2001

A decade of ethnic enrollment and achievement trends in mathematics

Barbara L. Schallau
San Jose State University

Follow this and additional works at: https://scholarworks.sjsu.edu/etd_theses

Recommended Citation

Schallau, Barbara L., "A decade of ethnic enrollment and achievement trends in mathematics" (2001).
Master's Theses. 2158.
DOI: <https://doi.org/10.31979/etd.5z99-gszf>
https://scholarworks.sjsu.edu/etd_theses/2158

This Thesis is brought to you for free and open access by the Master's Theses and Graduate Research at SJSU ScholarWorks. It has been accepted for inclusion in Master's Theses by an authorized administrator of SJSU ScholarWorks. For more information, please contact scholarworks@sjsu.edu.

INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

ProQuest Information and Learning
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
800-521-0600

UMI[®]

**A DECADE OF ETHNIC ENROLLMENT AND
ACHIEVEMENT TRENDS IN MATHEMATICS**

A Thesis

Presented to

The Faculty of the Department of Mathematics and Computer Science

San José State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Arts

By

Barbara L. Schallau

May 2001

UMI Number: 1403991

Copyright 2001 by
Schallau, Barbara L.

All rights reserved.

UMI[®]

UMI Microform 1403991

Copyright 2001 by Bell & Howell Information and Learning Company.

All rights reserved. This microform edition is protected against
unauthorized copying under Title 17, United States Code.

Bell & Howell Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346

© 2001

Barbara L. Schallau

ALL RIGHTS RESERVED

**APPROVED FOR THE DEPARTMENT OF
MATHEMATICS AND COMPUTER SCIENCE**

Dr. Joanne Rossi Becker

Dr. Marilyn Blockus

Dr. Barbara J. Pence

APPROVED FOR THE UNIVERSITY

ABSTRACT

A DECADE OF ETHNIC ENROLLMENT AND ACHIEVEMENT TRENDS IN MATHEMATICS

By Barbara L. Schallau

During 1990-2000, East Side Union High School District implemented a board policy requiring all students to enter high school at Integrated Mathematics 1/Algebra I or higher. This study looks at enrollment and achievement data for students in mathematics classes during that decade. In 1990-91, 28% of the Hispanic and 38% of the African-American students were enrolled in college preparatory classes. Ten years later, 66% of each of these ethnic groups are enrolled in college preparatory classes. Only 1% of each ethnic group is enrolled in non-college preparatory classes, compared with 55% Hispanic and 45% African-American in 1990-91. Success rates in mathematics classes are different for the four ethnic groups studied. In general, the Asian and European-American groups had the greatest success in mathematics, while the African-American and Hispanic students experienced the least. However, more Hispanic students (2,780) passed college preparatory mathematics classes in 1999 than were enrolled (2,157) in 1990.

ACKNOWLEDGMENTS

This thesis would not have been possible without the help of many people. First and foremost, for my husband Don and children Adrienne, Carmen Christopher, Stephanie, and Matthew, whose patience, love and support, I am eternally grateful. My mom, Marjorie Schallau, was extremely efficient in finding obscure information about life in the 1900's. She amazed me with her research and suggestions. Data for the 1990-91 school year would not have been possible without the help of Rafael Rentería. I am very appreciative he has meticulously collected student enrollment and achievement data over the decade. Dianne Pors provided more than data and literature about EQUITY 2000, she provided encouragement and moral support. Finally, my thesis committee. I would not have become a mathematics major without the continual encouragement of Dr. Blockus. I continue to be thankful to her for that gift. Drs. Pence and Rossi Becker were (and continue to be) instrumental in my career as a mathematics teacher. Thank you all with all of my heart.

TABLE OF CONTENTS

Chapter 1	Introduction	1
Chapter 2	Review of Literature	4
	Introduction	4
	Factors that Affect College Attendance and Completion	6
	Access to College Preparatory Experiences	7
	The Effects of Tracking	10
	Measuring Success in Mathematics	16
	Factors Affecting Success in Mathematics	22
	EQUITY 2000	27
Chapter 3	Methodology	32
	Background	32
	Time Frame Studied	35
	District Computer Systems	36
	Data for District and State Ethnic Trends	36
	Data Sources	37
	Mathematics Classes	41
Chapter 4	Results.....	50
	Student Population Trends, by Ethnicity	50
	Mathematics Class Enrollment Trends, by Ethnicity	56
	Enrollment Trends in Mathematics within Ethnic Groups	66
	Success Rate Trends in Mathematics, by Class	73
	Success Rate Trends in Mathematics, by Ethnicity	87
	Summary	93
Chapter 5	Conclusions	94
	Question 1	94
	Question 2	96
	Question 3	101
	Question 4	105
	Summary	107
	Recommendations	109
Appendix A	NAEP Trends 1973-99	117
Appendix B	SGP11 Sample Report	118
Appendix C	EQ2000_RPT Sample	119
Appendix D	Student Population Data for State, County, and District	120

Appendix E	Mathematics Class Enrollment Compared with District Mathematics Enrollment, by Ethnicity	121
Appendix F	Success Rate and Enrollment Calculations for Advanced Placement Mathematics Classes	122
Appendix G	Success Rate and Enrollment Calculations for Math Analysis Classes	123
Appendix H	Success Rate and Enrollment Calculations for Algebra II/Integrated Mathematics 3 Classes.....	124
Appendix I	Success Rate and Enrollment Calculations for Geometry/Integrated Mathematics 2 Classes	125
Appendix J	Success Rate and Enrollment Calculations for Algebra I/Integrated Mathematics 1 Classes.....	126
Appendix K	Success Rate and Enrollment Calculations for Non-college Preparatory Mathematics Classes	127
References		128

LIST OF TABLES

- Table 1: SAT I mean scores compared to family income in 2000...p. 21
- Table 2: Percentage ethnic make-up for mathematics courses in ESUHSD during 1990-91...p.57
- Table 3: Percentage ethnic make-up for mathematics courses in ESUHSD during 1995-96...p.60
- Table 4: Percentage ethnic make-up for mathematics courses in ESUHSD during 1999-00...p.62

LIST OF FIGURES

- Figure 1: NAEP trends in age 9 average mathematics scale scores by race/ethnicity...p. 20
- Figure 2: NAEP trends in age 17 average mathematics scale scores by race/ethnicity...p. 20
- Figure 3: Mathematics course sequencing in ESUHSD before EQUITY 2000 ...p. 34
- Figure 4: Mathematics course sequencing in ESUHSD after EQUITY 2000 ...p. 34
- Figure 5: State of California K-12 student population trends during 1990-2000 ...p. 52
- Figure 6: County of Santa Clara K-12 student population trends during 1993-2000 ...p. 54
- Figure 7: East Side Union High School District 9-12 student population trends during 1990-2000...p. 55
- Figure 8: Ethnic make-up of each mathematics course during 1990-91...p.58
- Figure 9: Ethnic make-up of each mathematics course during 1995-96...p.61
- Figure 10: Ethnic make-up of each mathematics course during 1999-00...p.63
- Figure 11: Mathematics course enrollment trends for East Side Union High School District...p. 65
- Figure 12: Asian, Filipino, American Indian, Pacific Island student mathematics course enrollment compared with district enrollment during 1990-2000 ...p. 68
- Figure 13: Hispanic student mathematics course enrollment compared with district enrollment during 1990-2000...p. 70
- Figure 14: African-American student mathematics course enrollment compared with district enrollment during 1990-2000...p. 72
- Figure 15: European-American student mathematics course enrollment compared with district enrollment during 1990-2000...p. 74

- Figure 16: Success rate (A, B and C) of AP Mathematics classes, by ethnicity
...p. 76
- Figure 17: Success rate (A, B and C) of Math Analysis classes, by ethnicity
...p. 78
- Figure 18: Success rate (A, B and C) of IM 3/Algebra II classes, by ethnicity
...p. 80
- Figure 19: Success rate (A, B and C) of IM 2/Geometry classes, by ethnicity
...p. 82
- Figure 20: Success rate (A, B and C) of IM 1/Algebra I classes, by ethnicity
...p. 84
- Figure 21: Success rate (A, B and C) of non-college preparatory mathematics
classes, by ethnicity...p. 86
- Figure 22: Asian, Filipino, American Indian, Pacific Island student success rate
trends...p. 89
- Figure 23: Hispanic student success rate trends...p. 90
- Figure 24: African-American student success rate trends...p. 91
- Figure 25: European-American student success rate trends...p. 92

CHAPTER 1

INTRODUCTION

One decade ago, East Side Union High School District (ESUHSD) in San José, California joined a coalition of local school districts that came together with a common goal of reforming the mathematics policies of the participating public schools. The major goal of this collaborative was to provide access to college preparatory mathematics to *all* of the students of the participating school districts. This coalition was known as the San José Educational Collaborative and EQUITY 2000 was the name of the program that was to help implement this change in mathematics expectations for *all* students.

Prior to EQUITY 2000, ESUHSD had a two-year mathematics requirement for graduation. These two years did not have to be at the college preparatory level. Many students were receiving diplomas without ever taking an algebra class. EQUITY 2000 changed all of that. Currently, the lowest level of mathematics a student can take is Algebra I/Integrated Mathematics 1. Therefore, the two-year mathematics graduation requirement now translates to *all* students passing Algebra I/Integrated Mathematics 1 and Geometry/Integrated Mathematics 2.

I chose to study the status of my school district's mathematics enrollment and achievement in mathematics classes one decade after EQUITY 2000 was first discussed. The goal of this study is to determine if the enrollment of students in higher-level mathematics classes has changed as a result of EQUITY 2000 and how the success rate in these classes has been affected. Many professionals

(mathematics teachers, counselors, principals, and teachers of other disciplines) have voiced disagreement over the philosophy behind EQUITY 2000, so a long-range evaluation of its impact seemed indicated.

Data produced in 1996 showed that more students were passing Algebra I than had even been enrolled in this class before implementation of EQUITY 2000. Encouraged by this information, I wanted to see how EQUITY 2000 affected enrollment in the other mathematics classes. More importantly, I wanted to find out if we really were providing equity. Are *all* students, regardless of ethnicity, taking and succeeding in higher mathematics?

My specific research questions are:

1. Does the ethnic make-up of each mathematics course reflect the ethnic make-up of the district? That is, if there are 39% Hispanic students in the district, does each class level, i.e. Algebra, Geometry, Advanced Placement (AP) Mathematics, have a 39% Hispanic enrollment?
2. Is the mathematics enrollment of the district comparable for each ethnic group? For example, if 19% of the student population is taking Geometry, is 19% of each ethnic group represented in geometry?
3. How has the success rate in each mathematics course been affected for each ethnicity during this decade of change?
4. How has the success rate of each ethnicity been affected for each mathematics course during this decade of change?

In chapter 2, literature pertinent to this study is reviewed. The review contains relevant background pertaining to the learning and assessment of

mathematics, the effects of tracking in the mathematics classroom, the effects of different learning styles for the teacher and student, and the history of the EQUITY 2000 movement. Chapter 3 provides background information on East Side Union High School District and discusses the methodology used in this study. Chapter 4 reports the results from the data collected. And finally, Chapter 5 provides a summary and suggestions for further research as well as ideas for the classroom.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

Imagine living in the United States of America in the year 1900. There are 45 states in the Union. According to the United States Census Bureau, the population of the United States is 76,094,000. Two percent of that population (1,485,053) is in California (Cox, 2000). The average life expectancy at birth is 41.7 years. The population is close to an even percentage of males and females, yet women cannot vote in elections. People from Japan cannot own land, become citizens or vote. In 1904, African Americans cannot vote. According to the U.S. Department of Commerce, the ethnic breakdown for the nation at that time was 87.8% European American (white), 11.6% African American and 0.6% Asian and other (Hispanic origin population was not collected in 1900). Almost all teenagers work in factories or fields. The average American had to work two hours to earn enough to buy a chicken (Weimers, 2000).

One hundred years later, the year is 2000. Roughly four generations have been born during this time frame. The population in the fifty states of the union of the United States has increased 258% to 272,690,813 people. Twelve percent (33,145,121) of the nation's population live in California. Using data from the 1990 census and a "Population Estimates Program," the U.S. Census Bureau calculated the ethnic breakdown for the nation in July 1999 to be 72% European-American (white), 12% African-American, 12% Hispanic, 4% Asian, and 0.7%

American Indian. All U.S. citizens can vote (except convicted felons). Life expectancy at birth is 76.23 years. There are 90,874 public elementary and secondary schools in operation. A child is expected to attend school through high school (12 grades plus kindergarten) which is completed around the 18th birthday. The average worker has to work about 20 minutes to earn enough to buy a chicken (Weimers, 2000).

According to the United States Census Bureau, in 1999 84% of all adults 25 years and over are high school graduates. The Department of Commerce reported that in 1999, "adults age 18 and over with a bachelor's degree earned an average of \$45,678 a year, while those with only a high school diploma earned \$24,572. Adults without a high school diploma averaged \$16,121" (Newburger & Curry, 2000 p. 1). So while a high school diploma is worth a 52% increase in potential annual pay, a college degree is worth a 183% increase!

A college degree that was once a luxury for 2% of the population (19 people per 1000 persons 28 years old in 1900), now becomes an economic necessity for all. Unfortunately, not all students are given the opportunity to prepare for college. As we celebrate the beginning of the new millennium—the 21st century—equal educational opportunities are mandatory for a just society. The educational system of the past prepared students to be white- and blue-collared workers. White-collared workers came predominantly from groups of European-American ancestry, while blue-collared workers came predominantly from people of color. One century later is the education system unintentionally contributing to the existing power relations among culture groups?

Fluency in mathematics is an important key to the future for all citizens regardless of ethnicity and gender. In advancing society today, citizens who “understand and can do mathematics have significantly enhanced opportunities and options for their future” (NCTM, 2000, p. 5) as compared to the person who avoids (or worse yet, fears) mathematics. “A society in which only a few have the mathematical knowledge needed to fill crucial economic, political, and scientific roles is not consistent with the values of a just democratic system or its economic needs” (NCTM, 2000, p. 5). After one hundred years, what are the mathematical opportunities, experiences, and successes of students based on gender, ethnicity, socioeconomic status and family background?

Factors That Affect College Attendance And Completion

An analysis of data from a U.S. Department of Education longitudinal study of high school classes of 1980 and 1982 (AKA the High School and Beyond or HS&B study), found significant differences between minority and white and poor and non-poor students in college attendance and completion (Pelavin and Kane, 1990). The College Board commissioned this analysis of HS&B and concluded that the main factors affecting college attendance were the completion of college preparatory mathematics courses and the type of high school program in which students enrolled (academic, general, or vocational) (Pelavin and Kane, 1988).

When socioeconomic status (SES), family education, race, ethnicity, and gender are controlled, the common path that leads towards college is the type of mathematics courses completed in high school. More specifically, the College

Board has identified the successful completion of algebra and geometry in high school as the common denominator among students who succeed on the SAT and, ultimately, in college (Fields, 1997). As citizens, educators, and parents we want all students to have the option of going on to college and becoming successful in careers. If the successful completion of algebra and geometry can provide that opportunity, then schools must open the doors to those mathematics classes for each and every student. Lack of access and continual lack of success in school have barricaded the college preparatory gates for many students.

Access to College preparatory experiences

At the turn of the 20th century, only a small percentage of students had access to high school and college education. One century later—at the turn of the 21st century—the situation has changed dramatically. All students under the age of 18 are required to attend school. This statement implies that an equal access to high school education exists. Now the important question is: how does the high school experience compare for “college bound” students and “non-college bound” students?

Inequities

It is the professional opinion of ethnomathematician Ubiratan D’Ambrosio that the entire modern world has been plagued by inequities involving race, gender, culture, economics, and religion.

All these inequities play a role in suggesting that some people are more evolved, some are more intelligent, some are more civilized,

some have more and are entitled to more material comforts. In short, some people feel they are better and deserve more than others. This attitude has been an intrinsic feature of modern occidental philosophy (D'Ambrosio, 1997, p. 245).

Social justice begins by addressing the issue of access to equal educational opportunities and how the labeling, and then the sorting, of students affects access to college preparatory education.

Ethnic Labeling

Labeling research raises some important issues about who defines membership in a given group and the meanings that members attach to their affiliation (Secada, 1992). For example, membership can be imposed from outside, as occurs when the government, school staff, teachers, or even researchers identify individuals as African-American, Hispanic, or other race/ethnicity. Ironically, "members of diverse groups interpret their membership in ways that differ from the interpretation of those who are outside of the groups" (Secada, 1992, p. 627). Based on these membership labels, outsiders attach certain beliefs to the individuals with whom they are interacting. For example, a Hispanic female student who is failing mathematics may be viewed by the instructor as not having the ability to think and reason mathematically or, as not having an educationally supportive family environment. On the other hand, a Vietnamese female student experiencing the same difficulties in mathematics may be viewed as not putting in enough effort.

If students have a label imposed on them by a school system and they disagree with the label—or more importantly—the implications of the label, school may be viewed as an oppressive system. A vicious cycle begins. A

student with an imposed label may not identify with the school culture that imposed the label and therefore may lack the “power” to do well in that environment and in many cases will “purposely learn how not to learn” (Ladson-Billings, 1994, p. 11).

Culture of Power

Lisa Delpit (1995) discusses what she calls “the culture of power.” She presents five aspects of power that lead to alienation and miscommunication:

1. Issues of power are enacted in classrooms [teacher over student, publishers of textbooks, labeling (and sorting) of students, curriculum (and how accurately it presents various cultures)].
2. There are codes or rules for participating in power; that is, there is a “culture of power” [ways of talking, interacting (competitive vs cooperative), dressing, communication styles, expected behavior in classroom].
3. The rules of the culture of power are a reflection of the rules of the culture of those who have power. Children from middle-class homes tend to do better in school than those from non-middle-class homes because the culture of the school is based on the culture of upper and middle classes—of those in power.
4. If you are not already a participant in the culture of power, being told explicitly the rules of that culture makes acquiring power easier.
5. Those with power are frequently least aware of—or least willing to acknowledge—its existence. Those with less power are often most aware of its existence (p. 24).

If a student is not able to access the rules of power, that student is very likely to experience failure in school. Instead of addressing the cultural issue at hand, the school system deems the student below grade level, in need of remediation or, sadly, a troublemaker (depending on how the student deals with the failure). The school system then places that student into lower level classes (especially in mathematics). For that student a vicious, pernicious and often unchangeable cycle of tracking begins.

The Effects of Tracking

This section looks at some of the research completed during this past decade regarding several of the issues around the practice of tracking used in the school system.

Sorting in School

In a National Science Foundation (NSF) sponsored study, Dr. Jeannie Oakes found that assessments of academic ability, placement in different tracks or ability-grouped classes, and the reduced educational opportunities that characterize low-track classes often parallel race and social class differences (Oakes, 1990). Not only are poor students and many students of color experiencing unequal opportunities in their home life, but also in their careers as students in school.

The process of tracking therefore reflects and preserves societal inequities. Tracking, in essence, is a sorting of students that has predictable characteristics. Students are identified in a public way as to their intellectual capabilities and accomplishments and separated into a hierarchical system of groups for instruction (Oakes, 1985). It is conventional for an arbitrary test or a teacher's impression of a student to determine the student's placement level.

A student's experience with this arbitrary test is an example of Delpit's first aspect of power mentioned previously. A student lacking the knowledge of the rules of the culture of power may not understand the significance of the test. A teacher's impression of a student may be influenced by Delpit's second aspect of power—the rules for participating in power. There are expected ways of

talking in class, peer interaction, student-teacher interaction, attire, communication, school yard behavior and parent participation. Students from non-majority cultures may be sorted, labeled, and categorized even before they are asked to take a high-stakes test.

Consequences of Labeling

The process of tracking makes decisions about some students before they are in the classes—that they are not going to succeed—and puts them in courses that are going to limit their life options (Jones, 1997b). If all students are to have equal access to knowledge, tracking must be eliminated (Jones, 1992). In the past, students have been placed into courses based on an outsider's view of their potential. A student may be labeled "college bound" and placed into college preparatory classes. Another student may be labeled "accelerated" and then pushed to complete as many mathematics classes as possible so (s)he can reach advanced placement (AP) classes while in high school. Yet another student may be labeled "non-academic" and placed into non-college preparatory classes.

The problem with tracking is that the damage often done to the "non-academic" student is reprehensible. Students in the lower levels of mathematics may never see themselves as able to "do math." No matter how carefully students are diagnosed "low level," any incorrect placements are life-changing. According to Secada (1992), De Avila and associates asked teachers to select a group of students who would not do well with a particular program. What the researchers found was the teachers were successful in predicting achievement but they were not successful in predicting learning. The sad implication of this is

that a teacher's expectation of low student achievement becomes the reality for many students.

The groups that students are placed in are labeled openly and characterized in the minds of teachers (and others) as being of a certain type—high ability, low achieving, slow, average, and so on (Oakes, 1990). Oakes documents how students in these groups come to be defined by others—both adults and their peers—in terms of the group types. A student in a high-achieving group is seen as a high-achieving *person*, while a student in the low-achieving group is seen as a slow and below average *person*.

Quality of Instruction and Curriculum

In addition, most schools value the different groups unequally. Low-achieving groups need exceptional instruction from the best teachers using the highest quality curriculum. To the contrary, junior and senior high school students in low-ability classes are being taught by teachers considerably less well-qualified than those teaching other levels. Nearly all secondary schools tend to place their least qualified teachers with low-ability classes and their most qualified teachers with high-ability classes (Oakes, 1990). Many times this is a credential issue. For example, in California a teacher teaching high school mathematics who does not have full mathematics authorization can only teach up through Algebra I/Integrated Mathematics 1. In some school districts this is the lowest level of class offered in high school. Lower level mathematics students need teachers with a broad and deep understanding of mathematics and instead they often receive teachers with a narrow and superficial

comprehension of a complex subject.

Research performed in Israeli middle school mathematics classes found that the quality of instruction and interaction in mathematics classes at both extremes is very different. Teachers at the lower level track tended to have low expectations for their students, use a nonacademic curriculum, spend valuable class time managing behavior, and use repetitive drill and practice lessons (Kutscher & Linchevski, 1998). Conversely, teachers at the higher level track had high expectations of their students, provided an interesting, challenging curriculum and a creative learning environment. Oral interaction, a very important part of learning mathematics, was also vastly different in the two tracks. Students on the higher track had the opportunity for rich discussion and dialogue built on the foundation of the curriculum, while students at the other end received discipline and instructions for answering practice problems.

Students on the lower track were not only missing interesting and challenging curriculum, the oral interaction, and the creative learning environment, but often the qualified teacher that understands mathematics at any depth (Kutscher & Linchevski, 1998). Would the need for lower level classes diminish if the best teachers with the strongest mathematics background taught the students that needed the most understanding of mathematics?

Issues with Heterogeneous Grouping

When tracking is removed, students are taught in heterogeneous instead of homogeneous groups. Heterogeneous grouping is controversial as well. The greatest concern is that heterogeneous grouping will slow down the learning and

achievement of high-achieving students. Research indicates that homogeneous grouping does not *consistently* help any level of student learn better (Kutscher & Linchevski, 1998; Gamoran, 1990; Oakes, 1985, 1990) and, in fact, even more studies (Boaler, 1997, 1998; Haury & Milbourne, 1999; Oakes, 1985, 1990, 1992; Slavin & Braddock, 1993) show that the achievement gap between the high level student and the low level student widens within a homogeneous group setting.

Sadly, the campaign for accelerated classes has less to do with what is best for students and their learning and more to do with the parents' strong sense of entitlement. Oakes and her colleagues conducted interviews with parents over a two-year period at 10 schools throughout the nation that had moved to heterogeneous grouping. The authors found that these parents strongly felt that their children were "entitled to more resources, because their children are more intelligent and talented than other students" (Oakes, J., Wells, A. S., Yonezawa, S., & Ray, K., 1997 p. 57). How can our schools promote a just society if there is a push to keep separate and different programs?

Aside from the parental pressure, where is the same (and very valid) concern for the achievement level and learning of the other (not the brightest) learners? It is *critical* to point out that Oakes found that the benefits "accelerated" students experience are not from the homogeneity of the group, but from their enriched curriculum—which lower track students would also thrive on, given sufficient support (1992). The nefarious mistake is in thinking that a detracked curriculum means the elimination of enrichment. Schools that are successful with heterogeneous grouping provide *all* students access to

enriched curriculum.

Post-Secondary Effects of Tracking

Another problem with labeling and sorting students as college bound and non-college bound is that particular students not showing the signs of college aspirations may, after graduation from high school and working, decide they do want to go to college. At this point they will need to take college preparatory classes before starting college work. As educators, we must look at each and every student as a “college intending” student. “This careful choice of words is intended to communicate the idea that any student may choose to pursue college study, and that school mathematics must prepare all of them for that option” (Seeley, 1998 p. 4). Changing the phrase “college bound” to “college intending” has significant ramifications for changing expectations of teachers, counselors, parents and students. The “normal” schooling experience for a “low-ability student”—an inexperienced teacher with limited mathematical knowledge, using curriculum that belittles the students’ intelligence and insults their culture—is not acceptable for any college intending student!

Many mission statements, such as East Side Union High School District’s, are including declarations, “To provide ...learning environment where students achieve the academic...development...required to continue learning, pursue post-secondary education...”. One of the student outcomes listed for ESUHSD is students will be “...lifelong learners”(East Side Union High School District, 1998). If this pledge is to be believed, then it is the duty of every teacher,

counselor and school to provide quality college preparatory work to every student while in high school.

Measuring Success in Mathematics

Measuring mathematical thinking and mathematical development is a controversial issue. Questions raised by mathematicians, teachers, parents, students, and even politicians include some of the following: What is mathematical thinking? How is it measured? What mathematics is important for every high school graduate to know? If a concept is taught one year and the knowledge is not retained, was the learning valid? Does the use of calculators impede or enhance mathematical knowledge? What mathematics should every citizen know in order to be a productive participant in society?

Types of Assessment

Formal assessment in mathematics occurs at various levels. The Third International Mathematics and Science Study (TIMSS) compares students worldwide, while national comparisons are done through The National Assessment of Educational Progress (NAEP), Scholastic Assessment Test (SAT), and other nationally-normed tests like the Stanford Achievement Test (SAT9) and the Comprehensive Tests of Basic Skills (CTBS). Statewide, California has Standardized Testing and Reporting (STAR) which includes the SAT9 and a state standards test. Soon there will be the High School Exit Exam (HSEE) required of all California students graduating from a public secondary school. There is also the Golden State Examination Program (GSE) which is a voluntary end-of-course examination in academic subjects with the goal to increase student achievement

in subjects such as algebra, geometry, biology, chemistry, and economics.

Besides the state level tests, often districts have their own formal assessments as well. Fortunately, with the increase in state use of formal tests, districts are opting to use the same assessment instead of requiring a separate one.

Each of the above assessments has a slightly different method of measuring mathematical thinking and mathematical development. Within the classroom environment, teachers have their own methods of assessing student understanding. Besides formal assessments such as chapter tests and final exams, teachers can look for evidence of learning through a variety of other sources. These may include projects, portfolios, presentations, problems of the week, and class discussions. Any assessment given should provide useful information about the knowledge of the student and provide information to the teacher about student progress towards educational goals.

Formal assessments provide only one viewpoint on what students can do in a very particular situation—often working individually on paper-and-pencil tasks, with limited time to think about and complete the tasks. Over-reliance on such assessments may give an incomplete and, worse yet, a distorted picture of students' performance (NCTM, 2000). It is almost impossible to accurately describe any person with one source of information. Ideally, multiple types of assessments are used if important decisions are made about students, the courses they are to take, and graduation decisions.

Standardized Testing

Content that is valued is assessed. The way we teach deeply affects the way students perceive the content of the curriculum (Ladson-Billings, 1994). Problem solving and inventive thinking cannot be assessed in the 30 seconds that are usually allowed for each multiple-choice question. Standardized test creators care only about whether the student got the right answer. Getting the right answer is a good thing, but it is important to point out that a correct answer does not necessarily mean understanding, just as an incorrect answer does not mean the absence of understanding. "Most standardized tests ignore the process by which students arrive at an answer, so ... a minor calculation error is interchangeable with a major failure of reasoning" (Kohn, 2000 p. 8). A valid assessment measures what it says it is measuring. Can we say that multiple-choice standardized tests are a reliable and valid measure of student understanding? If we, as a school system, are making important decisions about the students based on test scores, we have a moral and ethical obligation to ensure the use of reliable and valid instruments to gather those scores.

Standardized tests, at their best, can measure quantities of facts but cannot measure creativity, critical thinking, problem solving or potential. In fact, no test can measure all of what is learned in school, only a sample of it.

Nathan McCall, an African-American journalist for the Washington Post and author of the national best-selling book Makes Me Want to Holler, recalls his own experiences with standardized tests in school in the 1970's:

...discussions in my African Psychology class at Norfolk State helped me understand why so many white folks walk around thinking they

know everything and why black folks are so psyched out with deep-rooted complexes about what they *think* they don't know. I never did well on standardized tests in school. That stuff bored me stiff. I'd answer questions until I got tired, then lay my head on the desk. Since I never scored high on those tests, I never thought I had much on the ball (p. 243).

How many students test poorly because they *think* they do not know what the "white man" knows before the test has started? Is society unintentionally sending these messages two decades after Mr. McCall's experience?

National Assessment Trends

The general picture of racial and/or ethnic disparities in mathematics achievement that comes from the 1973-1999 NAEP data is that European-Americans perform better in mathematics than do Hispanics who, in all but one year, achieve slightly better than African Americans. Figures 1 and 2 show the trends in age 9 and age 17 average mathematics scale scores by race/ethnicity. See Appendix A for complete data in table form.

Data from 1999-2000 SAT I average mathematics scores show the same ethnic disparity. In comparing Hispanic, African-American and European-American students, female African American students scored the lowest (415 and 419), while white males scored the highest with 548 and 549 (College Board, 2000).

What causes this disparity? Are the NAEP and SAT I culturally biased? Are there other factors that influence test scores? Surprisingly, the strongest predictor of increased SAT I verbal and mathematics scores is family income (College Board, 2000). Table 1 from the College Board web site shows that each \$10,000 increase of family income brings an increase in the mean verbal and mathematics scores.

Figure 1: NAEP trends in age 9 average mathematics scale scores by race/ethnicity

Figure 2: NAEP trends in age 17 average mathematics scale scores by race/ethnicity

Source: National Center for Education Statistics, NAEP 1999 Long-term trend assessment. (Campbell, 2000)

Table 1: SAT I mean scores compared to family income in 2000.

Income	Number of SAT I Test Takers	Mean SAT I Scores	
		Verbal	Math
Less than \$10,000	39,221	425	447
\$10,000 - \$20,000	77,734	447	460
\$20,000 - \$30,000	95,452	471	478
\$30,000 - \$40,000	114,557	490	493
\$40,000 - \$50,000	96,919	503	505
\$50,000 - \$60,000	100,119	511	515
\$60,000 - \$70,000	83,278	517	522
\$70,000 - \$80,000	76,246	524	530
\$80,000 - \$100,000	97,143	536	543
More than \$100,000	146,319	558	571

Source: <http://www.collegeboard.org/sat/cbsenior/yr2000/nat/natbk400.html#income> (01/01/01).

A study of mathematics scores on the 1992 NAEP found that the combination of four variables that had nothing to do with instruction (number of parents living at home, parents' educational background, type of community, and state poverty rate) explained 89 percent of the differences in state scores (Robinson and Brandon, 1994).

Other Assessment Issues

Once again referring to Delpit's second and third rules of power, students considered "high achieving" or "college bound" are most often students who know the rules of the school system. They know how to act and participate in lessons. Some of the expected actions for students include listening to their instructors, looking for cues for answering problems (either from the teacher or

from the textbook), following lessons that are presented by the instructor at the board or overhead projector, and correctly answering similar questions on tests and quizzes (Boaler, 1997). Ironically, students of all races and either gender just want to be given the opportunity to express, and have validated, their knowledge and thought processes.

It has also been shown that students need to feel that their success in mathematics is attributed to their efforts and ability. Students who are basically mimicking the teacher are not putting forth much effort and their ability is related directly to the teacher's lead (Middleton & Spanias, 1999). Students in that type of learning environment will feel disoriented if the teacher is not there to give cues. Research shows that students, especially female students, in a cue-based situation will view mathematics as fixed, inflexible and tied to a textbook and teacher (Boaler, 1997). Mathematics is too important a subject for our students to emerge from twelve years of schooling with these beliefs.

Factors Affecting Success in Mathematics

The attitudes, beliefs and expectations of the teacher, the student, and the parent are important components of experiencing success or lack of success in school mathematics.

Teachers' Attitudes

Teacher attitude, beliefs, and expectations for students are all variables in the success equation for students of mathematics. Lee Stiff, at the 1998 Benjamin Bannaker Association (BBA) Leadership Conference, pointed out that:

Students tend to live up to the expectations we have of them. These expectations can be positive or negative. Often, teachers have negative expectations of many African-American students because they do not fit an image of success by the things they do in the classroom (p. 73).

Teachers' negative judgements of students whose actions do not fit the image of success are again evidence of Delpit's second rule of power in action, even if unintentional.

An even more alarming perspective on the low expectations and negative beliefs about African-American students comes from Ladson-Billings' view of the effect of mainstream society's invalidation of African-American culture.

This invalidation of African American culture is compounded by a notion of assimilationist teaching, a teaching style that operates without regard to the children's particular cultural characteristics. According to assimilationist perspective, the teacher's role is to ensure that students fit into society. And if the teacher has low expectations, the place that the teacher believes the students "fit into" is on society's lower rungs (Ladson-Billings, 1994 p. 22).

Exclusion, whether based on gender, race, class, or any other category, is a way of insulting and injuring people (Kohl, 1991). Teachers are the agents who must work to *include* students with appropriate dialogue and vocabulary, accurate and relevant curriculum, and non-offensive mannerisms.

Parents' Attitudes

As a mathematics educator, it is frustrating to hear repeatedly from otherwise rational adults, "Math is not my subject." Or "I could never do math." Or "My child can't do math, but neither could I so I don't expect them to get it." Or "I can't help my child in math because they are doing math that is way beyond what I learned." Or "Math—I get nervous just talking about it."

The belief in the American culture is that either one has mathematical ability or one does not have it. And the way to “get it” is through genetic inheritance (Ladson-Billings, 1997). Asian parents attribute their children’s mathematical failure to lack of effort and mathematical success to perseverance and hard work. All students would benefit with this proactive way of thinking.

Students’ Attitudes

Another variable in this complex equation is the students’ own beliefs about school and mathematics. “Students will not learn mathematics if they have decided that school has nothing to offer” (Stiff, 1998). If the school system is unintentionally replicating existing rules of power, then a student lacking those rules may not feel the need to attend and perform well in school.

Herbert Kohl labels one behavior of students that feel oppressed at school as “not-learning.” A student who is failing due to lack of knowledge will usually display a frustrated will to know, “whereas not-learning involves the will to refuse knowledge” (Kohl, 1991). Not-learning, however, “tends to strengthen the will, clarify one’s definition of self, reinforce self-discipline, and provide inner-satisfaction. To agree to learn from a stranger who does not respect your integrity causes a major loss of self” (Kohl, 1991). Whatever the reasons for failure, the consequences are often a loss of self-confidence accompanied by a sense of inferiority and inadequacy.

Learning Styles

How many students get frustrated and give up when they can not comprehend the material in the form presented? Reading a ten-page chapter in a

textbook may work for some students, but many learn more effectively with different techniques.

Research by Howard Gardner identified eight different types of intelligences. Gardner defines intelligence as “an ability to solve problems or to create a product that is valued in one or more cultures, and often includes the potential for finding or creating problems so that the groundwork is set for acquiring new knowledge.” (Gardner, 1990). His extensive research has recognized, identified, and described the different human intelligences with eight genera. They are linguistic, logical-mathematical, musical, spatial, bodily kinesthetic, interpersonal, intrapersonal and naturalist.

Our school system, in operation for over a century, has worked best for the student who is linguistic and logical-mathematical intelligent. “Individuals with a certain blend of linguistic and logical intelligence will do well on standard tests, and they will be considered very smart” (Gardner, 1990). The system has been focusing and testing, at best, two of the eight intelligences. Imagine if we could tap into the other six!

Assessment in the Classroom

When we evaluate our students in college preparatory mathematics courses, the “nontraditional college bound” students are not passing in rates comparable to the “traditional college bound” students. Why? School instruction at the college bound level and higher was designed to educate a small percentage of the population. These students generally “know how to pay attention to their teacher(s), learn the skills and procedures presented, and

perform those skills and procedures relatively accurately in assessment situations that are probably comprised of pencil-and paper, short-answer items” (Seeley, 1998 p. 2). Are these the only students with knowledge?

According to Dr. Gardner, Americans have utilized standardized testing to an overzealous degree. In spite of the universality of this testing mania, there is every reason to question its legitimacy. High scores on standardized tests measure how well a student can take the test—not actual working knowledge. There are always bright, new minds out there, but standardized tests are not assessing who they are and who will be successful. Albert Einstein and Thomas Edison are two of history’s most well known examples of brilliant minds that were terrible at taking tests and thus terrible at school in general. As educators, we must ask if we are assessing *what* students know? More importantly, are we assessing *which* students know the material? Many students who do not test well have the content knowledge and, many students who do test well do not have deep content understanding.

In our system, students’ performance in mathematics has been assessed in ways that “underestimate the mathematics capability of most students and perpetuate costly myths about students’ abilities and effort. Too often, tests designed for other purposes have been used unintentionally as filters that deny underrepresented groups access to further study of mathematics” (NCTM, 1995 p. 1). In our multicultural society, we must value the mathematical development of each child. “Assessment procedures must no longer be used to deny students the opportunity to learn important mathematics” (NCTM, 1995 p. 1). We must

find assessment tools that more accurately give a picture of the knowledge a student has and does not have. We must see to it that the bodily-kinesthetic and musical learners are valued for the mathematical knowledge they possess just as we do the linguistic and logical learners.

If the way mathematics is currently taught and assessed alienates many students because it does not appreciate or validate their ways of knowing, then students may choose not to pursue and perform well in mathematics and mathematics-related careers (Becker, 1995). Full active participation in our society points to the need for EVERYONE—not just a few—to possess more and different mathematical literacy than is currently made available in schools (Secada, 1992). Unless we modify the educational experiences that students from “the lower tracks” receive, we will fail to educate people, as citizens of society should be educated.

EQUITY 2000

EQUITY 2000 was one of the more complex reform efforts attempted in United States education. With the goal of academic excellence for all students in mind, the College Board’s EQUITY 2000 educational reform program was designed to test the hypothesis that enrollment and success in the gatekeeper courses of algebra and geometry will bridge the gap in achievement and college-going rates between the traditional college bound and non-college bound students. The program’s goal was not only to bring about change in student achievement levels, but also to influence educational policies and practices with

respect to tracking, professional development, guidance and counseling, and educational leadership within and across school districts (College Board, 1996).

Algebra as a Pump instead of a Filter

Of all the schooling experiences a student confronts during thirteen years of education, successful completion of the first course in algebra has the greatest impact on future opportunities. “Mathematics courses have tended to screen out certain groups, such as minorities, females, and students from low-income families in excessive numbers. This process has contributed to the inequities in employment and income that exist in society today” (Taylor, 1990). In order to have a just and equitable society, we must change certain mathematics classes from gatekeepers or filters into floodgates or pumps that propel students towards equal educational and career opportunities.

Requiring all students to complete algebra 1 does not change an underlying problem—many of our students have been unsuccessful in school mathematics classes throughout elementary and middle school. This lack of success has been both in terms of developing functional proficiency in traditional computational skills and in terms of developing meaningful problem solving skills to help deal with real situations in a changing technological society.

Background

The College Board, founded in 1900, is a national, nonprofit membership association of schools, colleges, and other educational organizations working together to help students succeed in the transition from school to college. The College Board meets the diverse needs of these educational institutions and the

key players (students, teachers and parents) through the development of standards of excellence. "The Board promotes universal access to high standards of learning, equity of opportunity, and sufficient financial support so that every student has the opportunity to succeed in college and work" (College Board, 1997 p. 2).

EQUITY 2000 is a district (K-12) reform movement that the College Board established in 1990 with six sites nationally. The assumption of EQUITY 2000 is that early "exposure of all students to algebra and geometry coursework, along with support for teaching and learning, will increase college-going rates overall and decrease the gap between the rates at which disadvantaged, minority students and nondisadvantaged, nonminority students attend college" (Quiñones, Rodríguez & Bohrnstedt, 1999 p. 1).

The six specific components of EQUITY 2000 are:

- 1) Districtwide policy changes to end tracking and raise standards, beginning with the requirement that all students complete algebra by the 9th grade and geometry by 10th grade;
- 2) Ongoing professional development for teachers, counselors, and principals;
- 3) Student academic enrichment "safety nets," such as Saturday Academies;
- 4) Empowering parents to become advocates for their children's education;
- 5) School-community partnerships that include links with colleges, the business sector and community based organizations; and
- 6) Use of student enrollment and achievement data broken down by ethnic group and gender to drive decisions and monitor the reform process (College Board, 1995 p. 2).

Timeline for EQUITY 2000 in East Side Union High School District

In June of 1990, the EQUITY 2000 project concepts were outlined to the local school districts in the San José area. A meeting in Fort Worth, Texas with

the six regional sites during December of 1990 provided an overview of the project by the College Board. A letter of agreement with the local districts and the College Board was signed in February of 1991.

School administrators, teachers, counselors, and board members went through an EQUITY 2000 orientation for the local consortium. Once committees were formed and support staff hired, a mathematics institute for middle school teachers was given in the summer of 1991. All high school sites were represented by their feeder schools at this institute. During the same summer, guidance counselors attended an institute in Maryland. Both institutes had follow-up days of inservice during the 1991-92 school year.

During the summer of 1992, a high school mathematics institute was held as was a second guidance institute (this time locally). A summer school course titled "Equity mathematics" was offered for the first time to incoming ninth graders. During the 1992-93 school year the EQUITY 2000 program developed a Principal's institute, established Saturday academies for middle school students, organized follow-up inservices for the summer institutes, established model resource centers at three middle schools, and established a higher education component.

This process of institutes, academies, and follow-up inservices continued during the 1993-94 school year. After this third year of institutes, nearly all of the mathematics teachers and guidance counselors in East Side Union High School District had received training about EQUITY 2000. The school board of East Side Union High School District agreed to a policy that all incoming 9th grade students

would be enrolled in Algebra I/Integrated Mathematics 1 or higher by September 1994.

Data collected by the College Board in 1990-91 showed that 37% of 9th grade ESUHSD students were enrolled in Algebra I or higher. The number increased to 45% in 1991-92. The 1994-95 school year was the last year this type of data were collected; they showed that 85% of 9th grade students were in the appropriate high school level course.

Continued Research

EQUITY 2000 continues to collect data by following three successive cohorts of students (starting with the students who were in the 9th grade when EQUITY 2000 was implemented). A transcript analysis and an analysis of data collected from Senior Surveys are being completed by American Institutes for Research (of which Pelavin Research Center is a part).

In the meantime, teachers in East Side Union High School District want to know about the effects of EQUITY 2000 on students' course taking and success rates in mathematics. The next chapter discusses the methodology used in this study to answer those questions.

CHAPTER 3

METHODOLOGY

Background

When the expectations of students are raised, students will rise to the new standard. When students are held to a lower standard, it most often becomes a self-fulfilling prophecy (Jones, 1997a).

The district studied, East Side Union High School District (ESUHSD), raised the standard significantly in 1994 by requiring all incoming 9th graders to take Algebra I/Integrated Mathematics 1 (or higher) as their entry-level mathematics class. The belief was, if students succeed in Algebra I/Integrated Mathematics 1 in 9th grade and Geometry/Integrated Mathematics 2 in 10th grade, then they are more likely to go on and succeed in college. Many mathematics teachers voiced strong opinions of why “Algebra for all” was dooming students to failure. After six years of implementation, I wanted to know how students were achieving. Were they having success in their mathematics classes and were they going on to higher mathematics?

Overview of District

The East Side Union High School District encompasses a 180 square mile area of San José, bordering on “Silicon Valley” in Santa Clara County, California. It is one of California’s largest high school districts (grades 9–12), with an enrollment of over 24,500 students. The district operates ten comprehensive high schools, four alternative schools, and one continuation high school. The district

also administers an Adult Education Program that serves over 20,000 adults. The student population is multicultural and is comprised of 38.8% Hispanic, 25% Asian, 18.7% White, 9.9% Filipino, 5.8% African American, 0.8% American Indian, 0.9% Pacific Islander and 0.1% other. East Side employs 1,357 certificated and 813 classified staff members and 314 adult education teachers. The East Side community has a population of over 434,000, rich in racial and cultural diversity. The community has a tradition of involvement and interest in its schools. It is considered an ideal community because of its appealing climate, convenient geographical location and proximity to cultural centers and numerous institutions of higher learning.

Graduation Requirements

As of this writing, in order to graduate from ESUHSD, a student needs to earn 220 units. Twenty of those units must be in mathematics at the Algebra I/Integrated Mathematics 1 (IM 1) and Geometry/Integrated Mathematics 2 (IM 2) level or higher. There is a movement to change the graduation requirements by increasing the number of units and required mathematics and science courses.

The course sequences for mathematics classes before and after implementation of EQUITY 2000 are shown in Figures 3 and 4 respectively.

Since there is a two-year mathematics graduation requirement in this district this research project investigated how EQUITY 2000 affected student enrollment in classes above Geometry/Integrated Mathematics 2. More specifically, does the ethnic breakdown in the classes above Geometry/Integrated Mathematics 2 match the ethnic breakdown of the district?

Figure 3: Mathematics course sequencing in ESUHSD before EQUITY 2000

Note: Courses in blue are college preparatory mathematics classes.

Figure 4: Mathematics course sequencing in ESUHSD after EQUITY 2000

Is the district truly providing equal opportunities and ensuring equal outcomes?

This chapter describes methods used to calculate success rates and ethnic counts. Constraints that were encountered will also be discussed.

Time Frame Studied

In order to answer these questions, the research planned to examine data from the fall and spring semesters of 1989-90, 1995-96, and 1999-2000 school years. Those three school years were chosen for several reasons.

Initially, 1989-90 was chosen as the “before” snapshot of the district. Even though EQUITY 2000 was in discussion phases from 1990-1993, there was at least one school working towards eliminating tracking in the mathematics curriculum as early as the 1990-91 school year. Unfortunately, the data for the 1989-90 school year were not available, so 1990-91 provides the “pre-EQUITY 2000” look at the district.

The academic year 1995-96 gives a mid-implementation picture of the district. Besides being the middle of the time frame studied and one year after the school board policy, 1995-96 was the first year of a new computer data system which provided access to data in a more completely disaggregated form.

Finally, 1999-2000 gives a “post-EQUITY 2000” snapshot. During this year, the district switched to another computer system, but information was also kept on the previous system as a back-up. This allowed for consistency in the form of reports.

Data were collected and analyzed during the 1998-99 school year so this year is included to help document the enrollment and achievement trends of

students. The time frame of 1990-2000 allowed the investigation to focus on the trends of one decade of student learning for this urban district.

District Computer Systems

During the 1990-2000 time frame, this district changed computer systems for reporting student data three times. The first system, Panamation, was in use from 1984 to 1994. The second system, Digitronics, was used from 1994 until 1999. A new system, School Administration and Student Information (SASI), was implemented in 1999 as a vehicle to allow ESUHSD to receive student data from the seven elementary districts that feed into it. As a student moves from one district to another, course information and test scores will travel with the student.

These system changes proved to be troublesome in retrieving data in the form desired for the 1990-91 school year. The definition of success used in this thesis is a student receiving an A, B or C in a class. This is consistent with the district's definition as of 1996. Prior to this time, Ds were also counted as success since a student receives credit for the course if they earn a D. The irony is that a student receiving a D is not considered eligible to go to the next level of class. For this reason, it was not consider it to be an appropriate measure of success for this investigation.

Data for District and State Ethnic Trends

Ethnic data for the district and for the state were taken from the California Basic Educational Data System (CBEDS) which is a statewide database providing

statistical information about schools, teachers, and students. This information is collected from each public school in the state in the fall.

From the CBEDS database, state and district data for each school year during the 1990-2000 time period were garnered. These data more accurately show the ethnic population trends over time for both the state and the district and allow a comparison between the two. These descriptive data are presented numerically and graphically.

Note that the data for the three years studied have combined all of the Asian categories. This was not the original intent, but needed to happen once the data for 1990-91 were retrieved. The enrollment and success data for 1990-91 combined Asian, Filipino, and Pacific Islander students. The original plan was to have the following categories: American Indian/Pacific Islander, Asian, Filipino, Hispanic, African-American, and European-American. Since the 1990 data combined Pacific Islander, Asian, and Filipino, and since the numbers for American Indian were relatively small, it was decided to combine American Indian with this group as well. Each ethnicity in the "Asian" category should have been separated to validate the uniqueness of each culture. However, limitations in how the data were reported prevented that separation.

Data sources

This section will discuss how the enrollment rates were found, as well as the calculations used to determine success rates for each ethnicity.

Definition of Success

As mentioned previously, success was defined to be receipt of a mark of

A, B or C in a mathematics course. Students who received a mark of D, F, I (incomplete), or NM (no mark) were counted as unsuccessful. Because the district data included marks for both semesters it was not clear how to count the number of successful students. The decision was made to count both semesters. This gave the number of semesters per school year of success for each ethnic group. The number of unsuccessful students for each semester was also counted. To obtain the success rate for each ethnic category, the number of successful semesters was divided by the sum of the successful and unsuccessful semesters. Changing this to a percentage compensated for each student being counted twice. Data were counted for each individual school in the district.

Many students who do not pass a mathematics class in the regular school year go to summer school to make it up. Because summer school students would be counted once as unsuccessful in the school year and once as successful or unsuccessful in the summer, the decision was made to not include the summer school students.

Data Reports Used

The report used to generate the number of each mark for each semester is called a "GRD11" report. The GRD11 was reported by mathematics class, by school, and by semester. The report shows the number of A, B, C, D, F, I, and NM for each ethnicity by grade level in school (see Appendix B for a sample report). It also breaks out the marks by gender and by grade level. Unfortunately, it does not break out the marks by gender within the ethnicity. Thus the original intent to investigate the success of each gender within each

ethnicity was not possible with any of the reports available.

From the GRD11 report for each school and each mathematics course. classes that were comparable like Algebra I and Integrated Mathematics 1 were combined. Also included in these data were any sheltered and bilingual classes for each level. Classes that were coded for Special Education students only were not included. However, any special education students that were mainstreamed into regular classes were counted.

It was more difficult to retrieve the data for the 1990-91 school year as the Digitronics system did not allow one to access the data in the form needed. Unfortunately, it was not a productive search. Fortunately, one of the principals of the district had collected and saved data for all the school years from 1990-1994. These were used as a basis for the 1990-91 data. The data report used for the 1990-91 school year was a special report run for the district on March 3, 1993 titled "EQ2000_RPT". A sample copy is included in Appendix C.

Issues with 1990-91 Data

EQUITY 2000 data from the "EQ2000_RPT" were collected in 1993 and again in 1994 and then sent to the College Board. This report included information about the 1990-91, 1991-92, 1992-93, and 1993-94 school years. Each mathematics course had three pages of data for each of the two semesters (the exception is 1990-91 which only had the spring semester data). The first page of data showed the number of students enrolled in the given course. The second page showed number of students "passing" the given course. Finally, the third page of data showed the number of students receiving a B or above. The

problem with this format is that the number of students passing includes D students. The data collected for the 1995-96, 1998-99, and 1999-2000 school years included only the number of students receiving a C or better. Due to the limitations of data reporting, success rates for mathematics classes were only calculated for the 1995-96, 1998-99, and 1999-2000 school years.

Calculating Enrollment in Mathematics Classes

When calculating the number of students in any given mathematics class the number of students for both semesters who were successful in any given class was added to the number of students for both semesters who were unsuccessful. This total was then divided by two. This gave the mean number of students that finished the course. Granted this may not accurately reflect the number enrolled at the beginning of the school year (which would be higher), but for purposes of this paper, it answers how many were enrolled and finished (even if it was an unsuccessful finish).

During the 1999-00 school year, one of the schools implemented a new method for students to earn mathematics credit in Integrated Mathematics 1. The standard method has students receiving five credits at the end of each semester if they earned an A, B, C, or D in the class. This new method involved a focused curriculum with specific objectives for each of the six marking periods. If a student demonstrated mastery of the objectives they received an A, B, or C (no Ds) and either 1.5 credits or 2.0 credits (depending on the unit). The outcome at the end of the year was still 10 credits in mathematics if the student was successful, but there was more accountability for students that were not

successful. A student receiving an F in one of the six marking periods is required to attend an after school class to make-up the objectives missed. So in the calculation of student enrollment in Integrated Mathematics 1 for that school year at that one school, data were collected for all 6 marking periods. The mean was then found with those six numbers instead of the two semesters of data at the other schools.

In order to find the percent of each ethnicity enrolled in each level of mathematics class, the number of students of each ethnicity enrolled in each class were divided by the ethnic total as reported by CBEDS. In this process, a limitation with the CBEDS data was discovered. Once the enrollment by class for each ethnicity was completed, it was discovered that there were a large number of students unaccounted for. It was first assumed these students were not enrolled in mathematics classes. It was then discovered that the CBEDS numbers also included students enrolled in the continuation school and alternative forms of education, while the success data by mathematics class did not include these students. The number of students in the continuation school and alternative education represent approximately 12% of the district population, so it is unfortunate that the data could not have been separated to show the regular high school population. When this issue comes up in chapter 4, the bar graphs have a category titled "No math, Continuation school, and Alternative education."

Mathematics Classes

This next section provides a description for each of the mathematics classes offered during the pre- and post-EQUITY 2000 time period. The course descriptions that follow come from narration used in school course catalogs.

Descriptions in 1990

Introduction to Algebra was primarily for 9th grade students. It was designed to prepare students for successful achievement in Algebra I. The course reviewed and reinforced the principles of arithmetic, while introducing many algebraic concepts.

Math A was the first year of an integrated math sequence which was designed to meet the needs of incoming 9th grade students who were not yet ready for Algebra I. This course was non-remedial and satisfied one year of the high school mathematics graduation requirements while providing the option of entering a college preparatory sequence. The curriculum included introductory topics from Algebra I and Geometry plus topics from statistics, probability, function and discrete mathematics.

Math B was the second course in a 9-12 non-college preparatory integrated math curriculum. This course included some of the concepts contained in the Algebra I, Geometry and Algebra II curriculum plus concepts from statistics, probability, and discrete mathematics. The course satisfied a second year high school mathematics graduation requirements, and gave students the option of entering a college preparatory sequence.

General Mathematics was a course intended to strengthen and further develop skills learned through the eighth grade by the use of meaningful and varied drill exercises.

Math 1-4 were consecutive one year courses for entering students who were deficient in basic skills. The student worked on concepts in which an interim test had revealed a weakness. By continual progress, the student moved through the concepts of the course. Depending on the student's progress, the course could have taken one to four years.

Consumer Mathematics was a comprehensive course in consumer and basic mathematics for students who were terminating their formal education, or who were deficient in mathematics, or who needed a practical mathematics course for completion of their secondary mathematics requirements, or for college preparatory students not intending to pursue a scientific vocation. Successful completion of this course fulfilled the competency level in mathematics required for graduation by the State of California.

Introduction to Computer Science 1 was designed to be a two semester introductory course in high level programming languages. The students were exposed to a minimum of two of the following languages: BASIC, Logo, and Pascal. In addition to these languages, at least one quarter consisted of software applications and fourth generation programming languages.

Algebra I was the first course in the traditional four-year college preparatory mathematics sequence. The course covered the properties of the real number system, the solving of equations and inequalities, and techniques for

problem solving. Emphasis was placed upon linear and quadratic functions.

Geometry was the second course in the traditional four-year college preparatory mathematics sequence. It was an investigation of the properties and relationships of points, lines, and planes and 2- and 3-dimensional figures with their applications in area, volume, and proportions. It included an introduction to analytic geometry, a study of the structure of logic and deductive, inductive, and intuitive reasoning and the development of proof and demonstration.

Algebra II was the third course in the traditional four-year college preparatory mathematics sequence. The material covered was an extension of Algebra I with emphasis on quadratic functions, properties of number systems, structure, the system of complex numbers, matrices, determinants, progressions, series, logarithms, and graphing.

Trigonometry/Math Analysis was the fourth course in the traditional four-year college preparatory mathematics sequence. The course was designed to prepare students for college level courses such as calculus and abstract algebra. The course emphasized the analysis of the algebraic and trigonometric functions with attention given to their graphs. In addition the course covered vectors, operations with vectors, and applications of vectors to the solution of problems.

Calculus (APAB) was a two-semester course covering the topics prescribed by the College Entrance Examination Board for advanced placement in Calculus AB. Calculus (APBC) was a two-semester course covering the topics prescribed by the College Entrance Examination Board for advanced placement

in Calculus BC.

The goals of Advanced Placement Computer Science 1 were comparable to those of a first year college computer science course. The course was a two-semester introductory computer science course in Pascal and data structures. The course prepared students for the Advanced Placement Computer Science Examination.

The purpose of Advanced Placement Computer Science 2 was to expand on the concepts students had learned in Advanced Placement Computer Science 1. Practice with programming in Pascal was an important component of this course. Students who have not taken the Advanced Placement Computer Science Examination were encouraged to do so at the conclusion of the course.

1990-91 Curricular Issues

During this school year all schools offered some course below Algebra I/Integrated Mathematics I. There was a district curriculum for Math A used at many of the schools. All schools offered Consumer Mathematics to junior and senior students. Many of the schools were using some form of an algebra book, but there was no consistent book in the district. One school began implementing an Integrated Mathematics curriculum as a pilot. All schools used the same Geometry, Algebra II, and Math Analysis textbook.

Introduction to Computer Science was offered during this school year, but the data were not included for this study. The prerequisite for this class is Algebra I/Integrated Mathematics I, so it could not be counted as below Algebra. However, it was coded as a college preparatory class so it could not be

counted as a Geometry level course. It was decided to include it with the “No mathematics and Alternative Education” data.

Descriptions in 1999

Consumer Mathematics is a comprehensive course in consumer and basic mathematics for students who are deficient in mathematical proficiency and who have not yet fulfilled all mathematics and proficiency requirements. (This course was last offered in 1999-00 and is no longer available to any student.)

Introduction to Computer Science 1 is a two-semester course that teaches basic concepts of computer science through programming and computer graphics. The students will learn at least one high-level programming language from among: BASIC, Logo, Pascal, C++, or Java. In addition, the students will learn basic skills of computer operating systems, spreadsheets and charting, relational databases, telecommunications, presentation software, computer graphics and game theory, and data encryption and decryption.

Algebra I is the first course in the traditional four-year college preparatory mathematics sequence. The course covers the properties of the real number system, the solving of equations and inequalities, and techniques for problem solving. Emphasis is placed upon linear and quadratic functions.

Geometry is the second course in the traditional four-year college preparatory mathematics sequence. It is an investigation of the properties and relationships of points, lines, and planes and 2- and 3-dimensional figures with their applications in area, volume, and proportions. It includes an introduction to analytic geometry, a study of the structure of logic and deductive, inductive,

and intuitive reasoning and the development of proof and demonstration.

Algebra II is the third course in the traditional four-year college preparatory mathematics sequence. The material covered is an extension of Algebra I with emphasis on quadratic functions, properties of number systems, structure, the system of complex numbers, matrices, determinants, progressions, series, logarithms, and graphing.

Integrated Mathematics is a three-year sequence of college preparatory mathematics. Over a three-year period, Integrated Mathematics presents the core of traditional algebra and geometry curriculum while integrating concepts from statistics, probability, trigonometry, and discrete mathematics. The courses have been written to prepare students for success in their daily lives, careers, and college in the 21st century by helping them develop their abilities to explore and solve mathematical problems, think critically, work cooperatively with others, and communicate ideas clearly. These courses are built on the idea that students develop better conceptual understanding of mathematics and stronger problem solving skills when they see the connection among different branches of mathematics, are actively involved in the learning process, and study mathematics that is meaningful.

Math Analysis is the fourth course in the traditional four-year college preparatory mathematics sequence. The course is designed to prepare students for college level courses such as Calculus and Abstract Algebra. The course emphasizes the analysis of the algebraic and trigonometric functions with attention given to their graphs. In addition the course covers vectors, operations

with vectors, and applications of vectors to the solution of problems.

Calculus (APAB) is a two-semester course covering the topics prescribed by the College Entrance Examination Board for advanced placement in Calculus AB. Calculus (APBC) is a two-semester course covering the topics prescribed by the College Entrance Examination Board for advanced placement in Calculus BC.

The goals of Advanced Placement Computer Science 1 are comparable to those of a first year college computer science course. The course is a two-semester introductory computer science source in Pascal and data structures. The course prepares students for the Advanced Placement Computer Science Examination.

The purpose of Advanced Placement Computer Science 2 is to expand on the concepts students have learned in Advanced Placement Computer Science 1. Practice with programming in Pascal is an important component of this course. Students who have not taken the Advanced Placement Computer Science Examination are encouraged to do so at the conclusion of the course.

The purpose of the Advanced Placement course in statistics is to introduce students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Students are exposed to four broad conceptual themes: exploring data, planning a study, anticipating patterns, and statistical inference. Students who successfully complete the course and examination may receive credit, advanced placement, or both for a one-semester introductory college statistics course. This course was offered for the first time in East Side Union High School District during the 1997-98 school year.

1999-00 Curricular Issues

Math 1-4 and Intro to Algebra are offered to a very small, select group of students who are new to the country and have had less than five years of formal schooling in their home country. In the ten high schools in East Side, there are some using all three years of Integrated Mathematics, some using the more traditional Algebra I, Geometry, Algebra II, and some using Algebra I, with Integrated Mathematics 2 and 3. Schools are using recently purchased textbooks that are from two series of three books. One series promotes the more traditional separated approach (Algebra, Geometry, and Algebra II), while the other promotes the integrated model. All schools use the same Math Analysis and Calculus book.

Conclusion

Student information regarding ethnicity and grade received in mathematics class were retrieved from hard copy and computer database system. Data were counted, recounted, tabulated, displayed and interpreted. The next chapter discusses the results of the work described.

CHAPTER 4

RESULTS

This chapter examines trends during the decade of 1990-2000 in order to determine the effect of EQUITY 2000 on the mathematics classes students took and their achievement in those classes. In order to evaluate the effect of EQUITY 2000, student population trends, by ethnicity, in the State of California, the County of Santa Clara, and in the East Side Union High School District were examined. Next, the enrollment trends, by ethnicity, in the mathematics classes of East Side Union High School District were examined. Lastly, the success rate trends of students, by ethnicity, in the mathematics classes of East Side Union High School District were examined.

Student Population Trends, by Ethnicity

This section compares the enrollment trends of students of each ethnicity for the state, the county and the district. This is done to see how the East Side Union High School District student body compares with the student make-up in the State of California and the County of Santa Clara.

State of California

As of CBEDS day in October 1999, the K-12 student population in the State of California was 5,951,612 students. There were seven ethnic categories reported. The seven categories listed were American Indian, Asian, European American (white), Filipino, Hispanic, Pacific Islander, and African American

(black¹). Figure 5 shows the trends of each ethnicity in the California student population over the past decade. In general, five of the seven ethnic population percentages have remained constant. Over the decade, the percentage of Hispanic students has increased from 34% to 42% while the percentage of European-American students has decreased from 46% to 37%. During the 1996-97 school year, the percentages for Hispanic students and European-American students were equal. See Appendix D for a table of actual percentages for each ethnicity.

Santa Clara County

Roughly four percent of the state's student population resides in Santa Clara County. As of the same CBEDS day in 1999, there were 254,782 K-12 students in Santa Clara County. All of the ethnic population percentages (and trends) except Asian were relatively consistent with the state's percentages.

The main difference between the state and the county population is that the state's Asian population hovered around 8% during the entire decade while the county's Asian population was 18% in 1990 and increased to 21% in 1999. As with the state, the European-American percentage declined, but not as sharply. The county went from 40% to 35% of European-American students, while the state went from 46% to 37%. County Hispanic student trends also showed a slight increase as did the State of California. In 1993 (data were not available for

¹ Prior to 1998-99, African-American and European-American ethnic groups were referred to as "black" and "white". In 1998-99, "black" was replaced by African-American. "White" is still in use as of 1999-00.

Figure 5: State of California K-12 student population trends during 1990-2000.
Source: [http://www.cde.ca.gov/demographics/reports/statewide/ethstu\(01/21/00\)](http://www.cde.ca.gov/demographics/reports/statewide/ethstu(01/21/00))

1990-1992), 30% of the county student population was Hispanic compared with 33% in 1999.

East Side Union High School District

Approximately ten percent of the county student population attends East Side Union High School District (ESUHSD) schools. As of the 1999 CBEDS day, there were 24,452 students in the district. Figure 7 presents the student population trends by ethnicity from 1990-1999 for the district. The CBEDS counts include all students from the ten comprehensive high schools, four alternative high schools, and one continuation school.

Student Population Differences

There are four main differences in the student population of ESUHSD as compared with the State of California. One difference is which ethnic group represents the majority of students. In ESUHSD, the largest ethnic group during the entire decade is the Hispanic group. With the State of California, the European-American group was the largest until 1996-97, when Hispanic and European-American populations were comparable. The following year, Hispanics outnumbered European-American students.

Another difference occurs for the Asian population. In ESUHSD, the Asian population is the second largest group, making up approximately 25% of the student population. Statewide, the Asian population hovers around 8% and is the fourth largest group.

A third difference concerns the Filipino population. In ESUHSD, the Filipino population began at 8% in 1990 and increased to 10% in 1999. In the

Figure 6: Santa Clara County K-12 student population trends during 1993-2000
Source: [http://data1.cde.ca.gov/dataquest/Disfrmr2.asp?Select=4369427\(01/02/01\)](http://data1.cde.ca.gov/dataquest/Disfrmr2.asp?Select=4369427(01/02/01))

Figure 7: East Side Union High School District 9-12 student population trends 1990-2000
Source: [http://www.ed-data.k12.ca.us/fiscal/ethnicrends.DisCode-4369427\(06/27/00\)](http://www.ed-data.k12.ca.us/fiscal/ethnicrends.DisCode-4369427(06/27/00))

State of California, Filipinos made up approximately 2.3% of the student population across the decade.

The last difference is with the African-American population. In ESUHSD, there was a slight decrease in this ethnic group over the decade from 7.1% to 5.0%. Statewide, this population was consistently around 8.7% of the student population the entire decade.

Student Population Similarities

The similarities in the trends between the state and ESUHSD include the Hispanic population increasing and the European-American population decreasing during the decade. Also, American Indian and Pacific Islander populations are consistently low during the decade for both the state and the district. Both ethnic populations together constitute 2.0% of the student population for the state and for the district.

Mathematics Class Enrollment Trends, by Ethnicity

The first research question for this study asks if the ethnic make-up of each level of mathematics class reflects the ethnic make-up of East Side Union High School District. That is, if there are 39% Hispanic students in the district, does each class level, i.e. Algebra, Geometry, AP Mathematics, etc. have 39% Hispanic enrollment? In this section, a comparison of the enrollment trends, by ethnicity, in mathematics classes for ESUHSD during the decade of study will be shown in order to answer this question.

1990-91 School Year

During the 1990-91 school year, there were 33.4% Asian², 35.0% Hispanic, 7.1% African-American and 24.5% European-American students enrolled in East Side Union High School District. Figure 8 is a bar graph that compares this ethnic distribution for the district with the ethnic distribution for each level of mathematics class offered during this time period. The bar that represents Integrated Mathematics 1/Algebra I has the closest ethnic distribution to the district make-up. Advanced Placement Mathematics has the ethnic distribution that is furthest from that of the district.

Table 2:

Percentage ethnic make-up for mathematics courses in ESUHSD during 1990-91.

1990-91	Asian, Filipino, American Indian, Pacific Islander	Hispanic	African American	European American	# of students enrolled in class
District Breakdown	33%	35%	7%	25%	
AP Mathematics	79%	7%	2%	12%	622
Math Analysis	65%	9%	3%	23%	1191
IM 3/ Algebra II	50%	16%	5%	29%	2026
IM 2/ Geometry	45%	20%	6%	30%	2749
IM1/ Algebra I	36%	28%	7%	28%	4031
Below Algebra	22%	51%	9%	18%	8253
Comp. science, No math, Alternative ed.	17%	43%	8%	31%	3101

² The Asian category for this study encompasses Asian, Filipino, American Indian, and Pacific Islander.

Figure 8: Ethnic make-up of each mathematics course during 1990-91

Source: EQ2000_RPT

Reading across in Table 2, one can see the percentage breakdown for each mathematics class. As mentioned previously, Algebra I/Integrated Mathematics 1 has an ethnic distribution closest to the district make-up. In that class, the Hispanic students are underrepresented by 7%, while the other ethnic groups are within $\pm 3\%$ of their district population.

Reading down in Table 2, one can see that the African-American students have several classes where their representation in that class closely matches that of their district population percentage. Upper level classes of Math Analysis and AP Mathematics, however, are underrepresented by African-American students.

1995-96 School Year

During this school year, there were 35.2% Asian, 38.2% Hispanic, 6.3% African-American and 20.3% European-American students enrolled in the district. Figure 9 is the bar graph that compares this ethnic distribution for ESUHSD with the ethnic distribution for each level of mathematics class offered during this time period. The bar that represents Integrated Mathematics 1/Algebra I is again the closest ethnic distribution to the district make-up, although it is not as close of a match as the 1990-91 school year. Again, AP Mathematics was the furthest from the district's make-up.

Table 3:

Percentage ethnic make-up for mathematics courses in ESUHSD during 1995-96.

1995-96	Asian, Filipino, American Indian, Pacific Islander	Hispanic	African American	European American	# of students enrolled in class
District Breakdown	35%	38%	6%	20%	
AP Mathematics	71%	10%	3%	16%	754
Math Analysis	64%	15%	3%	18%	1304
IM 3/ Algebra II	55%	21%	4%	20%	2449
IM 2 Geometry	44%	29%	6%	22%	3675
IM 1/ Algebra I	29%	45%	7%	19%	7577
Below Algebra	18%	65%	6%	11%	911
Comp. science, No math, Alternative ed.	20%	48%	7%	25%	5412

Reading across in Table 3, Algebra I/Integrated Mathematics 1 is again the closest match to the ethnic make-up of the district. In that class however, there are more Asians represented and an under-representation of Hispanics. The Hispanic students are over-represented in the "Below Algebra" and "No mathematics" categories. The district population is 38% Hispanic, yet 65% of the students in courses below algebra are Hispanic. Of the students not enrolled in mathematics, taking computer science, or enrolled in some form of alternative education, 48% of them are Hispanic. Compare this to the AP mathematics classes where only 10% of the students are Hispanic.

Figure 9: Ethnic make-up of each mathematics course during 1995-96

Source: CRD11 printed July 13, 2000

1999-00 School Year

During this school year, there were 38.8% Asian, 39.3% Hispanic, 5.0% African-American and 16.9% European-American students enrolled in the district. Figure 10 is the bar graph that compares this ethnic distribution for ESUHSD with the ethnic distribution for each level of mathematics class offered during this time period. During this year, the bar that represents Integrated Mathematics 2/Geometry has the closest ethnic distribution to the district make-up. As in the prior two years of study, AP Mathematics was the furthest from the district's make-up.

Table 4:

Percentage ethnic make-up for mathematics courses in ESUHSD during 1999-00.

1999-00	Asian, Filipino, American Indian, Pacific Islander	Hispanic	African American	European American	# of students enrolled in class
District Breakdown	39%	39%	5 %	17%	
AP Mathematics	78%	10%	2%	10%	1226
Math Analysis	70%	13%	3%	15%	1610
IM 3/ Algebra II	56%	22%	5%	17%	3073
IM 2/ Geometry	42%	35%	4%	18%	4578
IM 1/ Algebra I	29%	51%	5%	15%	7251
Below Algebra	16%	62%	5%	16%	164
Comp. science, No math, Alternative ed.	25%	49%	6%	20%	6550

Figure 10: Ethnic make-up of each mathematics course during 1999-00

Source: GRD11 printed July 13, 2000

Reading across in Table 4, one can see that Geometry/Integrated Mathematics 2 has an ethnic distribution that almost matches that of the district's. Math Analysis and AP Mathematics classes are under-represented by Hispanic, African-American, and European-American students.

Reading down in Table 4, one can see that the African-American and European-American students have several classes where their representation in those classes closely matches that of their district population percentage. Both groups of students are under-represented in AP Mathematics. Again reading down, the Asian students are over-represented in each class above Algebra I/Integrated Mathematics 1.

Enrollment Trends by Mathematics Class

Over the ten-year span of this study, the enrollment trends show an increase for each class except the category "Below Algebra." This category had the highest enrollment of all the classes in 1990 (38% of ESUHSD population) and the lowest in 1999 (1.3%) of all the classes. Figure 11 is a trend graph that shows these comparisons.

Algebra I/Integrated Mathematics 1 enrollment went from 18.4% in 1990-91 up to 34.3% enrollment in 1995-96 and then dropped to 30% during the last two years of the study. This means that in 1990-91, there were 4,031 students taking Algebra I/Integrated Mathematics 1, but in 1995-96 there were 7,577 students and in 1999-00 there were 7,251 students in this course.

Figure 11: Mathematics course enrollment trends for East Side Union High School District

Geometry/Integrated Mathematics 2 went from 12.5% enrollment in 1991-92 and increased over the decade to 18.7% in 1999-00. This translates to 2,749 Geometry/Integrated Mathematics 2 students at the beginning of the decade up to 4,578 students in 1999-00.

Algebra II/Integrated Mathematics 3 enrollment went from 9.2% (2,026 students) up to 12.6% (3,073 students) over the ten year span.

Advanced Placement Mathematics went from 1.4% enrollment in 1990-91 (only Calculus AB and BC were counted), to 5.0% in 1999-00 (besides Calculus, Computer Science 1 and 2, and Statistics were counted). So in 1990-91 there were 622 Advanced Placement students in ESUHSD, but in 1999-00 there were 1,226.

Enrollment Trends in Mathematics within Ethnic Groups

This section presents the mathematics class enrollment for each ethnic group. These data address the second research question—is the mathematics enrollment of the district comparable for each ethnicity? For example, if 19% of the student population are taking geometry, are 19% of each ethnic group represented in geometry? Bar graphs will show the mathematics course enrollment for the 1990-91, 1995-96 and 1999-00 school years for each ethnic category. For ease of comparison, each bar representing the enrollment of a particular ethnic group has a district enrollment juxtaposed with it. Ideally, the colored bands of the bar on the left of each pair should match that of the district (the bar on the right of each pair). Appendix E provides the data for each ethnicity in table form.

Asian, Filipino, American Indian, Pacific Island Students

During each of the three years studied, the “Asian” enrollment in “Below Algebra”, and “No mathematics” categories is less than that of the district.

During the last two years, this was also true for Algebra I/Integrated Mathematics 1 (IM 1). Conversely, the “Asian” enrollment in all of the classes above Algebra I/IM 1 is greater than the district’s enrollment. There is some consistency in the increases—generally the “Asian” group enrollment is 5% points higher than that of the district. For example, the enrollment in Geometry/Integrated Mathematics 2 (IM 2) for the district for the three years was 12.5%, 16.6% and 18.7%. For the “Asian” group, the enrollment was 16.8%, 20.9% and 20.4% respectively.

The largest difference occurs with AP Mathematics enrollment in 1990-91. There were 1.4% of the district’s population enrolled in AP mathematics courses, but 6.7% of the “Asian” population. Figure 12 shows these data.

Grouping the courses so that Algebra I/IM 1 and Geometry/IM 2 are together, 31% of the district population fell into that category in 1990-91, while 1999-00 had 48% of the district population represented at this level. The “Asian” student representation during those two years of study was 37% and 43%, respectively.

Grouping Algebra II/Integrated Mathematics 3 (IM 3), Math Analysis, and AP Mathematics classes together shows that, districtwide, 16% of students were enrolled in these upper level courses in 1990. During 1999, 24% of the

Figure 12: Asian, Filipino, American Indian, Pacific Island student mathematics course enrollment compared with district enrollment during 1990-2000

students were in these courses. The “Asian” student representation during those two years of study was 31% and 40%, respectively.

Hispanic Students

The Hispanic enrollment comparisons are the exact opposite of the “Asian” enrollment. Figure 13 shows that the Hispanic enrollment is greater than the district’s in Algebra I/IM 1 and below, including the “No mathematics” category. Conversely, the Hispanic enrollment is less than that of the district for all courses above Algebra I/IM 1. While 38% of the district was enrolled in courses below Algebra in 1990-91, 55% of the Hispanic population was enrolled in those courses. This situation changed significantly by the 1999-00 school year when 1.3% of the district was enrolled in courses below Algebra and only 1.1% of the Hispanics were enrolled there.

Grouping the courses so that Algebra I/Integrated Mathematics 1 and Geometry/Integrated Mathematics 2 are together, 31% of the district population fell into that category in 1990-91, while 1999-00 had 48% of the district population represented at this level. The Hispanic student representation during those two years of study was 22% and 55%, respectively.

Grouping Algebra II/IM 3, Math Analysis, and AP Mathematics classes together shows districtwide, 16% of students were enrolled in these upper level courses in 1990. During 1999, there were 24% of the students at that level. The Hispanic student representation during those two years of study was 6% and 10.5%, respectively.

Figure 13: Hispanic student mathematics course enrollment compared with district enrollment during 1990-2000

African-American Students

The African-American enrollment in mathematics classes is very similar to the Hispanic enrollment. Figure 14 shows that African-American students are under-represented in AP Mathematics, Math Analysis and Geometry/IM 2 classes. The enrollment in Algebra I/IM 1 is relatively consistent with the district's. However, the courses below Algebra during the 1990-91 school year showed an over-representation of African-American students. There were 38% of the district's student population in those courses but 45.3% of the African-American students.

Grouping the courses so that Algebra I/IM 1 and Geometry/IM 2 are together, 31% of the district population fell into that category in 1990-91, while 1999-00 had 48% of the district population represented at this level. The African-American student representation during those two years of study was 29% and 43%, respectively.

Grouping Algebra II/IM 3, Math Analysis, and AP Mathematics classes together shows districtwide, 16% of students enrolled in upper level courses in 1990. In 1999, 24% of the students were at that level. African-American student representation during those two years of study was 9.5% and 18%, respectively.

European-American Students

During all three years of the study, the European-American student enrollments were very close to that of the district. The students were slightly under-represented in the lower level classes during the 1990-91 school year, but

Figure 14: African-American student mathematics course enrollment compared with district mathematics enrollment during 1990-2000

very close to the district enrollment during the other two years. Figure 15 shows the data and relationships for this group of students.

Grouping the courses so that Algebra I/IM 1 and Geometry/IM 2 are together, 31% of the district population fell into that category in 1990-91, while 1999-00 had 48% of the district population represented at this level. The European-American student representation during those two years of study was 36% and 46%, respectively.

Grouping Algebra II/IM 3, Math Analysis, and AP Mathematics classes together shows districtwide, 16% of students were enrolled in these upper level courses in 1990. During 1999, there were 24% of the students at that level. The European-American student representation during those two years of study was 17% and 22%, respectively.

Success Rate Trends in Mathematics, by Class

Enrollment in college preparatory mathematics classes was the first step in reaching the goals of EQUITY 2000. Enrolling all students in at least Algebra I/IM 1 gave them access, but access is not enough. Mathematical success in the higher level classes was (and continues to be) a vital component of EQUITY 2000. This section presents the success rate data for each class level broken out by ethnicity. The third research question will be addressed by looking at the success rate of mathematics classes for each ethnicity during the ten years of EQUITY 2000.

Figure 15: European-American student mathematics course enrollment compared with district mathematics enrollment 1990-2000

As mentioned in the previous chapter, there were some limitations with the data available when calculating success rates during the decade of this study. Those limitations will be repeated here.

For the purpose of this study, success is defined as students earning an A, B or C. Success data for the school years before 1995 included students earning a D, so success rates could not be compared in the “pre-EQUITY 2000” years. Success data had already been collected for the 1998-99 year, so it was included for the discussion of success rates in order to have three years of study. Therefore, success rates for each class level are shown for 1995-96, 1998-99, and 1999-00 school years.

Students enrolled in the continuation school or any of the alternative high schools were included in the enrollment statistics (there was a band of each bar graph that included them with the Intro to Computer Science students and those not enrolled in mathematics). Data about grades for these students were not collected. Therefore, success rate data does not include the continuation and alternative high schools.

Advanced Placement Mathematics Classes

In the 1995-96 school year, the average success rate in Advanced Placement Mathematics classes was 82%. Less than three percent of the district student population was enrolled in that level of mathematics class. Five years later, 5% of the population was enrolled and the average success rate had risen to 87%. Figure 16 describes the success rate trends for each ethnicity in this class.

Figure 16: Success rate (A, B, C) of AP Mathematics classes, by ethnicity

The European-American student success rate in AP Math during the 1995-96 school year was 93% of 120 students earning an A, B or C. In the 1998-99 school year the success rate dropped to 84% for this group of students. However, in the following year the rate increased to 87% (out of 127 students).

The success rate of African-American students in AP Math showed a steady increase during the five years. In 1995-96, there were 19 students enrolled, with 74% experiencing success. In 1998-99 the success rate increased to 76%. The success rate in 1999-00 increased to 78% of the 27 enrolled students.

Out of the 538 Asian, Filipino, Pacific Island, and American Indian AP Math students in 1995-96, 82% experienced success. During 1998-99 and 1999-00, the success rate was 89% (there were 956 students enrolled in 1999-00).

Hispanic AP Math students experienced the lowest success rate with 65% of the 77 students earning an A, B, or C during 1995-96. That rate increased to 74% in 1998-99 and then dropped slightly to 72% in 1999-00 (out of 118 enrolled).

Math Analysis Classes

In the 1995-96 school year, the average success rate in Math Analysis classes was 75%. About six percent of the district student population was enrolled in that level of mathematics class. Five years later, close to seven percent of the population was enrolled and the average success rate had risen to 79%. Figure 17 describes the success rate trends for each ethnicity in this class.

The European-American students again achieved the highest success rate of all ethnic groups in Math Analysis. During the 1995-96 school year 80% of the 232 students earning an A, B or C. In the 1998-99 school year the success rate

Figure 17: Success rate (A, B, C) of Math Analysis classes, by ethnicity

increased to 89% for this group of students. However, in the following year the rate decreased to 84% (out of 248 students).

The success rate of Hispanic students in Math Analysis started at 65% in 1995-96 when there were 191 students enrolled. In 1998-99 the success rate increased to 78%, followed by a slight decrease to 77% in 1999-00 (of the 202 enrolled students).

Out of the 837 Asian, Filipino, Pacific Island, and American Indian Math Analysis students in 1995-96, 78% experienced success. During 1998-99 and 1999-00, the success rate was 82% and 79%, respectively (there were 1,110 students enrolled in the 1999-00 school year).

African-American Math Analysis students experienced the lowest success rate with 55% of the 44 students earning an A, B, or C during 1995-96. That rate increased to 71% in 1998-99 and 76% in 1999-00 (out of 50 students enrolled).

Algebra II/Integrated Mathematics 3 Classes

In the 1995-96 school year, the average success rate in Algebra II/IM 3 classes was 67%. About eleven percent of the district student population was enrolled in this level of mathematics class. Five years later, close to thirteen percent of the population was enrolled and the average success rate had stayed the same. Figure 18 describes the success rate trends for each ethnicity in this class.

The Asian, Filipino, American Indian, Pacific Island students achieved the highest success rate of all ethnic groups in Algebra II/IM 3. During the 1995-96 school year 71% of the 1,342 "Asian" students earning an A, B or C. In the 1998-

Figure 18: Success rate (A, B, C) of IM 3/Algebra II classes, by ethnicity

99 school year the success rate increased to 73% and in 1999-00 the rate went to 74% (out of 1,715 students).

The success rate of European-American students in Algebra II/IM 3 started at 69% in 1995-96 when there were 490 students enrolled. In 1998-99 the success rate increased to 74%, followed by a slight decrease to 71% in 1999-00 (of the 523 enrolled students).

Out of the 106 African-American Algebra II/IM 3 students in 1995-96, 58% experienced success. During 1998-99 the success rate rose to 61%. In the 1999-00 school year, the success rate dropped to 52% (there were 146 students enrolled).

Hispanic Algebra II/IM 3 students experienced the lowest success rate with 56% of the 510 students earning an A, B, or C during 1995-96 and 1998-99. That rate dropped to 51% in 1999-00 (out of 689 students enrolled).

Geometry/Integrated Mathematics 2 Classes

In the 1995-96 school year, the average success rate in Geometry/IM 2 classes was 62%. Seventeen percent of the district student population was enrolled in this level of mathematics class. Five years later, 19% of the population was enrolled and the average success rate had dropped slightly to 59%. Figure 19 describes the success rate trends for each ethnicity in this class.

The Asian, Filipino, American Indian, Pacific Island students achieved the highest success rate of all ethnic groups in Geometry/IM 2. During the 1995-96 school year 71% of the 1,622 "Asian" students earning an A, B or C. In the 1998-99 school year the success rate increased to 72% and in 1999-00 the rate went down to 69% (out of 1,930 students).

Figure 19: Success rate (A, B, C) of IM 2/Geometry classes, by ethnicity

The success rate of European-American students in Geometry/IM 2 hovered at 67% during the five years. There were 792 students enrolled in 1995-96 and 829 enrolled in 1999-00.

Out of the 209 African-American Geometry/IM 2 students in 1995-96, only 40% experienced success. During 1998-99 the success rate rose to 50%. In the 1999-00 school year, the success rate dropped to 43% (there were 196 students enrolled).

Hispanic Geometry/IM 2 students also experienced low success rates with 48% of the 1,052 students earning an A, B, or C during 1995-96. In 1998-99 the rate dropped to 44%, then increased slightly to 46% in 1999-00 (out of 1,623 students enrolled).

Algebra I/Integrated Mathematics 1 Classes

In the 1995-96 school year, the average success rate in Algebra I/IM 1 classes was only 45%. Thirty-four percent of the district student population was enrolled in this level of mathematics class. Five years later, 30% of the population was enrolled and the average success rate had increased to 50%. Figure 20 describes the success rate trends for each ethnicity in this class. The success rate for this level of class increased for each ethnicity from 1995-96 to 1999-00.

The Asian, Filipino, American Indian, Pacific Island students achieved the highest success rate of all ethnic groups in Algebra I/IM 1. During 1995-96, 58% of the 2,217 "Asian" students earned an A, B or C. In the 1998-99, the success rate increased to 64% and in 1999-00 the rate went up to 66% (out of 2,110 students).

Figure 20: Success rate (A, B, C) of IM 1/Algebra I classes, by ethnicity

The success rate of European-American students in Algebra I/IM 1 started at 51% in 1995-96 (out of 1,406 students). The rate increased to 56% in 1998-99, and then increased again to 59% in 1999-00 when 1,082 students were enrolled.

Of the 557 African-American Algebra I/IM 1 students in 1995-96, only 36% experienced success. During 1998-99 the success rate rose to 40%. In the 1999-00 school year, the success rate was 43% (there were 381 students enrolled).

Hispanic Algebra I/IM 1 students also experienced low success rates with 35% of the 3,397 students earning an A, B, or C during 1995-96. In 1998-99 the rate stayed at 35%. In 1999-00 the success rate increased to 39% (out of 3,678 students enrolled).

Classes Below Algebra I

In the 1995-96 school year, the average success rate in classes below Algebra I was 57%. Four percent of the district student population was enrolled in this level of mathematics class. Five years later, one percent of the population was enrolled and the average success rate had increased to 63%. Figure 21 describes the success rate trends for each ethnicity in this class.

The Asian, Filipino, American Indian, Pacific Island students enrolled in classes Below Algebra, had a success rate of 68% during the 1995-96 school year (there were 161 enrolled). In the 1998-99 school year the success rate decreased to 65% and in 1999-00 the rate went down to 57% (out of 27 students).

The success rate of European-American students in classes Below Algebra started at 60% in 1995-96 (out of 103 students). The rate decreased to 55% in 1998-99, and then increased to 79% in 1999-00 when 27 students were enrolled.

Figure 21: Success rate (A, B, C) of non-college preparatory mathematics classes, by ethnicity

Of the 52 African-American students enrolled in classes Below Algebra in 1995-96, 62% experienced success. During 1998-99 the success rate dropped to 44%. In 1999-00, the success rate rose to 67% (there were 9 students enrolled).

Of the 595 Hispanic students enrolled in classes Below Algebra in 1995-96, 52% experienced success. In 1998-99 the rate dropped to 45%. In 1999-00, the success rate increased to 60% (out of 101 students enrolled).

During the time period of 1995-2000, more students were taking higher levels of mathematics. Looking only at success rates for each class during the five years can be deceptive. It is important to look at the number of students enrolled in each level and see how the success rate is affected when the enrollment changes.

Success Rate Trends in Mathematics, by Ethnicity

As mentioned earlier, access to college preparatory mathematics classes was the first part of EQUITY 2000, but access is not enough. Mathematical success in the higher level classes for students of all ethnic backgrounds is a vital component of EQUITY 2000. This section presents the success rate data for each ethnicity. This will answer the last research question about determining how the success rate for each ethnic group has been affected in each level of class.

Asian, Filipino, American Indian, and Pacific Island Students

During the time frame of 1995-2000, this group of students maintained a consistent trend. All classes are within a 10% (and most are within 5%) range during the years of study. The higher success rates for mathematics classes occurred in the 1998-99 school year. The success rates for 1999-00 were close to

those of the previous year. The lowest success rate occurred during the first year of this study (1995-96). See Figure 22 for a trend graph.

Hispanic Students

During 1995-2000, the trend for Hispanic students showed improvement in most classes, but especially the higher levels—Math Analysis and AP Math. The trends of success for Hispanic students show that a higher percentage of students succeed as the mathematics level increases. Students enrolled in Algebra I/IM 1, Geometry/IM 2 and Algebra II/IM 3 during the five years showed a steady increase that did not change much between the years. See Figure 23 for a trend graph for the Hispanic students.

African-American Students

During 1995-2000, the trend for African-American students showed improvement in most classes. The trends of success for 1998-99 show the most consistent increase as the level of class increases. During 1999-00, the success rate of African-American students enrolled in Algebra II/IM 3 dropped by almost 10%. Conversely, the success rate of students enrolled in Math Analysis increased by 20% over the five years. Figure 24 is a trend graph for this group.

European-American Students

During 1995-2000, this group of students maintained a consistent trend. All classes at the Algebra I level and higher are within a 10% (most within 5%) range during the years of study. Slightly higher success rates for mathematics classes occurred in the 1998-99 school year. The success rates for 1999-00 were close to those of the previous year. Figure 25 is a trend graph for these students.

Figure 22: Asian, Filipino, American Indian, Pacific Island student success rate trends

Figure 23: Hispanic student success rate trends

Figure 24: African-American student success rate trends

Figure 25: European-American student success rate trends

Summary

During 1990-2000, East Side Union High School District implemented a board policy requiring all students to enter high school at Algebra I/Integrated Mathematics 1 or higher (in other words, college preparatory classes only). In 1990-91, 28% of the Hispanic and 38% of the African-American students were enrolled in college preparatory classes. Ten years later, 66% of each of these ethnic groups are enrolled in college preparatory classes. Only 1% of each ethnic group is enrolled in non-college preparatory classes, compared with 55% Hispanic and 45% African-American in 1990-91. Success rates in mathematics classes are different for the four ethnic groups studied. In general, the Asian and European-American groups had the greatest success in mathematics, while the African-American and Hispanic students experienced the least. However, more Hispanic students (2,780) passed college preparatory mathematics classes in 1999 than were enrolled (2,157) in 1990.

CHAPTER 5

CONCLUSIONS

The goal of this study was to determine if the enrollment of students in higher-level mathematics classes changed as a result of EQUITY 2000 and how the success rate in these classes was affected. More importantly, the goal was to find out if East Side Union High School District was really providing equity. Are *all* students, regardless of ethnicity, taking and succeeding in higher mathematics? This last chapter will address the results for each specific research question.

Question 1

Does the ethnic make-up of each mathematics course reflect the ethnic make-up of the district? That is, if there are 39% Hispanic students in the district, does each class level, i.e. Algebra, Geometry, Advanced Placement (AP) Mathematics, have a 39% Hispanic enrollment?

Referring to Figures 8, 9 and 10 the answer to this question is, "No, the ethnic make-up of each mathematics course does not reflect the ethnic make-up of the district." One course during each of the three years studied had an ethnic make-up that was close to that of the district.

Mathematics Course Enrollment in 1990-91

Before EQUITY 2000, in 1990-91, the IM 1 / Algebra I course was 36% "Asian," 28% Hispanic, 7% African-American, and 28% European-American.

There were 4031 students enrolled in this course during that school year. The district ethnic mix was 33%, 35%, 7%, and 25%, respectively. This means there were 1,456 "Asian," 1,142 Hispanic, 287 African-American and 1,146 European-American students enrolled in IM 1/Algebra I classes in 1990.

Mathematics Course Enrollment in 1995-96

In 1995-96, the closest match was again IM 1/Algebra I. This time the course enrollment was 29% "Asian," 45% Hispanic, 7% African-American, and 19% European-American, while the district was 35%, 38%, 6%, and 20%, respectively. Even more remarkable is the fact that the number of students enrolled in IM 1/Algebra I almost doubled from the 1990-91 school year. In 1995-96 there was an IM 1/Algebra I student enrollment of 7577 students! Broken out by ethnicity, this means there were 2,217 "Asian", 3,397 Hispanic, 557 African-American and 1,406 European-American students enrolled in IM 1/Algebra I classes in 1995.

Mathematics Course Enrollment in 1999-00

A change happened in 1999-00. The closest match this time was the next course up, IM 2/Geometry. This course was 42% "Asian", 35% Hispanic, 4% African-American, and 18% European-American while the district was 39%, 39%, 5%, and 17%, respectively. Roughly a fifth of the district (4578 students) were enrolled in IM 2/Geometry during the 1999-00 school year. Again by ethnicity, this means there were 1,930 "Asian", 1,623 Hispanic, 196 African-American and 829 European-American students enrolled in IM 2/Geometry classes in 1999.

Conclusions for Question 1

Each year, one course was close to the ethnic break out of the district. In 1990-91 and 1995-96 it was IM 1/Algebra I. During 1999-00, it was IM 2/Geometry. It appears that it took 4-5 years for students to gain access (through success in the previous course) to a higher level course. If this trend continues then by the year 2004, IM 3/Algebra II would be a match with the district enrollment. It would be interesting to follow-up with this type of data each year to see if the trend of "ethnic matching" continues as predicted.

Question 2

Is the mathematics enrollment of the district comparable for each ethnic group? For example, if 19% of the student population is taking Geometry, is 19% of each ethnic group represented in Geometry?

Asian, Filipino, American Indian, Pacific Island Students

During 1990-91, almost 50% of the "Asian" population was enrolled in courses above IM 1/Algebra I. In addition, this group of students was over-represented in all classes at the level of IM 2/Geometry and above. With IM 1/Algebra I, 18.4% of the district's students were enrolled in this course; however, 19.8% of them were "Asian." This was the closest match for this ethnic group during the three different years of the study. When looking at the non-college preparatory classes during 1990-91, 38% of the students in the district were enrolled in these classes, but only 25% of the "Asian" students were.

In 1995-96, fifty-six percent of this ethnic group was enrolled in classes at the level of IM 2/Geometry and above. Again, there was over-representation at the IM 2/Geometry level and above by the “Asian” students. There was under-representation in the remaining classes.

During the 1999-00 school year, a full 60% of the “Asian” student body was enrolled in IM 2/Geometry level and above. The enrollment in IM2/Geometry for the district was 18.7% and 20.4% for the “Asian” population. This was the closest for this group for 1999-00. Almost thirty percent of the district was enrolled in IM 1 /Algebra I, but only 22% of the “Asian” students were thus enrolled.

The course-taking patterns for this group of students is admirable, and should be commended. It is important to continue this push for higher levels of mathematics.

Hispanic Students

During 1990-91, only 30% of the Hispanic population was enrolled in college preparatory courses. Thirty percent! Out of every one hundred Hispanic students, thirty were enrolled in college preparatory classes. Fifty-five percent of the Hispanic population was enrolled in non-college preparatory mathematics classes. Compare that with the fact that only 38% of the district was enrolled in non-college preparatory mathematics courses. This supports the research trends presented in Chapter 2 about the ethnic make-up of lower level (especially non-college preparatory) courses. With IM 1 /Algebra I, 18.4% of the district’s students were enrolled in this course, and of the Hispanic population 14.9%

were in IM 1/Algebra I. This was the closest match for this ethnic group during this year.

The 1995-96 school year yielded a close match between Hispanic students and district mathematics enrollment. Each class level was within $\pm 6\%$ of the district enrollment. Sixty percent of the Hispanic students were enrolled in classes at the level of IM 1/Algebra I and above. In 1990-91 there were less than 30% of the Hispanic students taking IM 1/Algebra I and above. This translates to 5,228 students in college preparatory classes in 1995 compared with 2,157 in 1990.

During the 1999-00 school year, almost 70% of the Hispanic student body was enrolled in IM 1/Algebra I level and above. The enrollment in IM2/Geometry for the district was 18.7% and 16.9% for the Hispanic population. Almost thirty percent of the district was enrolled in IM 1/Algebra I. Hispanic students were over-represented in this class with 38.3% of the Hispanic students there. The biggest change in the course taking over the decade of all ethnic groups was with this group. In 1990-91, 55% of Hispanic students were enrolled in non-college preparatory classes. In 1999-00, only 1.1% of Hispanic students were in classes at that level. This means in 1990 there were 4,191 students in non-college preparatory classes, but one decade later, there were only 101! Over the decade, Hispanic students in large numbers moved out of the lower track and were put on a college intending path.

Hispanic students make-up the largest ethnic group in East Side Union High School District. When significant changes occur with this population, it significantly impacts the profile of the district.

The changes in course-taking patterns for this group of students have been substantial, and should be acknowledged, however it is vital that the momentum does not stop. Even more changes need to occur if East Side Union High School District is to realize true equal access and opportunity to the upper course levels. It is fundamental that parents, teachers, counselors, and peers encourage Hispanic students to take more and higher levels of mathematics.

African-American Students

During 1990-91, almost 40% of the African-American population was enrolled in college preparatory courses. Forty-five percent of the African-American population was enrolled in non-college preparatory mathematics classes. Compare that with the fact that only 38% of the district enrolled in non-college preparatory mathematics courses. Aside from the non-college preparatory classes, the African-American enrollment was relatively close to the district. AP Math enrollment for the district was 1.4% and African-American was 0.7%. Math Analysis was 5.4% for district and 2.3% for African-American. IM 3/Algebra II and IM 2/Geometry rates for the district were 9.2% and 12.5%, respectively. For the African-American students, the enrollments were 6.4% and 10.5%.

The 1995-96 school year presented a close match between the African-American students and the district enrollment. Each class level was within $\pm 5\%$ of the district enrollment, with most classes being within three percent. Almost seventy percent of this ethnic group was enrolled in classes at the level of IM

1/Algebra I and above. This is a marked change from 1990-91 when less than 40% of the African-American students were taking IM 1/Algebra I and above.

During the 1999-00 school year, almost 66% of the African-American students were enrolled in IM 1/Algebra I level and above. The enrollment in IM2/Geometry for the district was 18.7% and 16.1% for the African-American population. As with the Hispanic students, a big change in the course taking over the decade occurred for this ethnic group. In 1990-91, 45% of the African-American were enrolled in non-college preparatory classes. In 1999-00, only 0.7% of the African-American students were in classes at that level.

European-American Students

Referring to Figure 15, one can see that this ethnic group matches the enrollment of the district very closely. The one exception is in 1990-91 when the enrollment of European-American students in non-college preparatory classes was slightly lower than the district's and the IM 1/Algebra I was slightly higher than the district's. This is an ethnic group that comprises 18%-25% of the district student population and matches the mathematics enrollment of the district. The goal is to obtain this for each ethnic group enrolled in the district.

Conclusions for Question 2

East Side Union High School District has progressed substantially towards eliminating non-college preparatory classes. This was a critical move given the ethnic make-up of the district (roughly 50% Hispanic and African-American). History has shown that students of these two ethnic groups are enrolled in lower level, non-college preparatory classes, if they are available. East Side Union High

School District was no exception. Once those classes were removed, Hispanic and African-American students were placed on the college-intending track. More work needs to be done to keep this momentum moving forward until these two groups are represented strongly in courses at the level of IM3/Algebra II and higher, thus providing the access to college. Equity can be achieved only if students first have access to the college preparatory sequence.

Question 3

How has the success rate in each mathematics course been affected for each ethnicity during this decade of change?

Advanced Placement Mathematics

With the exception of the European-American students, all ethnic groups had a higher success rate in AP Math classes in 1999-00 compared with 1995-96. This is significant since the enrollment of students in courses at that level almost doubled (2.7% to 5.0%). Figure 16 shows that the gap between the success rate of the highest achieving group and the lowest achieving group is starting to close over the course of the five years, but there is still a twenty percent difference that needs to be looked at further.

A new class (AP Statistics) was added during this time period. In 1999-00, half of the schools in the district offer this course. Once the other schools offer AP Statistics, the enrollment in AP Math should continue to increase. It is a benefit that there are three very different Advanced Placement options available in mathematics. Calculus, Computer Science and Statistics provide a variety of

options for students wishing to begin their college mathematics career while in high school. The advantages of taking these courses need to be advertised continually to *all* students.

Math Analysis

As with Advanced Placement Mathematics, the success rate for Math Analysis had a net increase over the five years. The enrollment increased only slightly (from 5.9% to 6.6%), but the success rate was improved. Even more remarkable is that the gap between the highest and lowest achieving groups has diminished substantially (refer to Figure 17). There was a gap of 25% in 1995-96, compared to only 8% during 1999-00.

IM3/Algebra II

This course has a different result from the two courses described above. Figure 18 shows that the success rates for the top two achieving groups (Asian and European-American) steadily increased over the five years, however the rates of the other two groups dropped substantially. This has increased the achievement gap to twenty-five percent (from 15% in 1995-96). The enrollment in this course has only increased slightly over the five years. It was 11% in 1995-96 and went up to 12.6% in 1999-00. What caused such a drop in achievement in Hispanic and African-American students? Follow-up data should be collected for the 2000-01 school year regarding the success rate in this course. If necessary, support to students and teachers should be provided as soon as possible. A student in this level of mathematics is close to becoming college eligible, but must pass IM 3/ Algebra II in order to get there.

IM2/Geometry

Referring to Figure 19, the success rates in this course have stayed the same or dropped slightly. More students are taking this class as the enrollment increased from 16.6% to 18.7% (3,675 compared to 4,578 students), but the gap between the success rates for Asian students (highest achieving group) and African-American students (lowest achieving group) has remained the same over the five years. The success rate for Hispanic and African-American students has been below 50%. This needs to change as soon as possible. This class is now a requirement for graduation from East Side Union High School District. It is fundamental that students succeed at this class. It is important to note that the number of Hispanic students passing IM 2/Geometry in 1999-00 (741 students) is more than the number enrolled (537) in the course in 1990.

IM1/Algebra I

This course has the lowest level of success. Figure 20 shows that less than 65% of students taking it are passing it. For Hispanic students, less than 40% are experiencing success. This needs to change. Class sizes have been reduced for 9th grade IM 1/Algebra I courses, but the sheltered, bilingual, and “repeater” (classes with 10th–12th grade students) are much larger. These students all have special needs and 25 or 32 students in a class with one teacher does not promote effective instruction.

Non-College Preparatory Mathematics Classes

The number of students enrolled in this course has diminished to 312. This is an amazing statement when compared to 1990-91 when 8000 were

enrolled. The success rate over the past five years has fluctuated, which is easy to have happen when the number of students enrolled is so small.

Conclusions for Question 3

The higher-level classes are showing an increase in success rates and enrollment rates for students of all ethnic backgrounds. IM 2/Geometry and IM 1/Algebra I both need more research and resources. These two courses have become the minimum requirements for graduation from East Side Union High School District. The gap between the high- and low-achieving students has not widened, but it has not decreased either. This issue must be addressed by working to raise the achievement levels of the under-performing students.

It is also critical to find out which students are failing mathematics only and which ones are failing everything. In order to really address the mathematics problem, it is important to find out how big the problem truly is.

If a district were judged by how the lowest performing students were doing, and what support systems were in place for them, schools might not be so quick to boast about their achievements. East Side Union High School District has many support systems already in place because of EQUITY 2000, Title I, Title VII, and Voluntary Integration Program (VIP) monies. It is mandatory that support be continued and even strengthened. It is not appropriate to bring back remedial level courses, but instead we must find out what students' needs are within each ethnic group and address each of those.

Question 4

How has the success rate of each ethnicity been affected for each mathematics course during this decade of change?

Asian, Filipino, American Indian, Pacific Island Students

Referring back to Figure 22, the “Asian” population has maintained a consistent success rate in the different levels of mathematics. The success rate is higher in the more advanced classes. There is still room for improvement in IM 1/Algebra, IM 2/Geometry, and IM 3/Algebra II. The success rate in the non-college preparatory classes dropped during 1999-00, but again the number of students enrolled in this course is very small (27 students) so that 2 students not passing drops the success rate by ten percent.

Hispanic Students

Figure 23 shows that Hispanic students have achieved success at greater numbers in AP Math and Math Analysis. The success rates in IM 3/Algebra II and IM 2/Geometry have dropped slightly in the past five years, but the number of students succeeding has increased. There were 270 successful Hispanic IM 3/Algebra II students in 1995. This increased to 354 in 1999, even though the success rate dropped from 56% to 51%.

Hispanic students taking IM 1/Algebra I seem to need the most help. In all three years, the success rate never exceeded 40%. This means out of every 100 IM 1/Algebra I Hispanic students, 40 will pass and 60 will not. That is not acceptable. Having written that, it is critical to point out that the number of Hispanic students passing IM 1/Algebra I in 1999 (1,446 students) is greater than

the number of Hispanic students even *enrolled* in IM 1 / Algebra I in 1990 school year (1,142 students).

African-American Students

The number of African-American students in the district is relatively small compared with the other three groups. They make up 5-6% of the district population. The success rates for this small ethnic group has improved in general over the span of the five years. African-American students in AP Math and Math Analysis classes are succeeding at rates close to 75%. Figure 24 shows success rates in the other classes drop to 60%, 50%, and 40%, respectively. In 1999-00, 43% of the African-American students in Algebra I/IM 1 passed. This translates to 163 students passing. Students at the higher levels are succeeding, but we need to work with the students in the lower level college-preparatory classes to improve success rates there.

European-American Students

The success rates in Figure 25 shows trends similar to the “Asian” group. European-American students in IM 1 / Algebra I have the lowest success rate for that group at 50-60%. Students in the non-college preparatory classes obtained an impressive 80% success during the 1999-00. It is important to keep in mind there were only 27 European-American students in that level in 1999.

Conclusions for Question 4

The success rates for Hispanic and African-American students need substantial improvement. When success rates hover around 40% for five years

for these two groups of students only, something is happening that is preventing adequate education in mathematics. This should be the number one priority when schools address the needs of under-performing students. Is the curriculum used appropriate for all ethnic backgrounds and both genders? Are the learning styles of all students being employed on a regular basis? Are the assessments used in classrooms authentic and meaningful? Are teachers trained in cultural sensitivity? Do they see African-American and Hispanic students as deficient? Are teachers invalidating the thinking of students if it is not the same as their own thinking?

Yes, East Side Union High School District needs to address these issues. However, the district must be commended for enrolling more students in the higher courses. The bottom line is **the number of Hispanic students passing Algebra I/IM 1 now is more than the number that were enrolled prior to EQUITY 2000**. This cannot be forgotten. The district has made substantial progress in this very complex equation of equity.

Summary

Expectations, lowered or raised, become a self-fulfilling prophecy. With EQUITY 2000 East Side Union High School District raised expectations for students, teachers, counselors, and principals. It has been a difficult decade, but the outcomes are worth it. More students are taking and passing college preparatory mathematics than before EQUITY 2000.

In 1990-91 there were 10,619 students enrolled in courses at the Algebra I level or higher. Ten years later, 17,738 students are enrolled in these same

courses. In 1990-91 there were 3,839 students enrolled in courses at the Algebra II level or higher. Ten years later, 5,909 students are enrolled in these same courses. In 1990-91, 6,780 students were taking Algebra I and Geometry. Ten years later, 11,829 students are taking those courses. In 1990-91, 8,806 students were taking Algebra I, Geometry, and Algebra II. Ten years later, 14,902 students are taking those same courses.

Success has many definitions. The definition at ESUHSD for success in academic classes is earning an A, B, or C in the course. How has the success rate for students changed during this decade of higher expectations? The trend overall shows that success rates for mathematics students increase as the level of the course increases. This is a natural phenomena because each progressive level works with only the students who passed the prior level. The pool of students becomes more select as the level of class increases, so one would expect the success rate to increase with each level as well.

A fifty percent success rate in IM 1 / Algebra I more specifically translated to 3,633 people succeeding in this course in 1999-00. There were 4,031 students enrolled in IM 1 / Algebra I in 1990-91. It would have taken a success rate of 90% in 1990 to have this many students succeeding in IM1 / Algebra I. However, a fifty percent success rate means that fifty percent are failing the course. This important issue must still be addressed.

The bottom line is more students are enrolled in and succeeding at higher levels of courses, but the gap between the Asian students and African-American and Hispanic students has not narrowed. This also must be addressed.

Recommendations

Access to college preparatory mathematics classes has been achieved. Success in mathematics is the second part of the EQUITY 2000 goal. As outlined in Chapter 2, success in mathematics is multifaceted. Cultural issues, pedagogy, curriculum, learning styles, assessment, and the attitudes of parents, students and teachers are all a part of the complicated equation that leads to success for *all* students.

Cultural Responsibility

East Side Union High School District has a rich and diverse student population. Our make-up is very different from that of the State of California's student population. Our Hispanic, Asian, and Filipino populations comprise a larger percentage of our student body than the corresponding state percentage. Because of this I think we have many strengths and some added challenges. The traditional school calendar starts school one week before or after Labor Day. It includes a two-week winter break at Christmas time. The semester ends in the middle of January. There is a "ski week" in February and another week off for spring break in April or March. The second semester ends in the middle of June, followed by a two-month summer vacation. Is this calendar serving the needs of our diverse population?

A school calendar that is more culturally friendly is recommended. School would start in the middle of August so that the first semester would end in December before winter break. This winter break would be three weeks long (using the one week from "ski week"). Ending the semester before winter break

is very important for a number of reasons. First, educationally, it is hard for students to come back from two weeks off, learn new material for a week and then take very important semester exams. It makes more sense to finish the semester before the break and then begin a new one when we return. Secondly, many East Side students return to their home countries over the winter vacation. Some examples of home countries are Mexico, Vietnam, and the Philippines. These trips are costly so most parents take more than the two weeks of the vacation. Unfortunately, many students do not return in time to take the semester final exams and end up taking a failing grade in all of their classes. They may have been in class all semester and earned a C, but because of missing the last two weeks and the final, their grade drops to a D or F.

Another example of a culturally friendly calendar would be one with the Vietnamese and Chinese New Year, Yom Kippur, and Ramadan as holidays. Many parents do not feel comfortable going to work or sending their children to school on their holy days. It is time to think outside the box and create an environment that really embraces the diversity we admire. We must do more than lip service

Cultural institutes such as *Nsaka Sunsum (Touching the Spirit) Educational Process for Achieving Educational Excellence with African-American Students* (sponsored by Center for Applied Cultural Studies & Educational Achievement located at San Francisco State University), and Equity and Mathematics Education Leadership Institute (EMELI) must become systemic. All teachers, counselors, administrators must attend intensive workshops such as these. The

workshops are truly life changing for the participant, and the students who are in contact with the participants. School needs to be a place that educates the student and nurtures their spirit, not diminishes it. If one student is not succeeding because they are feeling disenfranchised due to their culture, then this issue must be addressed.

A committee of parents, students and teachers should be formed to examine each textbook in use at East Side Union High School District. This committee should check for ethnic, cultural, and gender authenticity. Any curriculum that is found objectionable should either be eliminated or have ancillary materials provided to explain the appropriate information.

Curriculum and Instruction

Besides ongoing work on cultural issues, it is important that teachers continue to learn about working in heterogeneous classrooms, on authentic assessments, and incorporating and assessing all learning styles. This was started with EQUITY 2000, but needs to become systemic. Collaboration time is almost non-existent at most schools. It is imperative that teachers get together and discuss lessons, pedagogy, assessments, technology, and cultural issues on a regular basis. Ideally, this should be done daily, but at a minimum, three hours per week. The TIMSS report brought out the fact that part of the Japanese teachers' day is collaborative planning and creating of lessons with colleagues. This intensive kind of lesson study might help us develop lessons that meet the needs of the least successful students.

Resources should be targeted to lower class size, provide in-class tutors, and provide collaboration time for teachers teaching Algebra I/IM 1 and Geometry/IM 2. Class sizes have been reduced to 20 students for the 9th grade Algebra I/IM 1 classes. This class size reduction needs to be expanded to the next level. It would be iniquitous to have a student fulfill all other requirements for graduation, except the successful completion of IM2/Geometry.

If one were to look at all students not succeeding at IM 1/Algebra I, it would be important to find out how many are failing only their mathematics class and how many are failing four or more classes. Since IM 1/Algebra I is the lowest level of course offered, students failing all of their classes would most likely be enrolled in this course instead of a higher level mathematics course. These data are critical, because they help separate the issues. Which are issues with mathematics and which are issues with the system of schooling, more generally?

Students need to be held accountable to high standards of learning. The model in use at one of the schools since 1998-99 involves awarding partial credit at the end of each six-week curriculum unit in IM 1/Algebra I. If a student does not pass that unit, they are required to attend after school tutoring to recover the curriculum and credit. There are very specific standards for the students to master and they are assessed throughout the six-weeks as well as with a final exam at the end. Focusing the curriculum and providing an immediate process for making up missed material puts the responsibility on the student.

Parent Education

If the learning and education of students and teachers is valued, then the learning of the parents must also be valued. If parents have not had a chance to experience high school Algebra, Geometry or Algebra II, why not provide them the opportunity? We would help our students tremendously by providing their primary teachers (their parents) with the resources to help their own children with the school curriculum. Valuing parents and parent education in mathematics, English, and computers must become part of the expected school environment. As a mathematics educator, it is very frustrating to hear repeatedly from otherwise rational adults, "Math is not my subject." Or, "I could never do math." Or, "I can't help my child in math because they are doing math that is way beyond what I learned." Or, "Math—I get nervous just talking about it." In a parent-student-teacher conference that I participated in, the parent worked hard to convince me that her son was not capable of learning algebra and geometry because she had never gotten it and she could not expect her son to get it. This attitude must stop!

What if these same adults said similar things about reading? "I could never read." "My child can't read, but neither can I, so I don't expect them to get it." "I can't help my child read because they are reading books way beyond what I read." Would society accept these excuses? Of course not! It must not be accepted for mathematics. At East Side Union High School District, hard work needs to be done to counter the mathematics phobic parent. The district must help parents learn and understand the subject—not just for the sake of their

child, but for their own good. Programs such as Math and Parent Partnership in the Southwest (MAPPS) provide curriculum for mini-courses in Algebra, Geometry, Data, and Number Systems. The curriculum is available in English and Spanish. As mentioned in Chapter 2, there is a belief in the American culture that a person either has a mathematical ability or they do not. The belief is that one can only get the mathematics gene through inheritance (Ladson-Billings, 1997). Asian parents attribute their child's mathematical ability to working hard (and conversely, if the student is not succeeding they are not working hard enough). We need to work towards acceptance of this type of mentality about mathematics. First we must start with the parents to break the cycle.

Other Resources

Safety nets such as after school and evening tutoring, computer labs open to students and parents after school, parent classes, all need to be continued and fortified. Mandatory tutoring and summer school for students needing more time must be a part of the expected school environment.

East Side Union High School District has a wonderful web site, but this can be expanded to include web links to sites that provide parents with information about curriculum. For example, the site *Colormathpink.com* is an excellent site for female students of all ages. It provides career information, as well as diagnostic mathematics tests and tutoring for students who are struggling with certain concepts. Links to the Monterey Bay Aquarium can provide students and parents information about science. With the internet, the

possibilities are endless. In the ideal world, parents and students would have access to the internet from their homes and would communicate to East Side Union High School District teachers via email. Teachers would post homework assignments and calendars of tests and important assignments, and even grades for students (password protected).

Schooling should not be about molding people to fit into a dominant culture, but instead about presenting accurate and complete historical information in all content areas and developing critical thinking skills by analyzing the issues and problems of then and now. Our school system must validate the integrity of each student's background not only for the benefit of the student's attitude towards learning, but more importantly, for a just society.

APPENDICES

Appendix A: NAEP Trends 1973-99

Average Mathematical Proficiency of European-American, African-American, and Hispanic Students 1973-1999.

		European-American	African-American	Hispanic
Age 9	1973	225*	190*	202*
	1978	224*	192*	203*
	1982	224*	195*	204*
	1986	227*	202*	205*
	1990	235*	208	214
	1992	235*	208	212
	1994	237	212	210
	1996	237	212	215
	1999	239	211	213
Age 13	1973	274*	228*	239*
	1978	272*	230*	238*
	1982	274*	240*	252*
	1986	274*	249	254
	1990	276*	249	255
	1992	279*	250	259
	1994	281	252	256
	1996	281	252	256
	1999	283	251	259
Age 17	1973	310*	270*	277*
	1978	306*	268*	276*
	1982	304*	272*	277*
	1986	308*	279	283*
	1990	309*	289	284*
	1992	312	286	292
	1994	312	286	291
	1996	313	286	292
	1999	315	283	293

*Significantly different from 1999.

Source: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1999 Long-Term Trend Assessment.

Appendix B: SGP11 Sample Report

[illegible]

Appendix C: EQ2000_RPT Sample

EQ2000_RPT

EAST SIDE UNION HIGH SCHOOL DISTRICT
EQUITY 2000 REPORT

3-Mar-1993
Page 4

SCHOOL YEAR: 1990-91
SEMESTER: 1

ENROLLED IN
ALGEBRA 1

GRADE	AFRICAN AMERICAN	HISPANIC	NATIVE AMERICAN	ASIAN/ PACIFIC ISLANDER	WHITE	OTHER	TOTAL
08 MALE	0	0	0	0	0	0	0
FEMALE	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0
09 MALE	35	164	7	353	208	3	770
FEMALE	48	182	11	277	252	2	772
TOTAL	83	346	18	630	460	5	1542
10 MALE	67	218	13	258	238	1	795
FEMALE	55	231	9	211	240	1	747
TOTAL	122	449	22	469	478	2	1542
11 MALE	32	159	7	115	86	0	399
FEMALE	35	113	2	115	81	0	346
TOTAL	67	272	9	230	167	0	745
12 MALE	4	49	2	38	24	0	117
FEMALE	11	26	0	31	17	0	85
TOTAL	15	75	2	69	41	0	202

SELECTION BY COURSE PREFIX:
"MA1", "MCPI"

Appendix D: Student Population Data for State, County, and District

State of California K-12 Student Enrollment by ethnicity during 1990-2000

	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
American Indian	0.8%	0.8%	0.8%	0.8%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Asian	7.8%	8.0%	8.1%	8.2%	8.2%	8.2%	8.2%	8.1%	8.1%	8.0%
Pacific Islander	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Filipino	2.2%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%
Hispanic	34.4%	35.3%	36.1%	37.1%	37.9%	38.7%	39.7%	40.5%	41.3%	42.2%
African American	8.6%	8.6%	8.6%	8.7%	8.7%	8.8%	8.7%	8.8%	8.7%	8.6%
European American	45.6%	44.5%	43.4%	42.3%	41.4%	40.4%	39.5%	38.8%	37.8%	36.9%
Total percentage	99.9%	100.1%	100.0%	100.1%	100.1%	100.0%	100.0%	100.1%	99.8%	99.6%
Number of students	4,950,474	5,107,145	5,195,777	5,267,277	5,341,025	5,467,224	5,612,965	5,727,303	5,844,111	5,951,612

Santa Clara County K-12 student enrollment, by ethnicity during 1993 to 2000

	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
American Indian	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%	0.6%
Asian	18.1%	18.4%	18.7%	19.3%	19.8%	20.5%	21.1%
Pacific Islander	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Filipino	4.9%	5.0%	5.2%	5.3%	5.3%	5.3%	5.2%
Hispanic	30.4%	30.9%	31.5%	31.9%	32.2%	32.7%	33.2%
African American	4.7%	4.7%	4.5%	4.4%	4.2%	3.9%	3.8%
European American	40.4%	39.5%	38.6%	37.6%	37.0%	36.1%	35.2%
Total percentage	100.0%	100.0%	100.0%	100.0%	99.9%	99.9%	99.8%
Total number of students	235,416	237,335	243,514	248,377	252,207	253,367	254,782

East Side Union High School District 9-12 Student Enrollment during 1990 to 2000
(includes continuation schools)

	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
American Indian	1.8%	1.7%	1.7%	1.6%	1.2%	1.0%	0.9%	0.8%	0.7%	0.6%
Asian	23.4%	24.1%	24.8%	25.1%	24.6%	24.0%	25.0%	24.7%	26.8%	27.4%
Pacific Islander	0.5%	0.4%	0.5%	0.6%	0.5%	0.7%	0.6%	0.6%	0.6%	0.6%
Filipino	7.7%	7.8%	8.0%	8.6%	9.1%	9.5%	9.6%	10.0%	10.1%	10.2%
Hispanic	35.0%	35.8%	36.6%	37.0%	38.1%	38.2%	39.0%	38.5%	39.0%	39.3%
African American	7.1%	6.8%	6.9%	6.9%	6.7%	6.3%	6.1%	5.6%	5.1%	5.0%
European American	24.5%	23.4%	21.5%	20.3%	19.8%	20.3%	18.8%	19.8%	17.8%	16.9%
Total percentage	100.0%	100.0%	100.0%	100.1%	100.0%	100.0%	100.0%	100.0%	100.1%	100.0%
Total students	21,973	22,187	22,548	22,032	21,931	22,082	23,037	23,802	24,254	24,452

**Appendix E: Mathematics class enrollment compared with
district mathematics enrollment, by ethnicity**

		Hispanic					Intro CS, no math, Alt. educ.
	AP Math	Math Analysis	IM3 Algebra II	IM 2 Geometry	IM 1 Algebra I	Below Algebra I	
1990-91	0.6%	1.4%	4.2%	7.0%	14.9%	54.6%	17.3%
District	1.4%	5.4%	9.2%	12.5%	18.4%	38.0%	15.1%
1995-96	0.9%	2.3%	6.1%	12.4%	40.3%	7.1%	30.9%
District	2.7%	5.9%	11.1%	16.6%	34.3%	4.1%	25.3%
1999-00	1.2%	2.1%	7.2%	16.9%	38.3%	1.1%	33.2%
District	5.0%	6.6%	12.6%	18.7%	29.7%	1.3%	26.1%
		Asian, Filipino, American Indian, Pacific Island					Intro CS, no math, Alt. educ.
	AP Math	Math Analysis	IM3 Algebra II	IM 2 Geometry	IM 1 Algebra I	Below Algebra I	
1990-91	6.7%	10.6%	13.9%	16.8%	19.8%	25.0%	7.2%
District	1.4%	5.4%	9.2%	12.5%	18.4%	38.0%	15.1%
1995-96	6.9%	10.8%	17.3%	20.9%	28.5%	2.1%	13.5%
District	2.7%	5.9%	11.1%	16.6%	34.3%	4.1%	25.3%
1999-00	10.1%	11.7%	18.1%	20.4%	22.3%	0.3%	17.1%
District	5.0%	6.6%	12.6%	18.7%	29.7%	1.3%	26.1%
		African American					Intro CS, no math, Alt. educ.
	AP Math	Math Analysis	IM3 Algebra II	IM 2 Geometry	IM 1 Algebra I	Below Algebra I	
1990-91	0.7%	2.3%	6.4%	10.5%	18.5%	45.3%	16.3%
District	1.4%	5.4%	9.2%	12.5%	18.4%	38.0%	15.1%
1995-96	1.4%	3.1%	7.6%	15.0%	40.1%	3.7%	29.1%
District	2.7%	5.9%	11.1%	16.6%	34.3%	4.1%	25.3%
1999-00	2.2%	4.1%	12.0%	16.1%	31.2%	0.7%	33.7%
District	5.0%	6.6%	12.6%	18.7%	29.7%	1.3%	26.1%
		European American					Intro CS, no math, Alt. educ.
	AP Math	Math Analysis	IM3 Algebra II	IM 2 Geometry	IM 1 Algebra I	Below Algebra I	
1990-91	1.4%	5.0%	10.9%	15.1%	21.3%	28.3%	18.0%
District	1.4%	5.4%	9.2%	12.5%	18.4%	38.0%	15.1%
1995-96	2.7%	5.2%	10.9%	17.7%	31.3%	2.3%	29.9%
District	2.7%	5.9%	11.1%	16.6%	34.3%	4.1%	25.3%
1999-00	3.0%	6.0%	12.6%	19.5%	26.1%	1.3%	31.5%
District	5.0%	6.6%	12.6%	18.7%	29.7%	1.3%	26.1%

Appendix F: Success rate and enrollment calculations for AP Mathematics Classes

1995-96	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in AP Math Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{886}{1076} = 82.3\%$	7775	$\frac{538}{7775} = 6.9\%$
Hispanic	$\frac{100}{153} = 65.4\%$	8431	$\frac{76.5}{8431} = 0.9\%$
African American	$\frac{28}{38} = 73.7\%$	1390	$\frac{19}{1390} = 1.4\%$
European American	$\frac{222}{239} = 92.9\%$	4486	$\frac{119.5}{4486} = 2.7\%$
District Total	$\frac{1236}{1506} = 82.1\%$	22082	$\frac{753}{22082} = 3.4\%$
1998-99	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in AP Math Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{1557}{1745} = 89.2\%$	9265	$\frac{872.5}{9265} = 9.4\%$
Hispanic	$\frac{145}{197} = 73.6\%$	9451	$\frac{98.5}{9451} = 1.0\%$
African American	$\frac{37}{49} = 75.5\%$	1229	$\frac{24.5}{1229} = 2.0\%$
European American	$\frac{218}{259} = 84.2\%$	4313	$\frac{129.5}{4313} = 3.0\%$
District Total	$\frac{1957}{2250} = 87.0\%$	24258	$\frac{1125}{24258} = 4.6\%$
1999-00	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in AP Math Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{1694}{1912} = 88.6\%$	9478	$\frac{956}{9478} = 10.1\%$
Hispanic	$\frac{169}{236} = 71.6\%$	9611	$\frac{118}{9611} = 1.2\%$
African American	$\frac{42}{54} = 77.8\%$	1221	$\frac{27}{1221} = 2.2\%$
European American	$\frac{216}{249} = 86.7\%$	4142	$\frac{124.5}{4142} = 3.0\%$
District Total	$\frac{2121}{2451} = 86.5\%$	24452	$\frac{1225.5}{24452} = 5.0\%$

Appendix G: Success rate and enrollment calculations for Math Analysis Classes

1995-96	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Math Analysis Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{1300}{1673} = 77.7\%$	7775	$\frac{836.5}{7775} = 10.8\%$
Hispanic	$\frac{248}{382} = 64.9\%$	8431	$\frac{191}{8431} = 2.3\%$
African American	$\frac{48}{87} = 55.2\%$	1390	$\frac{43.5}{1390} = 3.1\%$
European American	$\frac{369}{464} = 79.5\%$	4486	$\frac{232}{4486} = 5.2\%$
District Total	$\frac{1965}{2606} = 75.4\%$	22082	$\frac{1303}{22082} = 5.9\%$
1998-99	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Math Analysis Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{1754}{2139} = 82.0\%$	9265	$\frac{1069.5}{9265} = 11.5\%$
Hispanic	$\frac{329}{421} = 78.1\%$	9451	$\frac{210.5}{9451} = 2.2\%$
African American	$\frac{59}{83} = 71.1\%$	1229	$\frac{41.5}{1229} = 3.4\%$
European American	$\frac{381}{426} = 89.4\%$	4313	$\frac{213}{4313} = 4.9\%$
District Total	$\frac{2523}{3069} = 82.2\%$	24258	$\frac{1534.5}{24258} = 6.3\%$
1999-00	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Math Analysis Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{1750}{2219} = 78.9\%$	9478	$\frac{1109.5}{9478} = 11.7\%$
Hispanic	$\frac{309}{404} = 76.5\%$	9611	$\frac{202}{9611} = 2.1\%$
African American	$\frac{75}{99} = 75.8\%$	1221	$\frac{49.5}{1221} = 4.1\%$
European American	$\frac{418}{495} = 84.4\%$	4142	$\frac{247.5}{4142} = 6.0\%$
District Total	$\frac{2552}{3217} = 79.3\%$	24452	$\frac{1608.5}{24452} = 6.6\%$

Appendix H: Success rate and enrollment calculations for Algebra II/IM 3 Classes

1995-96	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Algebra II/IM 3 Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{1906}{2683} = 71.0\%$	7775	$\frac{1341.5}{7775} = 17.3\%$
Hispanic	$\frac{570}{1022} = 55.8\%$	8431	$\frac{511}{8431} = 6.1\%$
African American	$\frac{122}{212} = 57.5\%$	1390	$\frac{106}{1390} = 7.6\%$
European American	$\frac{671}{980} = 68.5\%$	4486	$\frac{490}{4486} = 10.9\%$
District Total	$\frac{3269}{4897} = 66.8\%$	22082	$\frac{2448.5}{22082} = 11.1\%$
1998-99	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Algebra II/IM 3 Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{2438}{3355} = 72.7\%$	9265	$\frac{1677.5}{9265} = 18.1\%$
Hispanic	$\frac{741}{1334} = 55.5\%$	9451	$\frac{667}{9451} = 7.1\%$
African American	$\frac{177}{290} = 61.0\%$	1229	$\frac{145}{1229} = 11.8\%$
European American	$\frac{894}{1204} = 74.3\%$	4313	$\frac{602}{4313} = 14.0\%$
District Total	$\frac{4250}{6183} = 68.7\%$	24258	$\frac{3091.5}{24258} = 12.7\%$
1999-00	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Algebra II/IM 3 Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{2522}{3431} = 73.5\%$	9478	$\frac{1715.5}{9478} = 18.1\%$
Hispanic	$\frac{708}{1378} = 51.4\%$	9611	$\frac{1378}{9611} = 14.3\%$
African American	$\frac{153}{292} = 52.4\%$	1221	$\frac{146}{1221} = 12.0\%$
European American	$\frac{744}{1045} = 71.2\%$	4142	$\frac{522.5}{4142} = 12.6\%$
District Total	$\frac{4127}{6146} = 67.1\%$	24452	$\frac{3073}{24452} = 12.6\%$

Appendix I: Success rate and enrollment calculations for Geometry /IM 2 classes

1995-96	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Geometry /IM 2 Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{2307}{3244} = 71.1\%$	7775	$\frac{1622}{7775} = 20.9\%$
Hispanic	$\frac{999}{2103} = 47.5\%$	8431	$\frac{1051.5}{8431} = 12.5\%$
African American	$\frac{165}{418} = 39.5\%$	1390	$\frac{209}{1390} = 15.0\%$
European American	$\frac{1067}{1584} = 67.4\%$	4486	$\frac{792}{4486} = 17.7\%$
District Total	$\frac{4538}{7349} = 61.7\%$	22082	$\frac{3674.5}{22082} = 16.6\%$
1998-99	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Geometry /IM 2 Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{2797}{3881} = 72.1\%$	9265	$\frac{1940.5}{9265} = 20.9\%$
Hispanic	$\frac{1220}{2768} = 44.1\%$	9451	$\frac{1384}{9451} = 14.6\%$
African American	$\frac{243}{487} = 49.9\%$	1229	$\frac{243.5}{1229} = 19.8\%$
European American	$\frac{1067}{1614} = 66.1\%$	4313	$\frac{807}{4313} = 18.7\%$
District Total	$\frac{5327}{8750} = 60.9\%$	24258	$\frac{4375}{24258} = 18.0\%$
1999-00	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Geometry /IM 2 Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{2668}{3861} = 69.1\%$	9478	$\frac{1930.5}{9478} = 20.3\%$
Hispanic	$\frac{1482}{3245} = 45.7\%$	9611	$\frac{1622.5}{9611} = 16.9\%$
African American	$\frac{169}{392} = 43.1\%$	1221	$\frac{196}{1221} = 16.1\%$
European American	$\frac{1111}{1658} = 67.0\%$	4142	$\frac{829}{4142} = 20.0\%$
District Total	$\frac{5430}{9156} = 59.3\%$	24452	$\frac{4578}{24452} = 18.7\%$

Appendix J: Success rate and enrollment calculations for Algebra I/IM 1 classes

1995-96	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Algebra I /IM 1 Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{2569}{4435} = 57.9\%$	7775	$\frac{2217.5}{7775} = 28.5\%$
Hispanic	$\frac{2382}{6793} = 35.1\%$	8431	$\frac{3396.5}{8431} = 40.3\%$
African American	$\frac{402}{1114} = 36.1\%$	1390	$\frac{557}{1390} = 40.1\%$
European American	$\frac{1419}{2812} = 50.5\%$	4486	$\frac{1406}{4486} = 31.3\%$
District Total	$\frac{6772}{15154} = 44.7\%$	22082	$\frac{7577}{22082} = 34.3\%$
1998-99	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Algebra I /IM 1 Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{2914}{4523} = 64.4\%$	9265	$\frac{2261.5}{9265} = 24.4\%$
Hispanic	$\frac{2616}{7493} = 34.9\%$	9451	$\frac{3746.5}{9451} = 39.6\%$
African American	$\frac{298}{749} = 39.8\%$	1229	$\frac{374.5}{1229} = 30.5\%$
European American	$\frac{1248}{2243} = 55.6\%$	4313	$\frac{1121.5}{4313} = 26.0\%$
District Total	$\frac{7076}{15008} = 47.1\%$	24258	$\frac{7504}{24258} = 30.9\%$
1999-00	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Algebra I /IM 1 Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{2778}{4221} = 65.8\%$	9478	$\frac{2110.5}{9478} = 22.3\%$
Hispanic	$\frac{2891}{7355} = 39.3\%$	9611	$\frac{3677.5}{9611} = 38.3\%$
African American	$\frac{325}{762} = 42.7\%$	1221	$\frac{381}{1221} = 31.2\%$
European American	$\frac{1272}{2163} = 58.8\%$	4142	$\frac{1081.5}{4142} = 26.1\%$
District Total	$\frac{7266}{14501} = 50.1\%$	24452	$\frac{7250.5}{24452} = 29.7\%$

Appendix K: Success rate and enrollment calculations for non-college preparatory mathematics classes

1995-96	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Non-college Prep math Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{219}{321} = 68.2\%$	7775	$\frac{160.5}{7775} = 2.1\%$
Hispanic	$\frac{621}{1189} = 52.2\%$	8431	$\frac{594.5}{8431} = 7.1\%$
African American	$\frac{64}{104} = 61.5\%$	1390	$\frac{52}{1390} = 3.7\%$
European American	$\frac{123}{205} = 60.0\%$	4486	$\frac{102.5}{4486} = 2.3\%$
District Total	$\frac{1027}{1819} = 56.5\%$	22082	$\frac{909.5}{22082} = 4.1\%$
1998-99	Percent Successful (Total successful ÷ total enrolled from both semesters.)	District Enrollment	Percent of Ethnicity Enrolled in Non-college Prep math Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{95}{147} = 64.6\%$	9265	$\frac{73.5}{9265} = 0.8\%$
Hispanic	$\frac{232}{516} = 45.0\%$	9451	$\frac{258}{9451} = 2.7\%$
African American	$\frac{26}{59} = 44.1\%$	1229	$\frac{29.5}{1229} = 2.4\%$
European American	$\frac{55}{101} = 54.5\%$	4313	$\frac{50.5}{4313} = 1.2\%$
District Total	$\frac{408}{823} = 49.6\%$	24258	$\frac{411.5}{24258} = 1.7\%$
1999-00	Percent Successful (Total successful ÷ total enrolled from both semesters)	District Enrollment	Percent of Ethnicity Enrolled in Non-college Prep math Classes (the total enrolled ÷ 2 for numerator)
Asian, Filipino, American Indian, Pacific Islander	$\frac{31}{54} = 57.4\%$	9478	$\frac{27}{9478} = 0.3\%$
Hispanic	$\frac{121}{202} = 60.0\%$	9611	$\frac{101}{9611} = 1.1\%$
African American	$\frac{12}{18} = 66.7\%$	1221	$\frac{9}{1221} = 0.7\%$
European American	$\frac{42}{53} = 79.2\%$	4142	$\frac{26.5}{4142} = 0.6\%$
District Total	$\frac{206}{327} = 63.0\%$	24452	$\frac{163.5}{24452} = 0.7\%$

REFERENCES

- Becker, J. R. (1995). Women's ways of knowing in mathematics. In P. Rogers & G. Kaiser (Eds.), *Equity in mathematics education: Influences of feminism and culture*. (p. 163-74). Washington D.C.: The Falmer Press.
- Boaler, J. (1998). Open and closed mathematics: Students' experiences and understandings. *Journal for Research in Mathematics Education*, 29, 41-62.
- Boaler, J. (1997). *Experiencing school mathematics: Teaching styles, sex and setting*. Philadelphia: Open University Press, 125-142.
- California Department of Education. (2001, January 2) *CBEDS Enrollment in public schools by district and by ethnic group*. [On-line]. Available: <http://data1.cde.ca.gov/dataquest/DistEnr2.asp?cSelect=4369427>
- California Department of Education. (2000, June 27) *Trends in ethnic distribution of students since 87/88*. [On-line]. Available: <http://www.ed-data.k12.ca.us/fiscal/ethnictrends.DistCode=4369427>
- California Department of Education. (2000, January 21) *CBEDS Public school summary statistics*. [On-line]. Available: <http://www.cde.ca.gov/demographics/reports/statewide/ethstu>
- Campbell, J. R., Hombro, C. M., and Mazzeo, J. (2000). *NAEP 1999 trends in academic progress: Three decades of student performance*. (NCES 2000-469), Washington, D.C.: U.S. Department of Education.
- College Board. (2000). *2000 College bound seniors' test scores*. [On-line]. Available: <http://www.collegeboard.org/sat/cbsenior/yr2000/nat/natbk400.html#income>
- College Board. (1997). *EQUITY 2000: What it takes*. New York: College Entrance Examination Board.
- College Board. (1996). *Signs of success EQUITY 2000: Preliminary evidence of effectiveness*. New York: College Entrance Examination Board.
- College Board. (1995). *EQUITY 2000: What it takes, creating a supportive climate for implementation*. New York: College Entrance Examination Board.

- Cox, W. (2000, June 4). U.S. Population by state from 1900. [On-line]. Available: <http://www.demographia.com/db-state1900.htm>
- D'Ambrosio, U. (1997) Diversity, equity and peace: From dream to reality. In J. Trentacosta & M. Kenney (Eds.), *Multicultural and gender equity in the mathematics classroom: The gift of diversity*. (p. 243-248). Reston, VA: NCTM.
- Delpit, L. (1995). *Other people's children: Cultural conflict in the classroom*. New York: The New Press.
- East Side Union High School District. (1998, February). East Side Union High Schools Gateways to success.
- Fields, C. (1997). An equation for equity. *Black Issues in Higher Education*, 13, 24-30.
- Gamoran, A. (1990). Instructional organizational practices that affect equity. In P. Baptiste, H. C. Waxman, J. W. deFelix, and J.E. Anderson (Eds.), *Leadership, equity and school effectiveness*. (p. 163-164). Newbury Park, CA: Sage Publications.
- Gardner, H. (1990). Multiple intelligences: Implications for art and creativity. In W. J. Moody (Ed.), *Artistic intelligences: Implications for education*. (p. 11-28). New York: Teachers College Press.
- Haury D. L., Milbourne, L. A. (1999). Should students be tracked in math or science? [on-line] <http://www.ericse.org/digests/dse99-04.html>
- Jones, V. (1997a). What a difference a standard makes! In D. M. Bartels and J. Opert Sandler (Eds.), *Implementing science education reform: Are we making an Impact?* (p. 201-214). Washington D.C.: American Association for the Advancement of Science.
- Jones, V. (1997b). Working with what works. *Black Issues in Higher Education*, 13, 31-34.
- Jones, V. (1992). Director's corner: Expecting the best from students. *EQUITY 2000 News*, 1(2), 8.
- Kohl, H. (1991). *I won't learn from you! The role of assent in learning*. Minneapolis: Milkweed Editions.

- Kohn, A. (2000). *The case against standardized testing: Raising the scores, ruining the schools*. Portsmouth, NH: Heinemann.
- Kutscher, B. & Linchevski, L. (1998). Tell me with whom you're learning, and I'll tell you how much you've learned: Mixed-ability versus same-ability grouping in mathematics. *Journal for Research in Mathematics Education*, 29, 533-554.
- Ladson-Billings, G. (1997). It doesn't add up: African American students' mathematical achievement. *Journal for Research in Mathematics Education*, 28, 697-708.
- Ladson-Billings, G. (1994). *The dreamkeepers: Successful teachers of African American children*. San Francisco: Jossey-Bass Inc.
- McCall, N. (1994). *Makes me wanna holler: A young black man in America*. New York: Vintage Books.
- Middleton, J. & Spanias, P. (1999). Motivation for achievement in mathematics: Findings, generalizations, and criticisms of the research. *Journal for Research in Mathematics Education*, 30, 65-68.
- National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: The Council.
- National Council of Teachers of Mathematics. (1995). *Assessment standards for school mathematics*. Reston, VA: The Council.
- Newburger, E. C., Curry, A. E. (2000). *Educational attainment in the United States (Update): Current population reports*. (P20-536). Washington D.C.: U.S. Department of Commerce.
- Oakes, J., Wells, A. S., Yonezawa, S., & Ray, K. (1997). Equity lessons from detracking schools. In A. Hargreaves (Ed.), *Rethinking educational change with heart and mind*. (p. 43-72). Alexandria, VA: Association for Supervision and Curriculum Development.
- Oakes, J. (1992). Can tracking research inform practice? Technical, normative, and political considerations. *Educational Researcher*, May, 12-21.

- Oakes, J. (1990). *Multiplying inequalities: The effects of race, social class, and tracking on opportunities to learn mathematics and science*. Santa Monica, CA: The RAND Corporation.
- Oakes, J. (1985). *Keeping track: How schools structure inequality*. New Haven, CT: Yale University Press.
- Pelavin, S. H. & Kane, M. (1990). *Changing the odds: Factors increasing access to college*. New York: College Entrance Examination Board.
- Pelavin, S. H. & Kane, M. (1988). *Minority participation in higher education*. Prepared for the U.S. Department of Education by Pelavin Associates.
- Quiñones, S. Rodríguez, C. Bohrnstedt, G. (1999). *A follow-up study of a sample of Equity 2000 graduates* (American Institutes for Research Rep. No. 88). Washington, D.C.: Pelavin Research Center.
- Robinson, G. E. & Brandon, D. P. (1994). *NAEP Test Scores: Should they be used to compare and rank state educational quality?* Arlington, VA: Educational Research Service.
- Secada, W. G. (1992). Race, ethnicity, social class, language, and achievement in mathematics. In D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning*. (pp. 623-660). New York: NCTM.
- Seeley, C. (1998). *What mathematics for whom?* A paper prepared for the University of Chicago School Mathematics Project's Fourth International Conference on Mathematics Education.
- Slavin, R. E. & Braddock III, J. H. (1993). *Ability grouping: On the wrong track*. The College Board Review. 168, 11-18.
- Stiff, L. V. (1998). The professional development of teachers of African American students. In C. E. Malloy & L. Brader-Araje (Eds.), *Challenges in the mathematics education of African American children: Proceedings of the Benjamin Banneker Association leadership conference*. (p. 71-77). Reston, VA: NCTM.
- Taylor, R. (1990). Teacher expectations of students enrolled in an algebra class. In E. L. Edwards, Jr. (Ed.), *Algebra for everyone*. (p. 45-52). Reston, VA: NCTM.
- Weimers, L. (2000, November 22). What's to be thankful for? Try this. *San José Mercury News*, pp. B1.