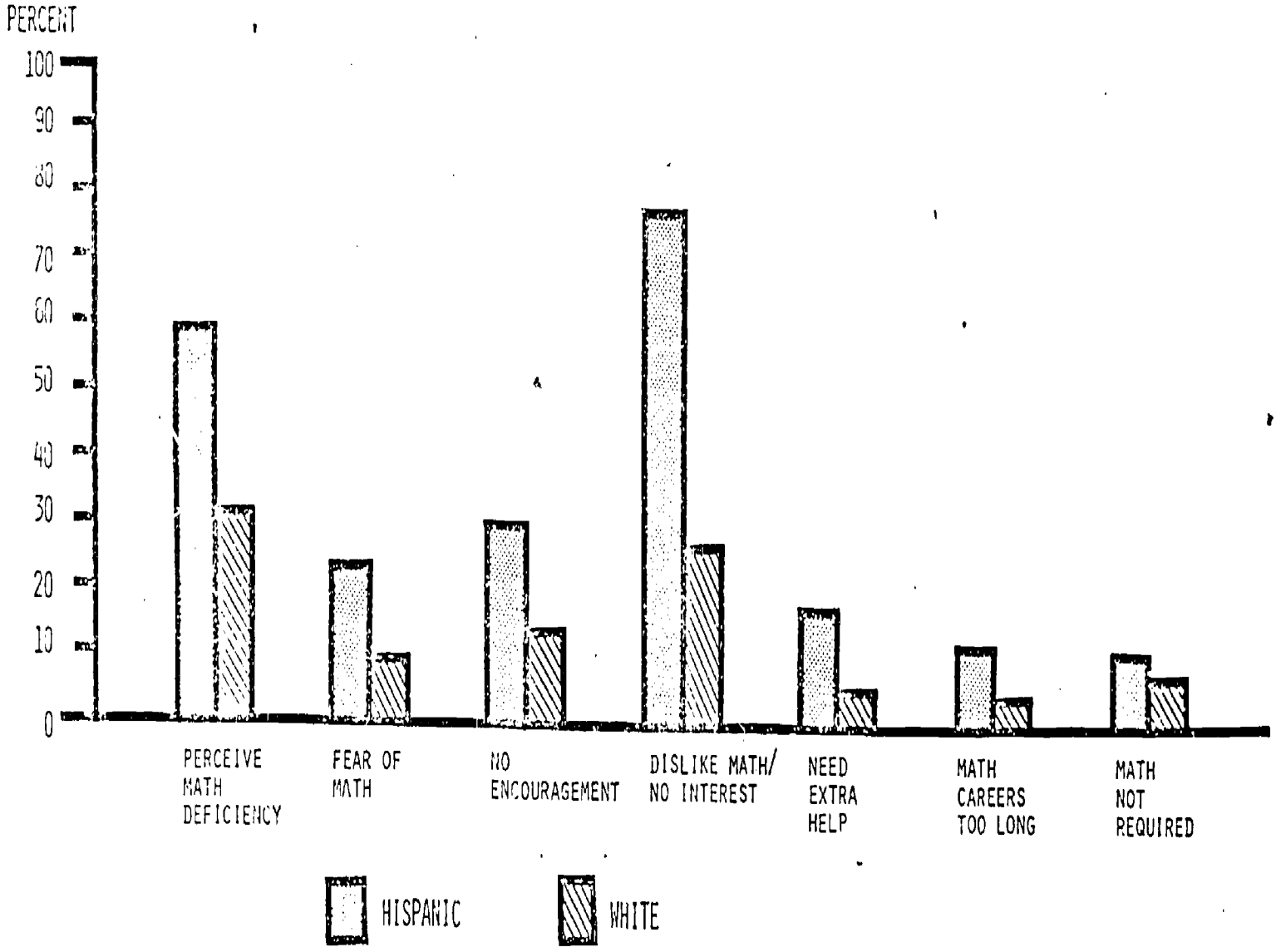


TABLE 11

Problems Experienced by Hispanic and White Students in Their Science Courses*

Type of Problem	Hispanic, N=1068		White, N=594	
	N	Percent	N	Percent
Find Science Boring	129	12	62	10
Fear of Science	78	7	33	6
Courses Too Difficult	213	20	57	10
Reading/Vocabulary Problem	625	59	242	41
Too Much Student Time Required	297	28	104	18
Receive Inadequate Explanations	153	14	59	10
Science Application	75	7	22	4
Problems With English Explanations	53	5	4	1
No Science Difficulty	285	27	239	40

*Students could make multiple responses.

CHART 11 PROBLEMS EXPERIENCED BY HISPANIC AND WHITE STUDENTS IN THEIR SCIENCE COURSES

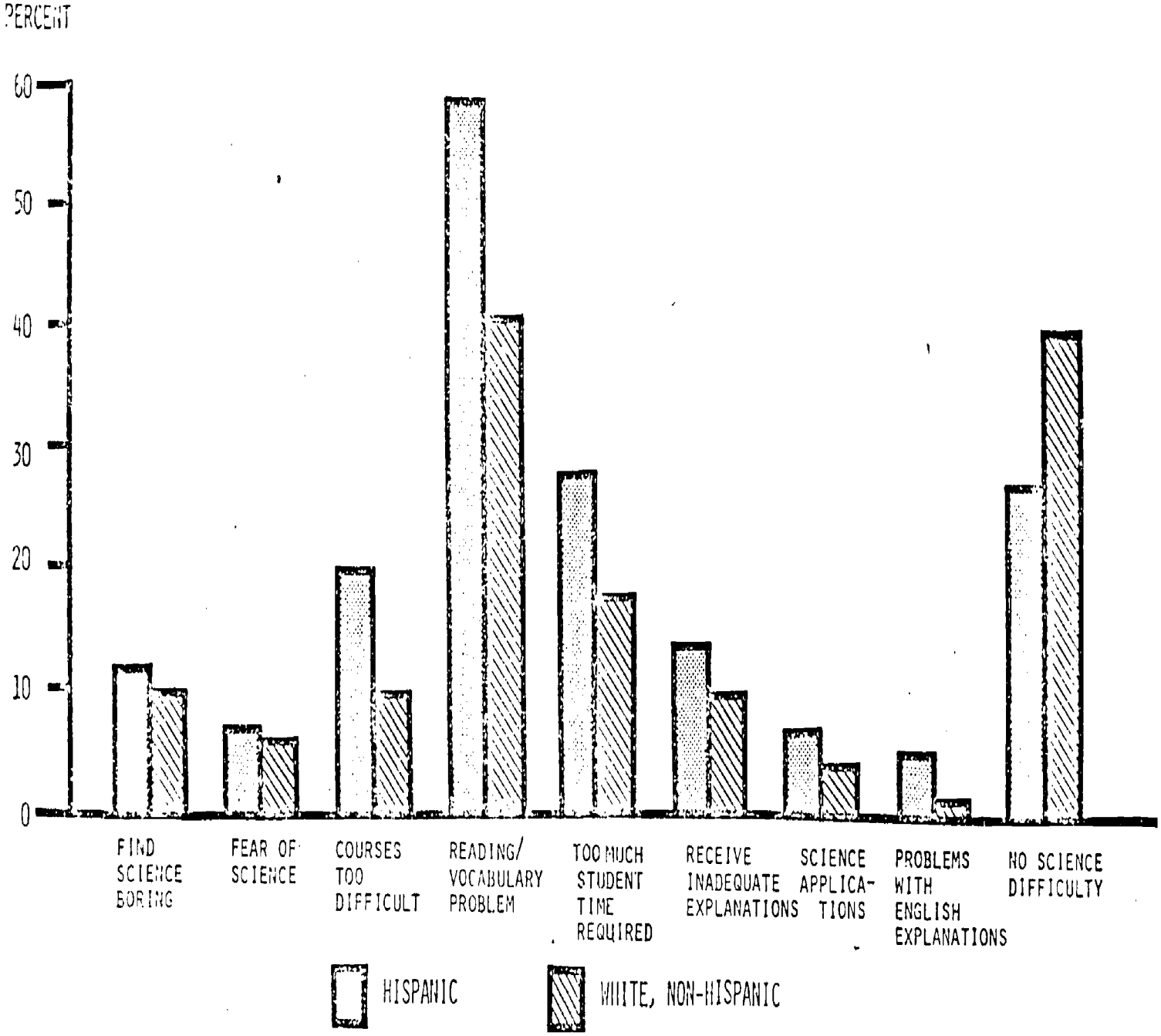


TABLE 12

Student Suggestions for What Community College Teachers Can Do to Help Students Succeed in Math and Science Courses[1]

Suggestion	Hispanics, N=1227		Whites, N=655	
	N	Percent	N	Percent
More Examples	566	46	242	37
Outside Class Contact	341	28	106	16
Better Books/Handouts	625	51	291	44
Overcome Math Fear	611	50	278	42
Show Math Applications	574	47	337	51
Patience/Understanding	697	57	336	51
Make Interesting	678	55	285	44
Tutors Needed	262	21	115	18
Self-Paced Courses	331	31	185	28

[1]Students could make multiple responses.

CHART 12 STUDENT SUGGESTIONS FOR WHAT COMMUNITY COLLEGE TEACHERS CAN DO TO HELP STUDENTS SUCCEED IN MATH AND SCIENCE COURSES

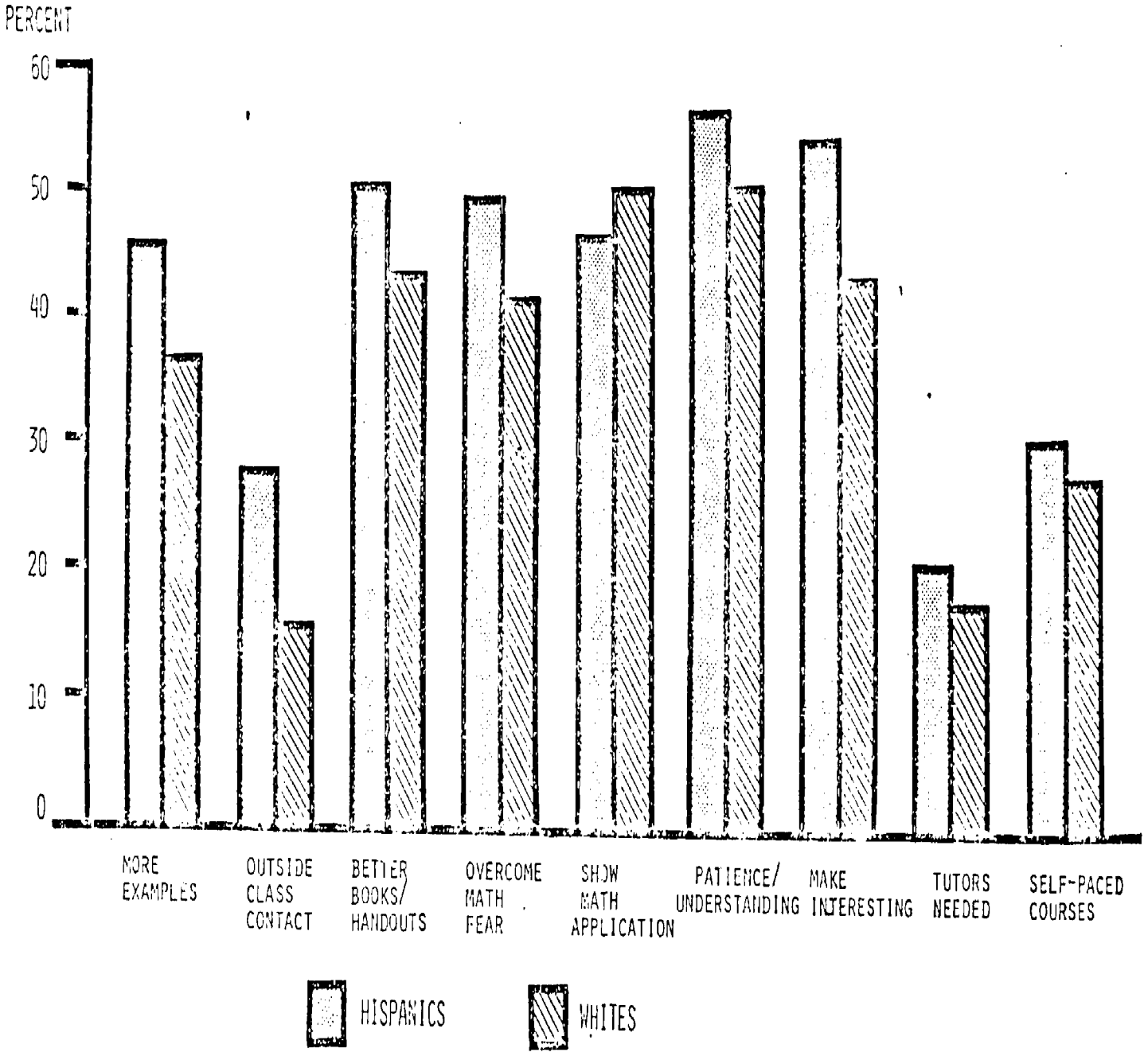


TABLE 13

Student Suggestions for What Community College Counselors Can Do to Help Students Succeed in Math and Science Courses[1]

Suggestion	Hispanics, N=1205		Whites, N=649	
	N	Percent	N	Percent
Career Information	925	77	475	73
Salary Information	516	43	283	44
Technical Career Information	774	64	395	61
Overcome Math Fear	549	46	299	46
More Student Contact	1097	91	518	80
Encourage Women	395	33	203	31
Help With Course Selection	825	68	439	68
Talk to Parents	153	13	122	19
Develop Study Skills	652	54	334	51
Visit High Schools	817	68	406	63

[1]Students could make multiple responses.

CHART 13 STUDENT SUGGESTIONS FOR WHAT COMMUNITY COLLEGE COUNSELORS CAN DO TO HELP STUDENTS SUCCEED IN MATH AND SCIENCE COURSES

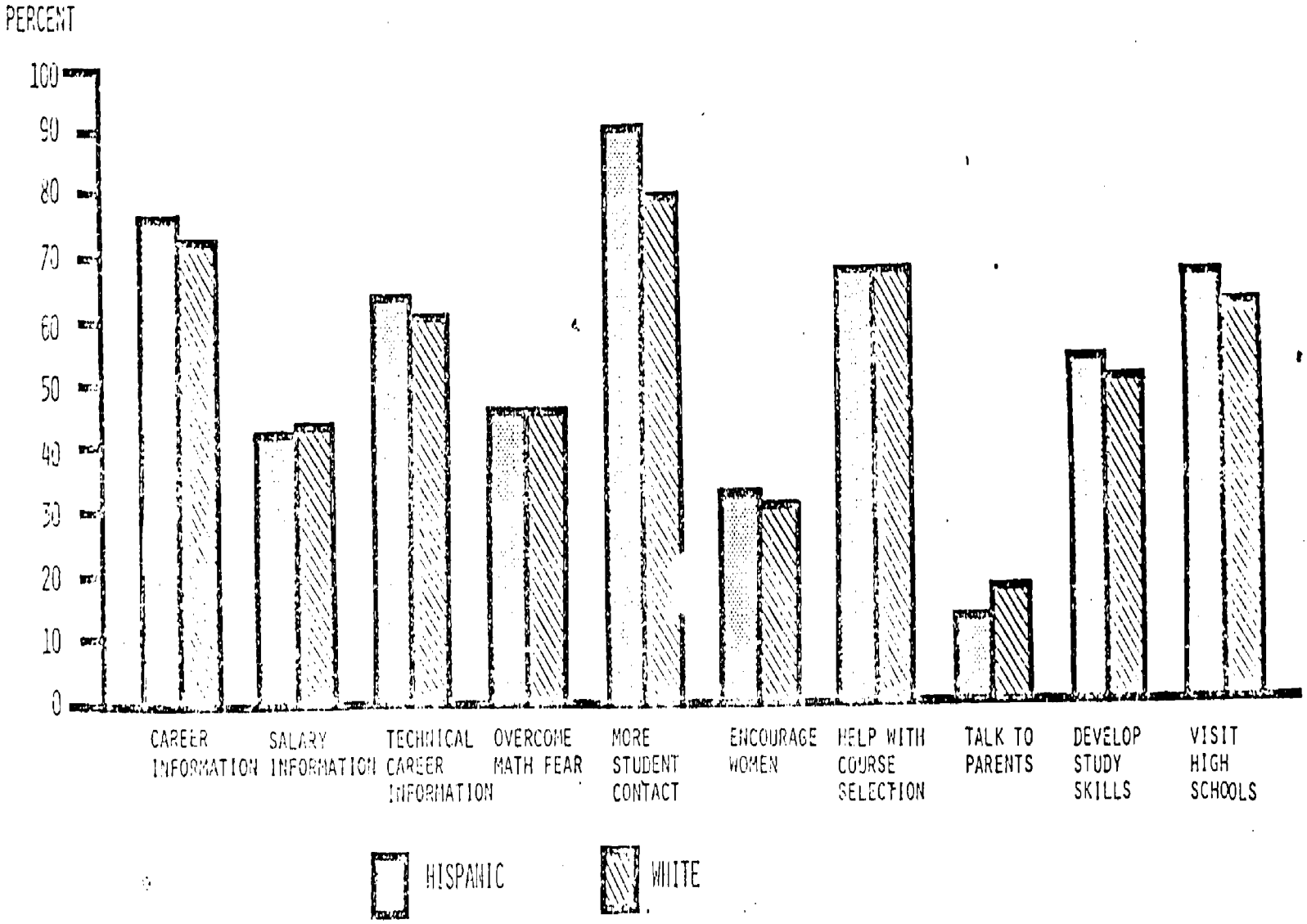


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TABLE 14

Grades Earned by Hispanic and White Males and Females in Math High School Courses

	Hispanics		White, Non Hispanic	
	N	Percent	N	Percent
Males	627	100	351	100
A-B	217	35	124	35
B-C	290	46	139	40
C-D	107	17	76	22
D-F	7	1	12	3
No Math	6	1	-0-	-0-
Females	674	100	358	101*
A-B	250	37	142	40
B-C	280	42	120	34
C-D	127	19	80	22
D-F	7	1	6	2
No Math	10	1	10	3

* Numbers may not add up to 100 because of rounding.

CHART 14 Grades Earned by Hispanic and White Males and Females in Math High School Courses

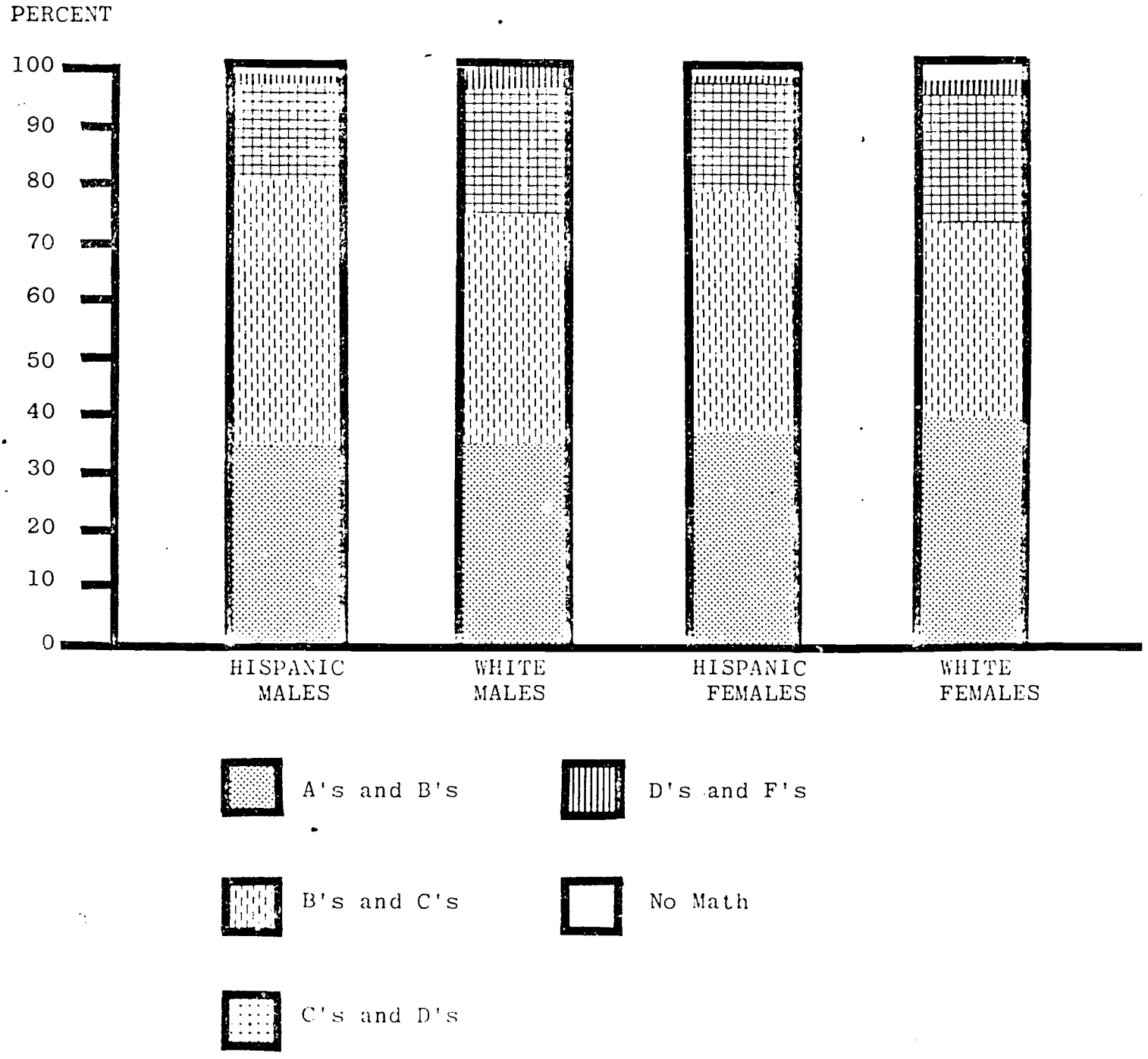

TABLE 15

Individuals Who Encouraged Hispanic and White Males and Females to Enter a Math or Science Field

Encouraging Individuals	Hispanics			White, Non-Hispanic		
	N	Yes	Percent	N	Yes	Percent
Males						
High School Teachers	551	220	40	328	121	37
High School Counselors	562	292	52	321	110	34
Parents	588	357	61	334	192	57
Good Friends	569	296	52	315	110	35
College Faculty	535	121	23	316	84	27
College Counselors	566	307	54	323	124	38
Females						
High School Teachers	622	302	49	307	127	41
High School Counselors	615	237	39	304	112	37
Parents	608	330	54	321	179	56
Good Friends	613	258	42	306	110	36
College Faculty	588	216	37	299	88	29
College Counselors	623	325	52	314	132	42

CHAPT 15 Individuals Who Encouraged Hispanic and White Males and Females to Enter a Math or Science Field

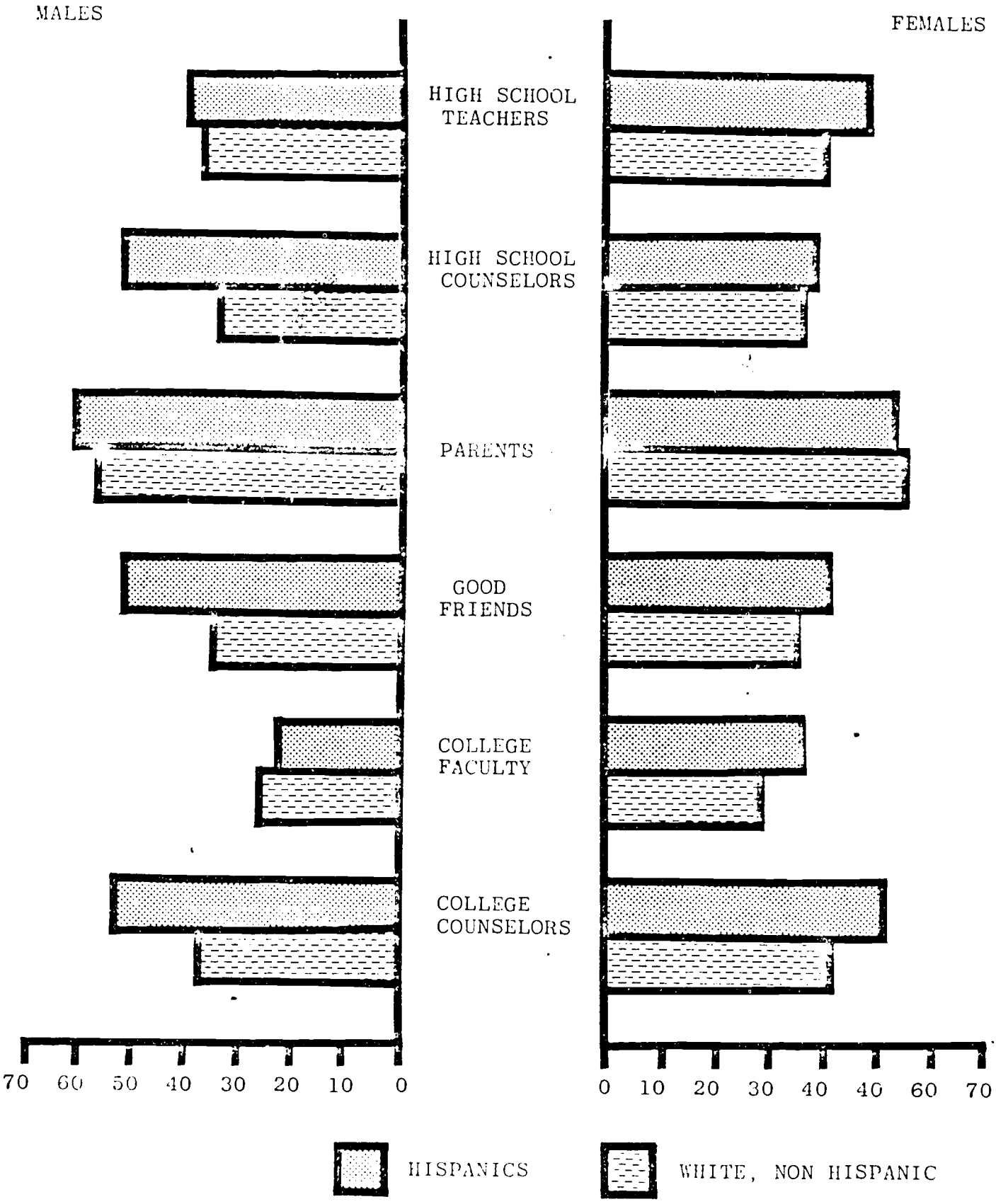

TABLE 16

Degree of High School Science Preparation Received by Hispanic and White Males and Females[1]

High School Science Preparation	Hispanic N	Hispanic %	White, Non-Hispanic N	White, Non-Hispanic %
Males	586	100	322	100
Little/No Preparation[2]	170	29	82	25
Some Preparation[3]	265	45	132	41
Good Preparation[4]	151	26	108	34
Females	598	100	329	100
Little/No Preparation	190	32	101	31
Some Preparation	198	33	122	37
Good Preparation	210	35	106	32

[1]The degree of science preparation was determined only for students who indicated they had taken science courses in high school.
[2]Student took 0-2 semesters of science.
[3]Student took 3-4 semesters of science.
[4]Student took 5 or more semesters of science.

CHART 16 Degree of High School Science Preparation Received by Hispanic and White Males and Females

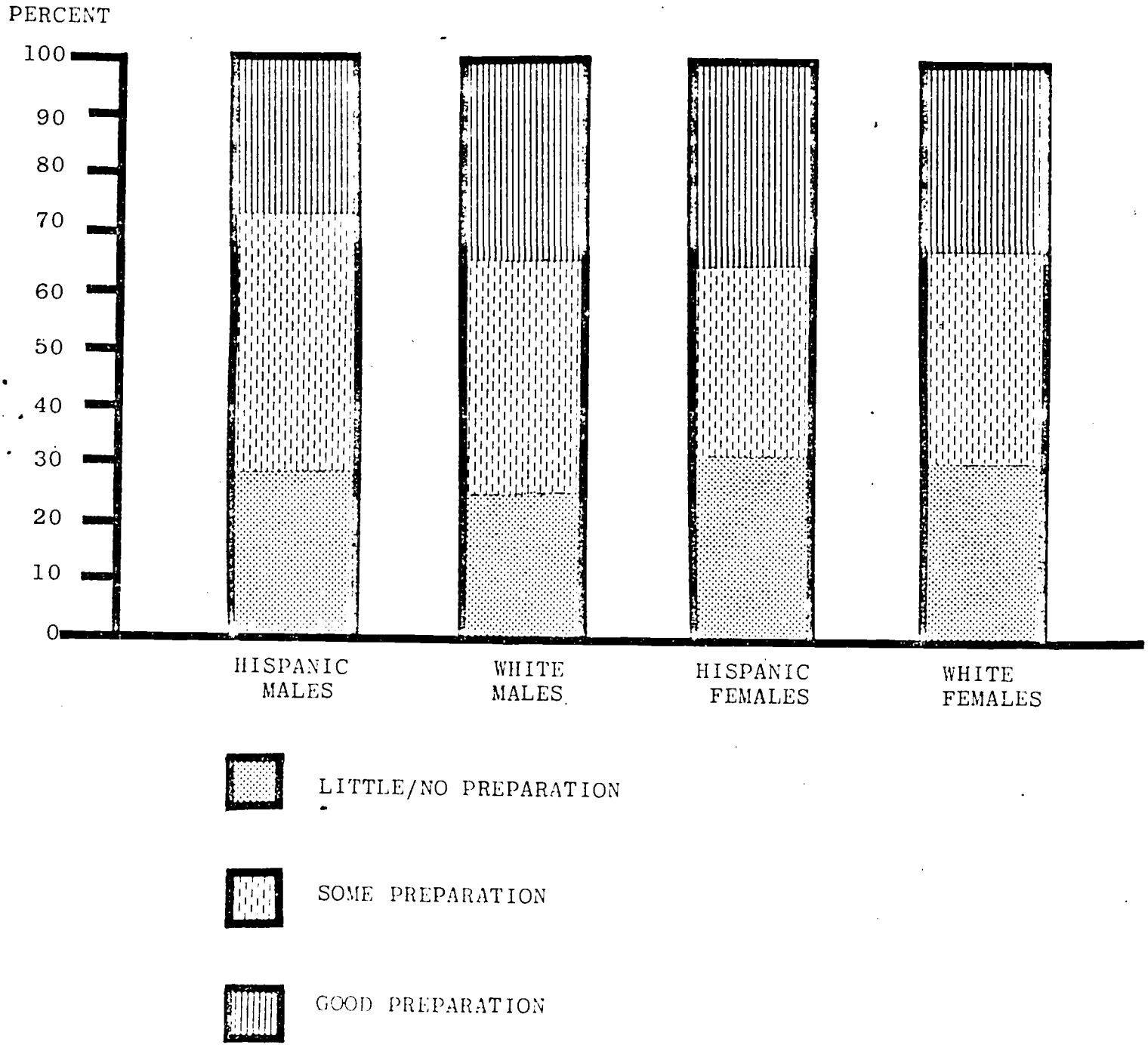

TABLE 17

Degree of High School Math Preparation Received by Hispanic and White Males and Females[1]

High School Math Preparation	Hispanic		White, Non Hispanic	
	N	%	N	%
Males	615	100	336	100
Little/No Preparation[2]	170	28	95	28
Some Preparation[3]	252	41	77	23
Good Preparation[4]	188	31	164	49
Females	635	101	335	100
Little/No Preparation	156	25	116	35
Some Preparation	283	45	88	26
Good Preparation	196	31	131	39

[1]The degree of math preparation was determined only for students who indicated they had taken math courses in high school.
[2]Student took up to and including Introduction to Algebra.
[3]Student took up to and including first year of Algebra and Geometry.
[4]Student took up to and including Advanced Algebra, Algebra 2, and Higher level courses.

CHART 17 Degree of High School Math Preparation Received by Hispanic and White Males and Females

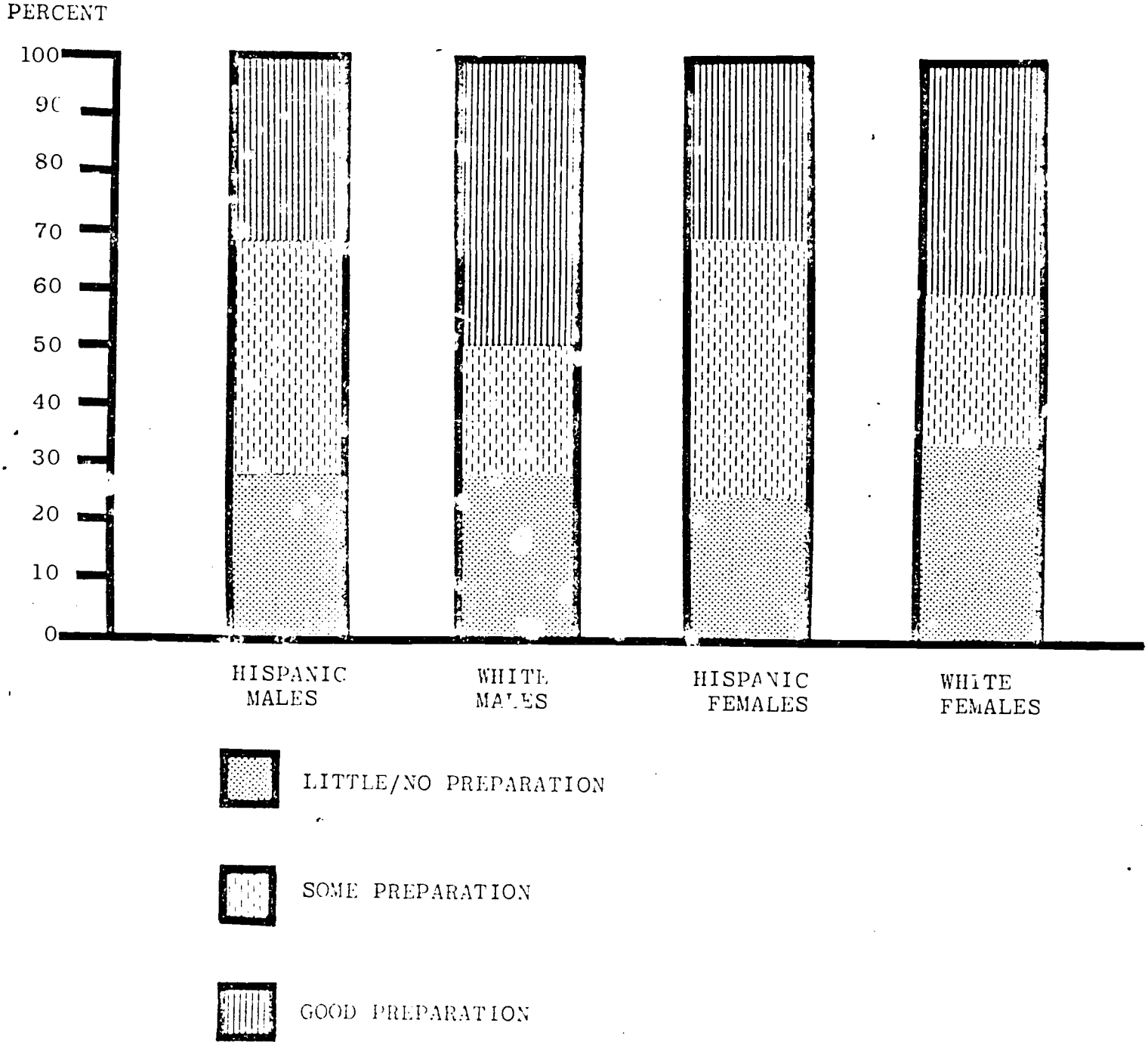

TABLE 18

Problems Experienced by Hispanic and White Males and Females in Their Math Courses

Type of Problem	Males				Females			
	Hispanic		White		Hispanic		White	
	N	%[1]	N	%	N	%	N	%
	512	100	342	100	640	100	352	100
Word Problems	363	59	134	39	380	59	181	51
Afraid of Math	35	6	24	7	105	16	56	16
Symbols & Formulas	89	14	37	11	160	25	59	17
Boring	95	15	69	20	111	17	57	16
H.S. Inability	95	15	59	17	108	17	75	21
Study Time	274	44	143	42	287	45	101	29
Teacher Explains	100	16	62	18	137	21	55	16
Diff. with Tutor	40	6	11	3	33	5	6	2
No Examples	86	14	39	11	91	14	27	8
Math Applies	95	15	45	13	119	19	51	14
Hard Textbooks	37	6	17	5	54	8	17	5
English Explain	30	5	5	1	31	5	0	0
No Difficulty	100	16	76	22	101	16	77	22
Other	70	11	52	15	78	12	60	17

[1]Multiple responses allowed.

TABLE 19

Problems Experienced by Hispanic and White Males and Females in Their Science Courses[1]

Type of Problem	Males				Females			
	Hispanic		White		Hispanic		White	
	N	%	N	%	N	%	N	%
	512	100[1]	294	100	553	100	302	100
Boring	57	11	30	10	72	13	31	10
Afraid	24	5	8	3	52	9	26	9
Difficult	89	17	21	7	124	22	38	13
Reading Books	130	25	54	18	154	28	75	25
Time	131	26	56	19	165	30	52	17
Teacher Explain	75	15	19	6	75	14	41	14
Science Apply	30	6	13	4	45	8	10	3
Vocabulary	153	30	49	17	187	34	64	21
English Explain	23	4	2	1	27	5	3	1
No. Difficulties	167	33	127	43	117	21	118	39
Other	57	11	59	20	70	13	49	16

[1] Multiple responses allowed.

INNOVATIVE ELEMENTS AND OBJECTIVES COMPRISING THE CURRENT MATH INTERVENTION PROJECT

Innovative Elements of the MIP

For the past two academic years (1981-1983) the Border College Consortium has implemented a successful, nationally and internationally visible Mathematics Intervention Project (MIP) model with Ford Foundation support. Several unique, innovative elements contribute to the effectiveness of the MIP model.

Multifaceted Approach. The MIP model used by the BCC is based on the important, research based assumption that a mathematics intervention strategy designed to create successful outcomes should occur at four levels: 1) faculty, 2) counselors, 3) parents, and 4) students. Research data presented in the previous section clearly demonstrates the critical role that college faculty and counselors play in impacting student persistence. Further, data indicates that parents and peers provide highly significant roles in encouraging college attendance and in affecting course-taking behavior. Current research literature also underscores the important role that college staff, parents and peers play in affecting student access. For example, studies substantiate that student informal contact with faculty is particularly critical to student persistence and is related to high grades, perceived intellectual growth, and interpersonal self-esteem (Astin, 1977; Beal, 1979; Pascarella & Terenzini, 1979; Wilson & Woods, 1974). Contact with peer groups creates a valuable friendship support system which contributes to social integration, institutional affiliation and student persistence (Pascarella & Terenzini, 1980; Tinto, 1975; Spady, 1971).

Rendon (1982) found that internal encouragement as defined by degree of encouragement provided to Chicano students by community college faculty, counselors and administrators about continuing their college careers is a critical element related to earning college credit hours. Further, Armstrong (1979) found that parental attitudes towards mathematics and science are potent factors related to their children's participation in mathematics or science-related activities. In essence, the success of the MIP model is due to a comprehensive, multifaceted approach addressing four critical dimensions which contribute to student success. Components of the MIP model, including faculty professional development activities, research projects, counselor professional development activities, a parent information/involvement program, a peer information/involvement program and a tutorial program contribute to specified faculty, counselor, parent and student outcomes.

Close College Collaboration. A unique feature of the MIP model is that it represents a six community college, consortium-wide approach to plan, implement and document mathematics activities in a systematic, cost-effective, collaborative fashion. The MIP model represents one of the first attempts to utilize close institutional collaboration among college administrators, faculty, and counselors. This collaborative approach, as opposed to isolated and fragmented institution efforts, allows institutions to jointly develop a "critical mass" of expertise which provides maximum benefits to member institutions. Through institutional resource sharing, cross-pollinization of concepts and activities allow six community colleges to adapt, integrate and institutionalize particularly successful math activities from one institution to another.

Hispanic Students as a Main Target Group. It has been noted in a previous section that the Hispanic population is the fastest growing group in the Southwest. The six consortium colleges are located in communities along the U.S.-Mexico border. This strategic border location and the fact that these institutions are located in communities with high levels of Hispanic populations indicates that the BCC institutions carry a very important responsibility to be the most responsive colleges to address the needs of this growing student clientele. The MIP model is the first mathematics intervention strategy involving six community colleges developed with the Hispanic student cohort as a primary target group. Through the years, the BCC has evolved into the community college organization which has the most knowledge and expertise regarding border-specific issues such as poverty, health, unemployment and high levels of educational deficiencies which seem to plague the Hispanic cohort. In essence, the MIP model reflects the cultural milieau of the border student populations and is attended to by professional staffs well experienced with border issues. Successes achieved with Hispanic students are of importance not only to the BCC, but to other post-secondary institutions with significant numbers of Hispanic students. More importantly, once the BCC has had the opportunity to fully document and validate the MIP model, it is entirely possible that other institutions may replicate this mathematics intervention archetype. Already, several institutions from throughout the nation including California, Arizona, New Mexico, Texas, Illinois and Michigan have expressed an interest in the MIP model.

Pilot Project Linking Community Colleges with Local School District. One of the most significant trends in higher education is the linkage of colleges and universities with their local school dis-

tricts (Boyer, 1981; O'Keefe, 1981). Connections between the nation's colleges and schools are presently viewed as one fundamental step to improve the quality of American education. A highly significant component of the MIP model is a Parent Information/Involvement Project involving Texas Southmost College (TSC) and the Brownsville Independent School District (BISD) in Brownsville, Texas. This Pilot Project's primary objective is to increase parental involvement in schools and in the community college so that parents may be able to provide information and encouragement to their children so that they may acquire a mathematics background required to enter a math or science-related career. With full administrative support from the BISD Superintendent and the TSC President to address this objective, the Parent Information/Involvement Project has collected data from parents in the BISD, created and distributed a Parent Brochure, and created video-tapes for parents and children in the schools and the community colleges. Additionally, this Pilot Project has facilitated the professional working relationships between school administrators and teachers with college administrators and faculty. This Pilot Project may be viewed as a hallmark of school/college collaboration and is a model which provides evidence that school and college staffs can work together to accomplish their common goals. At present, the Parent Information/Involvement Program is ready to be extended to other BCC institutions, using the Brownsville Pilot Project as a resource model.

Binational Collaboration. Through the years, the BCC has established close working ties with the Institutos Tecnologicos de Mexico. These Mexican technological institutes have developed some highly successful math programs, which may be viewed as critical resources for BCC institutions. Richard J. Griego, professor of

mathematics at the University of New Mexico, wrote the following in a report prepared for the Ford Foundation. "In fact we would do well to study the texts that have been developed in Mexico for use in the public schools. The Mexican mathematicians who wrote the texts have benefited by our mistakes and they have effectively gone beyond the New Math."[1] Three conferences involving math exchanges have been held in Tijuana, Mexicali and Matamoros, Mexico. The BCC views this unprecedented Ford Foundation fostered bi-national partnership of mutual respect and contribution as a highly significant educational effort which carries immeasureable potential to benefit the institutions of higher education in both nations.

MIP Objectives

The elements which comprise the MIP model presented above contributed to the accomplishments of the following MIP objectives:

1. Develop/revise math curriculum
2. Design and implement faculty professional development activities
3. Design and implement counselor professional development activities
4. Design and field-test mathematics tutorial program addressing Hispanic student needs
5. Design and implement parent information/involvement program.
6. Develop and conduct peer information/involvement activities.

MIP Model

Based on these important objectives, the Math Intervention Program Model was created as presented in Figure 1.

[1] Comments by Richard J. Griego in the Report, "Factors Affecting the Participation and Performance of Minorities in Mathematics," by C. Morning, R. Mullins, and B. Penick.

COMPONENTS OF MATH INTERVENTION MODEL

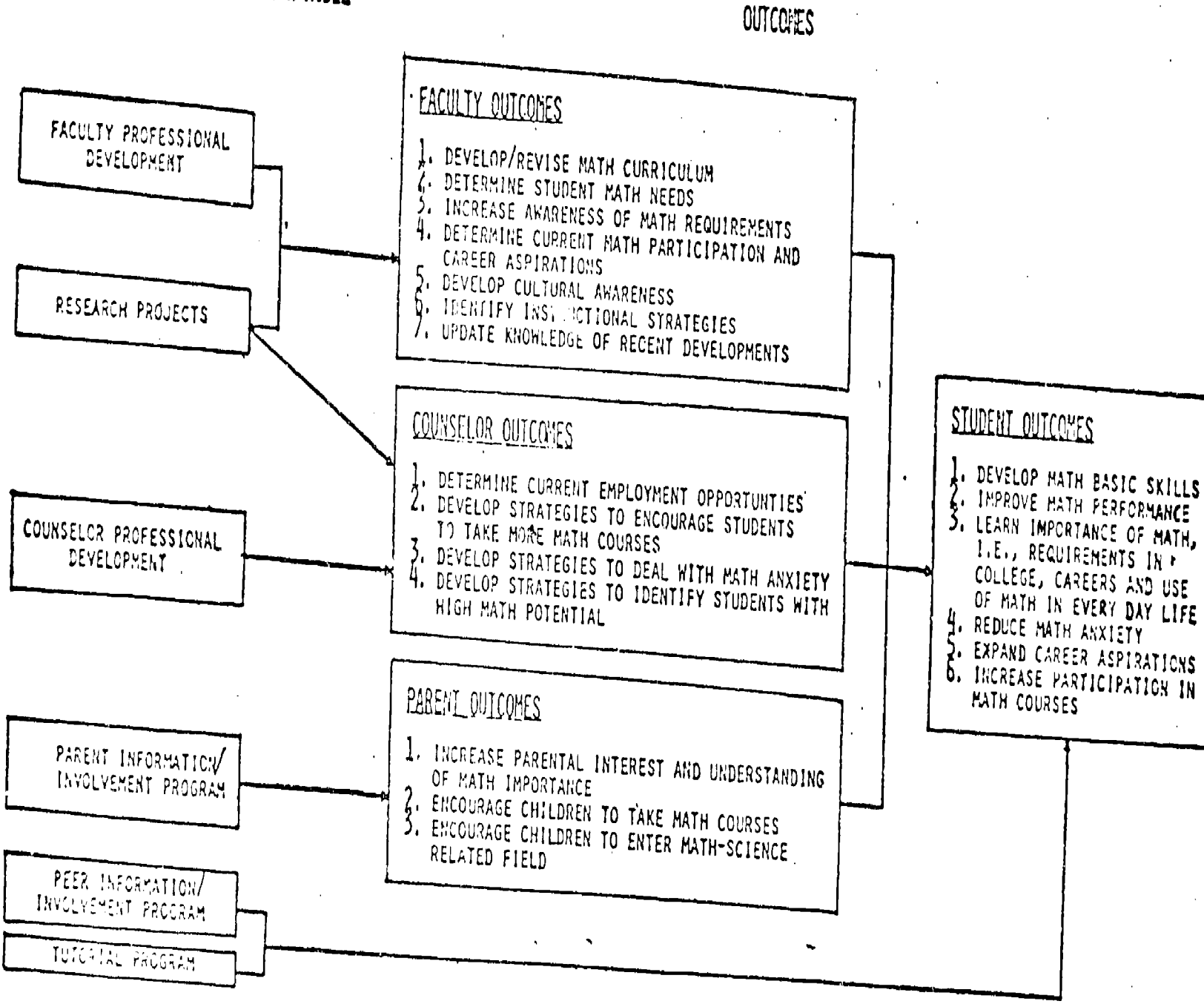

FIGURE 1 BORDER COLLEGE CONSORTIUM MATH INTERVENTION PROJECT MODEL.
MODEL IS BASED ON CONCEPT PRESENTED BY RESTA, PAUL AND JUSTIZ, MANUEL. A COMMUNITY COLLEGE MATH INTERVENTION PROGRAM FOR HISPANIC-AMERICAN STUDENTS. THE BORDER COLLEGE CONSORTIUM, LAREDO JUNIOR COLLEGE, LAREDO, TEXAS, MAY 1981.

Note: The Border College Consortium includes Southwestern College, Chula Vista, CA; Imperial Valley College, El Centro, CA; Arizona Western College, Yuma, CA; Cochise College, Douglas, AZ; Laredo Junior College, Laredo, TX; Texas Southmost College, Brownsville, TX.

CURRENT MATH INTERVENTION PROJECT ACTIVITIES

The Math Intervention Planning Committee

The judicious use of Ford Foundation funds has allowed the planning, implementation, documentation and dissemination of several exemplary projects. Under the direction of a Consortium-wide Math Intervention Planning Committee comprised of six math faculty members representing each institution, the initiation, implementation and evaluation of mathematics activities was made possible. This committee met with the MIP Director not less than twice a year in different state locations to conduct resource-sharing presentations, finalize plans for math activities, conduct professional development activities and prepare appropriate evaluation and documentation procedures.

These meetings proved to be very beneficial, particularly during the planning phase of the project. Careful program planning took place at the institutional and consortium levels. At the institutional level, the central administration and appropriate institution officials met with the specific math specialist to determine what resources, staff and mechanisms would be necessary to carry out the math intervention activities. At the consortium level, the institutional members of the MIP Planning Committee met with the MIP Director, and BCC officials and consultants at different college locations to direct the consortium-level math project planning and implementation activities. During these meetings, time was allocated to visit exemplary math programs at the host institution, make resource sharing presentations, conduct a workshop on "Problem Solving Skills in Mathematics," and

discuss evaluation and documentation mechanisms. Throughout the two-year period, the MIP Director visited college campuses and kept in close contact with each math specialist to ensure that math activities were implemented according to the specified program objectives. The MIP Director also made presentations at national conferences to disseminate BCC math activities.

Current MIP Activities

The Math Intervention Project model has proved to be a workable, cost-effective mechanism allowing a consortium of six community colleges in three states (Texas, Arizona and California) to address an educational problem of national priority for Hispanic students, a rapidly growing cohort in the Southwest. The history of the Border College Consortium goes back to the mid-60's. The BCC has been functional long enough to recognize specific educational problems in border regions and how to address them. Further, the BCC staff has built a collaborative professional friendship and continuous dialogue which has been the basis for program planning and development. Without this element of close, professional collaboration, the MIP would have been minimally successful. During the two-year course of the MIP, the Math Intervention Planning Committee, comprised of one faculty member from each institution, maintained the rapport of the BCC "family" institutions. Committee members quickly established a close, task-oriented relationship and were able to return to their campus to initiate new math projects and to generate enthusiasm for the MIP. Further, administrative support from BCC college presidents, vice-presidents, deans and department chairpersons facilitated the planning and implementation of math activities.

Beyond the establishment of a harmonious working establishment with BCC member institutions, these colleges have also established working ties with their "sister" technological institutions on the Mexican border. The BCC recognizes the invaluable educational resources of the Institutos Tecnologicos Regionales de Mexico and have worked closely with them in addressing similar needs for over four years. Using this relationship of mutual respect as a working base, it is possible to conduct math exchanges with the math faculty from the technological institutes to aid BCC faculty in planning and revising their math curriculum. This unique type of bi-national exchange is a source of educational strength for Mexico and the United States. The BCC recognizes the critical value of this unprecedented mutually productive relationship with its Mexican neighbors and believes that U.S. math faculty can benefit from learning more about the success Mexico has had in teaching mathematics.

Additional program strengths are exemplary mathematics programs which are intact systems that serve as resources for other BCC institutions. Southwestern College is the flagship institution for faculty and student course training math anxiety reduction. Imperial Valley College developed an impressive "Mathematics Festival" model to involve students in a day-long competitive contest to solve math problems. Arizona Western College developed supplementary mathematics materials such as a pre-engineering and a measurement module; Cochise College developed model research designs to collect data about students and faculty in their math and science programs. This data was used to revise existing courses and to serve as a basis for the creation and augmentation of math-related activities.

Laredo Junior College has a Tutorial Center which utilizes peer tutors, faculty and paraprofessionals to provide instruction and academic guidance for math students. Texas Southmost College created video tapes of faculty teaching specific math chapters in textbooks which are used in the tutorial center. The Pilot Project involving Texas Southmost College and the Brownsville Independent School District collected data to determine parental attitudes towards mathematics, and created a Parent Brochure to inform parents and children about the importance of mathematics for academic and career development. Presently, video tapes are being developed to parents and children that math is easy and fun and that math is needed in a wide range of careers. The Pilot Project is one of the first attempts to link the community college and the school district to address educational issues of mutual concern. This valuable program is a model which needs to be extended to other BCC institutions. The sharing of these intact mathematics systems among BCC institutions has enabled the colleges to benefit from each other's successes and allow for cross pollinezation of ideas which serve to strengthen mathematics programs created throughout the consortium.

The success of these exemplary math programs has generated much enthusiasm and interest within and without consortium colleges. The MIP Director had requests to present the MIP at regional conferences dealing with developmental studies and minority students in Phoenix, Arizona; Detroit, Michigan; and San Diego, California. Farther, a presentation of the MIP was made by the MIP Director to a nation-wide group of community college educators at the American Association of Community and Junior College Conference held in New Orleans, Louisiana.

Further program dissemination took place between consortium colleges and the Mexican Institutos Tecnologicos in San Diego/Tijuana; El Centro/Mexicali; and Brownsville/Matamoros. From abroad, the government of Nigeria is presently considering using consortium math faculty as consultants to provide staff development for their primary school mathematics teachers. In summary, a myraid of mathematics activities were planned, implemented and documented during two years of Math Intervention Project funding. Specific activities implemented by each institution are presented on the following pages.

1981 - 1983
MATH INTERVENTION PROJECT ACTIVITIES
BY OBJECTIVES AND INSTITUTION

: DEVELOPMENT/REVISION OF MATH-RELATED COURSES

College Code: SWC = Southwestern College
IVC = Imperial Valley College
AWC = Arizona Western College
CC = Cochise College
LJC = Laredo Junior College
TSC = Texas Southmost College
P.P. = Pilot Project (Parental Awareness)

ACTIVITY TITLE	PROGRESS OF ACTIVITY			DOCUMENTATION	READY TO SHARE	
	Completed	In Progress	New		Yes	No
1.0 Revision of M010, Fundamentals of Math; M020, Elementary Algebra	x			1.0 Project Report assessing math textbooks, assignments, tutoring, tests and conference hours	x	
1.1 Individualized studies in math for MA010 and MA020	x			1.1 Student Instruction Packet; Instruction's Instruction Packet; Course Modification Proposals; New Course Outlines-MA010, 020	x	
2.0 Pre-Engineering Module Essentials of Mathematics	x			2.0 Copy of Module	x	
2.1 Module in Measurement	x			2.1 Copy of Module	x	
2.2 Computer Assisted Instruction in Developmental		x		2.2 Learning Pre-and Post-Tests		x
3.0 Mathematics Instruction through video-tapes		x		3.0 Copy of tapes		x

1981 - 1983
MATH INTERVENTION PROJECT ACTIVITIES
BY OBJECTIVES AND INSTITUTION

DEVELOPMENT/REVISION OF MATH-RELATED COURSES

College Code: SWC = Southwestern College
IVC = Imperial Valley College
ANC = Antelope Valley College
CC = Cuyamaca College
LJC = Long Beach City College
TSC = Southwest College
P.P. = Parent Participation (Parental Awareness)

ACTIVITY TITLE	PROGRESS OF ACTIVITY		IMPLEMENTATION	READY TO SHARE?	
	Completed	In Progress		Yes	No
4.0 The Reliability and Validity of the LJC Mathematics Placement Test (Pilot Study)	x		4.0 Study Report	x	
4.1 Analyze Mathematics Placement Test to Improve Reliability and Validity		x	4.1 Pre-Post Test data, new placement test		x
4.2 Instruction in use of calculators and hand-held computers		x	4.2 Report on Teaching Effectiveness		x
4.3 Modified self-paced courses; MA315 and MA316 Intermediate Algebra		x	4.3 Self-Paced Program Model, Tests to be used in MA315		x
5.0 Computer Assisted Instruction in Math		x	5.0 Log-in procedures for software usage; Enrollment data for math courses	x	
5.1 Development in Math Anxiety course thru Team Teaching Approach		x	5.1 Student Grade Report or Student Evaluations	x	

1981 - 1983
MATH INTERVENTION PROJECT ACTIVITIES
BY OBJECTIVES AND INSTITUTION

DEVELOP AND IMPLEMENT MATH-RELATED FACULTY AND ADMINISTRATION PROFESSIONAL DEVELOPMENT ACTIVITIES

College Code: SWC = Southwestern College
IVC = Imperial Valley College
AWC = Arizona Western College
CC = Cochise College
LJC = Laredo Junior College
TSC = Texas Southmost College
P.P. = Pilot Project (Parental Awareness)

ACTIVITY TITLE	PROGRESS OF ACTIVITY			DOCUMENTATION	READY TO SHARE?	
	Completed	In Progress	New		Yes	No
1.0 Math Anxiety Workshop	x			1.0 Faculty Evaluations	x	
1.1 Institutional Research with Math Application	x			1.1 Research Report/Institution and Student Data		
1.2 Equal Educational Opportunity: A Look at Cochise College	x			1.2 Research Report/Institution and Student Data	x	
1.3 Student Survey of Math Attitudes	x			1.3 Research Report/Student Data	x	
1.4 Presentation at Bi-National Conference (Brownsville, Texas/Matamors, Mexico)	x			1.4 Bi-National Conference Report	x	
1.5 Assessment of the Relationship Between Individual Math Instructors and the Hispanic Student		x		1.5 Research Report/Faculty Student Data		x
1.6 Math and Science Student Survey	x			1.6 Research Report/Student Data	x	

1981 - 1983
MATH INTERVENTION PROJECT ACTIVITIES
BY OBJECTIVES AND INSTITUTION

DEVELOP AND IMPLEMENT MATH-RELATED FACULTY AND ADMINISTRATION PROFESSIONAL DEVELOPMENT ACTIVITIES

College Code: SWC = Southwestern College
IVC = Imperial Valley College
AWC = Arizona Western College
CC = Cochise College
LJC = Laredo Junior College
TSC = Texas Southmost College
P.P. = Pilot Project (Parental Awareness)

ACTIVITY TITLE	PROGRESS OF ACTIVITY			DOCUMENTATION	READY TO SUBMIT?	
	Completed	In Progress	Now		Yes	No
2.0 Math Anxiety Workshop	x			2.0 Faculty Evaluations	x	
2.1 Attend National Council of Teachers of Mathematics Conference	x			2.1 Conference Report	x	
2.2 Math and Science Student Survey	x			2.2 Research Report/Student Data	x	
2.3 Host MIPC Meeting	x			2.3 Math Meeting Proceedings	x	
2.4 Binational Exchange with Technological Institute in Nogales, Mexico	x			2.4 Meeting Proceedings	x	
3.0 Math Anxiety Workshop	x			3.0 Faculty Evaluations	x	
3.1 Math and Science Student Survey	x			3.1 Research Report/Student Data	x	
3.2 Host MIPC Meeting	x			3.2 Meeting Proceedings	x	
3.3 Bi-National Exchange with Technological Institute in Nuevo Laredo, Mexico	x			3.3 Meeting Proceedings	x	

1981 - 1983
MATH INTERVENTION PROJECT ACTIVITIES
BY OBJECTIVES AND INSTITUTION

: DEVELOP AND IMPLEMENT MATH-RELATED FACULTY AND ADMINISTRATION PROFESSIONAL DEVELOPMENT ACTIVITIES

College Code: SWC = Southwestern College
IVC = Imperial Valley College
AWC = Arizona Western College
CC = Cochise College
LJC = Laredo Junior College
TSC = Texas Southmost College
P.P. = Pilot Project (Parental Awareness)

ACTIVITY TITLE	PROGRESS OF ACTIVITY			DOCUMENTATION	READY TO SHARE	
	Completed	In Progress	New		Yes	No
4.0 Math Anxiety Workshop	x			4.0 Faculty Evaluations	x	
4.1 Math and Science Student Survey	x			4.1 Research Report/Student Data	x	
4.2 Host MIPC Meeting	x			4.2 Meeting Proceedings	x	
4.3 Bi-National Exchange with Technological Institute in Matamoros, Mexico	x			4.3 Meeting Proceedings	x	
5.0 Train Math Paraprofessional staff in techniques dealing with Math Anxiety	x			5.0 Consultant Availability	x	
5.1 Math and Science Student Survey	x			5.1 Research Report/Student Data	x	
5. Bi-National Exchange with Technological Institute in Tijuana, Mexico	x			5.2 Meeting Proceedings	x	

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1981 - 1983
MATH INTERVENTION PROJECT ACTIVITIES
BY OBJECTIVES AND INSTITUTION

OBJECTIVE: DEVELOP AND IMPLEMENT MATH-RELATED FACULTY AND ADMINISTRATION PROFESSIONAL DEVELOPMENT ACTIVITIES

College Code: SWC = Southwestern College
IVC = Imperial Valley College
AWC = Arizona Western College
CC = Cochise College
LJC = Laredo Junior College
TSC = Texas Southmost College
P.P. = Pilot Project (Parental Awareness)

COLLEGE CODE	ACTIVITY TITLE	PROGRESS OF ACTIVITY			DOCUMENTATION	READY TO SHARE?	
		Completed	In Progress	New		Yes	No
IVC	6.0 Math Anxiety Workshop	x			6.0 Faculty Evaluations	x	
IVC	6.1 Math and Science Student Survey	x			6.1 Research Report/Student Data	x	
IVC	6.2 Bi-National Exchange with Technological Institute in Mexicali, Mexico	x			6.2 Meeting Proceedings	x	

1981 - 1983
MATH INTERVENTION PROJECT ACTIVITIES
BY OBJECTIVES AND INSTITUTION

OBJECTIVE: DESIGN AND CONDUCT PROFESSIONAL DEVELOPMENT ACTIVITIES FOR CONSORTIUM COUNSELING STAFF

College Code: SWC = Southwestern College
IVC = Imperial Valley College
AWC = Arizona Western College
CC = Cochise College
LJC = Laredo Junior College
TSC = Texas Southmost College
P.P. = Pilot Project (Parental Awareness)

COLLEGE CODE	ACTIVITY TITLE	PROGRESS OF ACTIVITY			DOCUMENTATION	READY TO SHI	
		Completed	In Progress	New		Yes	N
CC	1.0 Math Anxiety Workshop	x			1.0 Counselor Evaluaations	x	
CC	1.1 Professional Training for Counseling Staff for dealing with Minority Students	x			1.1 Workshop format for training counseling staff		x
CC	1.2 Upgrade Counseling Department Materials		x		1.2 Documentation of monthly use of materials		x
CC	1.3 Present Computer Assisted Academic Program to Counselors and faculty advisors	x			1.3 Participant Evaluation		x
AWC	2.0 Math Anxiety Workshop	x			2.0 Counselor Evaluations	x	
LJC	3.0 Math Anxiety Workshop	x			3.0 Counselor Evaluations	x	
TSC	4.0 Math Anxiety Workshop	x			4.0 Counselor Evaluations	x	
TSC	4.1 Workshop on "Computerized Academic Assistance Placement Systems"	x			4.1 Counselor/Advisor Evaluations	x	
IVC	5.0 Math Anxiety Workshop	x			5.0 Counselor Evaluations	x	
SWC	6.0 Provide Consultants to conduct Math Anxiety Workshops	x			6.0 Consultant Availability	x	

1981 - 1983

MA VENTION PROJECT ACTIVITIES

CTIVES AND INSTITUTION

OBJECTIVE: DESIGN AND IMPLEMENT A MATHEMATICS TU IAL PROGRAM

College Code:
SWC = Southwestern College
IVC = Imperial Valley College
AWC = Arizona Western College
CC = Cochise College
LJC = Laredo Junior College
TSC = Texas Southmost College
P.P. = Pilot Project (Parental Awareness)

COLLEGE CODE	ACTIVITY TITLE	PROGRESS OF ACTIVITY			DOCUMENTATION	READY TO SHARE?	
		Completed	In Progress	New		Yes	No
SWC	1.0 Specialized Tutorials for Math Courses	x			1.0 Tutoring Center Log In/Out Data Instruction/Student Evaluations	x	
SWC	1.1 Train Tutors in Math Anxiety Reduction Methods; Procude Tutor Training Packet		x		1.1 Tutor Training Packet		x
SWC	1.2 Implement a specialized Tutorial Program in selected math courses		x		1.2 Summary Evaluation Report		x
SWC	1.3 Assessment of Tutorial Center			x	1.3 Evaluation Report for Math Tutorial Activities		x
IVC	2.0 Use of Student Tutor for one-on-one instruction	x			2.0 Report on Use of Tutor		x
TSC	3.0 Math workshops in Study Lab	x			3.0 Copy of Math Workshops	x	
LJC	4.0 Share Model for Tutorial Math Guidance Center	x			4.0 Copy of Math Tutorial Model	x	
AWC	5.0 Use of Student Tutors and Paraprofessionals	x			5.0 Report on Tutor Usage	x	

1981 - 1983
MATH INTERVENTION PROJECT ACTIVITIES
BY OBJECTIVES AND INSTITUTION

OBJECTIVE: DESIGN AND IMPLEMENT A MATHEMATICS TUTORIAL PROGRAM

College Code: SWC = Southwestern College
IVC = Imperial Valley College
AWC = Arizona Western College
CC = Cochise College
LJC = Laredo Junior College
TSC = Texas Southmost College
P.P. = Pilot Project (Parental Awareness)

COLLEGE CODE	ACTIVITY TITLE	PROGRESS OF ACTIVITY			DOCUMENTATION	READY TO SHARE	
		Completed	In Progress	New		Yes	No
CC	6.0 Study to determine the quality, availability, and usage of mathematics tutoring service		x		6.0 Research Report/Student Data		x
CC	6.1 Use of math-drill software in Tutorial Center		x		6.1 Report on Student Usage		x
CC	6.2 Use of Math audio-visual aids in Tutorial Center		x		6.2 Report on Student Usage		

1981 - 1983
MATH INTERVENTION PROJECT ACTIVITIES
BY OBJECTIVES AND INSTITUTION

OBJECTIVE: DESIGN AND IMPLEMENT A PARENT INFORMATION/ INVOLVEMENT PROGRAM

College Code:
SWC = Southwestern College
IVC = Imperial Valley College
AWC = Arizona Western College
CC = Cochise College
LJC = Laredo Junior College
TSC = Texas Southmost College
P.P. = Pilot Project (Parental Awareness)

COLLEGE CODE	ACTIVITY TITLE	PROGRESS OF ACTIVITY			DOCUMENTATION	READY TO SHARE?	
		Completed	In Progress	New		Yes	No
PP	1.0 Parent Survey	x			1.0 Parent Data	x	
PP	1.1 Parent Bilingual Brochure	x			1.1 Copy of Brochure	x	
PP	1.2 Video-tape for Parents and students in secondary schools and at Texas Southmost College		x		1.2 Copy of video-tape		x
PP	1.3 Video-tape for Parents and students in elementary schools		x		1.3 Copy of video-tape		x

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MATH INTERVENTION PROJECT ACTIVITIES
BY OBJECTIVES AND INSTITUTION

OBJECTIVE: DESIGN AND IMPLEMENT A PEER INVOLVEMENT/ INFORMATION PROGRAM

College Code: SWC = Southwestern College
IVC = Imperial Valley College
AWC = Arizona Western College
CC = Cochise College
LJC = Laredo Junior College
TSC = Texas Southmost College
P.P. = Pilot Project (Parental Awareness)

COLLEGE CODE	ACTIVITY TITLE	PROGRESS OF ACTIVITY			DOCUMENTATION	READY TO SHARE	
		Completed	In Progress	New		Yes	No
IVC	1.0 Mathematics Festival	x			1.0 Report on "How to Conduct a Mathematics Festival", Event Evaluation	x	
LJC	2.0 Brochures: LJC Mathematics Department Mathematics Opens Career Doors	x			2.0 Copy of Brochures	x	
LJC	2.1 Math Orientation for Freshman Students	x			2.1 Copy of Math Orientation Outline	x	
LJC	2.2 Revise Math Brochures		x		2.2 Copy of Brochures		x
CC	3.0 Math/Engineering Workshops in Career Planning		x		3.0 Report on Workshop Effectiveness		x

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APPENDICES

APPENDIX A

STUDENT SURVEY
MATH INTERVENTION PROJECT
BORDER COLLEGE CONSORTIUM

Dear Student:

This community college is presently involved in a project designed to help students participate and succeed in math and science courses.

In order to learn more about the kind of students we serve, we need your help in completing the Student Survey below. The information from this survey will be used to help your college math faculty to plan better programs to help students continue their education successfully.

Your cooperation in helping us with this project is greatly appreciated.

SECTION I: STUDENT BACKGROUND INFORMATION. In this section, we would like to know a little bit about you so that we may get a better idea of the different backgrounds of students in math and science courses.

1. Write in your campus name: _____

2. Write in your present course name and number: _____

3. Check your student classification: ___ Freshman ___ Sophomore

4. What is your present enrollment status? ___ Full-Time ___ Part-Time

5. Are you enrolled in college during the day or night? ___Day ___Night ___Both day & nigh

6. Check semester enrolled: ___ Fall ___ Spring ___ Summer

7. What is your sex: ___ Male ___ Female

8. What is your age: ___ years

9. Check your nationality and ethnic identification:

American Students Only

___ Hispanic (includes Mexican American, Chicanos, and Latin Americans permanently residing in the United States)
___ White, non-Hispanic
___ Black
___ Native American
___ Oriental
___ Other: _____

Foreign Students Only

Write in Country: _____

10. Which language is mostly spoken in your home? (Please check one for each category).

Yourself:	___ English	___ Spanish	___ Other
Mother:	___ English	___ Spanish	___ Other
Father:	___ English	___ Spanish	___ Other

11. What kind of grades did you make in your MATH courses in high school? (Check One).

___ Mostly A's
___ Mostly A's and B's
___ Mostly B's
___ Mostly B's and C's
___ Mostly C's
___ Mostly C's and D's
___ Mostly D's
___ Mostly D's and F's
___ I did not take math classes in high school

12. To the best of your knowledge, what was your academic rank when you graduated from high school? (Check One).

___ Top Quarter (very high)
___ Second Quarter (high)
___ Third Quarter (average)
___ Fourth Quarter (low)
___ GED Graduate
___ I did not graduate from high school

13. How many years of school did your parents complete? (If not certain, give best estimate).

Mother: ___years Father: ___years

14. Did any of the following people encourage you to take math and science courses so that you could later be prepared to go into careers such as medicine, dentistry, engineering, biology, etc.? (Please check one answer for each category).

High school teacher	___ Yes	___ No
High school counselor	___ Yes	___ No
Parents	___ Yes	___ No
Good friends	___ Yes	___ No
College faculty	___ Yes	___ No
College counselor	___ Yes	___ No

SECTION II: INFORMATION ABOUT MATH COURSES. In this section, you will be asked your opinions about math courses you have taken in high school and college.

15. Did you take math courses in High School?

___ Yes ⟶ If Yes: List the name of the courses and the number of semesters below:
___ No For example: Fundamentals of Mathematics, Algebra, Geometry, Calculus, Trigonometry, Advanced Algebra, etc.

	Course Name	Number of Semesters
1.	_____	____
2.	_____	____
3.	_____	____
4.	_____	____
5.	_____	____

16. Did you take math courses at your community college?

___ Yes ⟶ If Yes: List the name of the courses and the number of semesters
___ No below.

	Course Name	Number of Semesters
1.	_____	____
2.	_____	____
3.	_____	____
4.	_____	____
5.	_____	____

17. What kind of problems do you have with your math courses? (Check all that apply).

___ 1. I have difficulty understanding word problems.
___ 2. I am afraid of math.
___ 3. I don't understand mathematical symbols and formulas.
___ 4. I find math boring.
___ 5. I never learned how to handle math in high school.
___ 6. I have difficulty developing proper study habits and utilizing time.
___ 7. I have difficulty understanding how the teacher explains.
___ 8. I have difficulty understanding how the math tutors explain.
___ 9. The teacher doesn't give enough examples of math problems.
___ 10. I fail to see how math applies to every day life.
___ 11. The textbook of my math class is too difficult.
___ 12. I have difficulty understanding English explanations.
___ 13. I have no difficulties with my math courses.
___ 14. Other: _____

18. Of those you checked in question 17 above, which one is the most serious problem? (Please write in one number).

Number ____

SECTION III: INFORMATION ABOUT SCIENCE COURSES. In this section you will be asked your opinion about science courses you have taken in high school and college.

19. Did you take science courses in high school?

___ Yes ⟶ If Yes: List the name of the courses and the number of semesters below.
___ No For example: General Science, Biology, Chemistry, Physics, Earth Science, etc.

	Course Name	Number of Semesters
1.	_____	____
2.	_____	____
3.	_____	____
4.	_____	____
5.	_____	____

20. Did you take science courses at your community college?

___ Yes ——→ If Yes: List the name of the courses and the number of semesters
___ No below:

	Course Name	Number of Semesters
1.	_____	____
2.	_____	____
3.	_____	____
4.	_____	____
5.	_____	____

21. What kind of problems do you have with your science courses? (Check all that apply).

___ 1. Science courses are boring.
___ 2. I am afraid of science courses.
___ 3. Science courses are too difficult.
___ 4. I have trouble reading and understanding my science book.
___ 5. Science courses require too much of my time.
___ 6. I have difficulty understanding how my science teacher explains.
___ 7. I fail to see how science applies to every day life.
___ 8. I don't understand some of the vocabulary used in science books.
___ 9. I have difficulty understanding English explanations.
___ 10. I have no difficulties with my science courses.
___ 11. Other: _____

22. Of those you checked in question 21 above, which one is the most serious problem? (Please write in one number).

Number ____

23. Does your present major require math _____ (_____) or more?
number course name

___ Yes
___ No ——→ If No: If no, why did you avoid selecting a career field which requires an extensive math background? (Check all that apply).

___ 1. Math-related careers are "too hard".
___ 2. I am afraid to go into a math related career.
___ 3. No one encouraged me to go into a math-related career.
___ 4. I don't like math.
___ 5. I don't think I would get enough help in college to help me pass required math courses.
___ 6. Math and science majors take too long to finish college.
___ 7. I've never been good in math.
___ 8. Other: _____

SECTION IV: STUDENT SUGGESTIONS. Finally, in this section, you will be asked to give your opinions about how community college teachers and counselors can best help students.

24. What do you think community college TEACHERS can do to help students succeed in math and science courses? (Check all that apply).

___ 1. Give more examples in class.
___ 2. Meet with students outside of class more often.
___ 3. Choose easier textbooks.
___ 4. Give more teacher developed handouts.
___ 5. Help students overcome the fear of science and math.
___ 6. Show how math and science apply to every day life.
___ 7. Take more time in explaining the ideas and problems.
___ 8. Make classes more interesting.
___ 9. Provide math and science tutors.
___ 10. Allow for individualized, self-paced instruction.
___ 11. Other: _____

25. What do you think community college COUNSELORS can do to encourage students to take more math and science courses? (Check all that apply).

___ 1. Inform students about career opportunities in math and science courses.
___ 2. Help students develop study skills for math and science courses.
___ 3. Explain salary differences in several careers.
___ 4. Help students overcome their fears about math and science.
___ 5. Talk to parents about the importance of math and science.
___ 6. Go to high schools to inform students about the importance of taking math and science courses.
___ 7. Make it a point to see students more often throughout the college semester.
___ 8. Be available in math labs to help students with special problems.
___ 9. Visit math courses and work with math teachers.
___10. Encourage more women to go into fields like engineering, dentistry, and medicine.
___11. Help students to select the most appropriate math and science courses for their chosen career field.
___12. Tell students what the future career fields will require due to increasing technology.
___13. Other: _____

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE!

APPENDIX B

TABLE 20

Prior Encouragement Received by Math and Science Students in Six BCC Institutions

Type of Encouragement	HISPANICS			WHITES			BLACKS			ORIENTAL			NATIVE AMERICAN			FOREIGN		
	N	Yes	No	N	Yes	No	N	Yes	No	N	Yes	No	N	Yes	No	N	Yes	No
1. High School Teachers	1,182	525(44)[a]	657(56)	647	249(38)	398(62)	46	23(50)	23(50)	69	39(57)	30(43)	44	17(39)	27(61)	56	34(61)	22(39)
2. High School Counselors	1,192	545(46)	647(54)	638	227(36)	411(64)	46	22(48)	24(52)	67	28(42)	39(58)	43	17(40)	26(60)	44	14(32)	30(68)
3. Parents	1,200	691(58)	509(42)	662	371(56)	291(44)	46	28(61)	18(39)	69	43(62)	26(38)	45	30(67)	15(33)	64	45(70)	19(30)
4. Good Friends	1,191	557(47)	634(53)	627	214(34)	413(66)	43	20(47)	23(53)	69	42(61)	27(39)	41	17(41)	24(59)	54	34(63)	20(37)
5. College Faculty	1,132	337(30)	795(70)	624	173(28)	451(72)	42	12(29)	30(71)	66	22(33)	44(67)	43	14(33)	29(67)	45	13(29)	32(71)
6. College Counselors	1,197	640(53)	557(47)	646	258(40)	388(60)	43	21(49)	22(51)	71	32(45)	39(55)	46	27(59)	19(41)	48	22(46)	26(54)

[a] Numbers in parenthesis represent percentages.

APPENDIX C

TABLE 21

Level of Math Preparation By College for Students Who Took Math Courses in High School

Level of Preparation by College	HISPANICS		WHITES		BLACKS		ORIENTAL		NATIVE AMERICAN		FOREIGN	
Southwestern	N= 54		N= 69		N= 13		N= 33		N= 5		N= 5	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Little/No Preparation[1]	21	39	16	23	4	31	5	15	2	40	0	0
Some Preparation[2]	18	33	22	32	7	54	18	55	2	40	2	40
Good Preparation[3]	15	28	31	45	2	15	10	30	1	20	3	60
Imperial Valley	N= 101		N= 30		N= 2		N= 3		N= 4		N= 0	
Little/No Preparation	31	31	7	23	0	0	1	33	0	0	0	0
Some Preparation	34	34	12	40	2	100	0	0	3	25	0	0
Good Preparation	36	36	11	37	0	0	2	67	1	75	0	0
Arizona Western	N= 46		N= 78		N= 8		N= 2		N= 3		N= 1	
Little/No Preparation	3	6	7	9	4	50	1	50	2	67	0	0
Some Preparation	16	33	24	31	0	0	0	0	1	33	0	0
Good Preparation	28	57	47	60	4	50	1	50	0	0	1	100
Cochise	N= 52		N= 67		N= 0		N= 3		N= 3		N= 3	
Little/No Preparation	18	35	14	21	0	0	0	0	0	0	0	0
Some Preparation	23	44	31	46	0	0	0	0	3	100	1	5
Good Preparation	11	21	22	33	0	0	3	100	0	0	19	95
Laredo Junior College	N= 207		N= 16		N= 0		N= 0		N= 2		N= 7	
Little/No Preparation	32	15	1	6	0	0	0	0	0	0	0	0
Some Preparation	75	36	3	19	0	0	0	0	1	50	3	43
Good Preparation	100	48	12	75	0	0	0	0	1	50	4	57
Texas Southmost	N= 192		N= 30		N= 0		N= 0		N= 3		N= 3	
Little/No Preparation	58	30	6	20	0	0	0	0	0	0	3	100
Some Preparation	94	49	14	47	0	0	0	0	3	100	0	0
Good Preparation	40	21	10	33	0	0	0	0	0	0	0	0

[1]Student took up to and including Introduction to Algebra.
[2]Student took up to and including first year of Algebra and Geometry.
[3]Student took up to and including Advanced Algebra, Algebra 2, and higher level courses.

APPENDIX D

TABLE 22

Problems Experienced by Students in Math Courses in Six BCC Institutions

Type of Problem	Hispanics		Whites		Blacks		Orientals		Native American		Foreign	
	N= 664		N= 298		N= 23		N= 42		N=22		N=36	
	Number	Percent[1]	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1. Word Problems	363	55	159	53	15	65	26	62	13	59	21	58
2. Fear of Math	61	9	28	9	2	9	1	2	1	5	1	3
3. Symbols and Formulas	117	18	44	15	4	17	3	7	4	18	3	8
4. Math Boring	86	13	47	16	4	17	1	2	4	18	4	11
5. Math Deficiency	102	15	71	24	2	9	5	12	4	18	1	3
6. Study Habits/Time	294	44	116	39	10	43	15	36	13	59	6	17
7. Teacher Explanations	90	14	46	15	5	22	7	17	3	14	4	11
8. Tutor Explanations	35	5	9	3	2	9	2	5	0	0	0	0
9. Lack of Examples	63	9	19	6	2	9	7	17	3	14	2	6
10. Math Applications	104	16	39	13	0	0	5	12	4	18	2	6
11. Difficult Textbooks	39	6	15	5	1	4	4	10	1	5	1	3
12. English Explanations	31	5	5	2	0	0	4	10	2	9	10	28
13. No Difficulties	97	15	51	17	2	9	8	19	2	9	7	19

[1] Students could make multiple responses.

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