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ABSTRACT

In 1992, the U.S. Department of Education, through its National Assessment of Educational Progress (NAEP), surveyed the mathematics performance of approximately 250,000 students through two comprehensive surveys: (1) the National Assessment and (2) Trial State Assessment. The National assessment surveyed approximately 26,000 fourth, eighth, and twelfth grade students attending public and private schools. The Trial State Assessment included a representative sample of approximately 220,000 fourth and eighth grade students attending public schools in 44 states. The sample also contained 25,000 students of Hispanic and Asian origin. The purpose of this study is to compare the background characteristics and the mathematics performance of the fourth and eighth grade Hispanic and Asian students that participated in the 1992 NAEP Trial State Assessment and to determine how their mathematics performance varies as a function of their demographic characteristics, English competence, school-related attitudes, and school behaviors. Appendices list the variables selected for descriptive analysis, variables selected for multiple regression analysis, and procedures related to analysis. Contains 17 references. (ASK)

A Descriptive Study of the Mathematics Performance of Hispanic and Asian Youth in the 1992 Trial State Assessment

by

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Introduction

In 1992, the U. S. Department of Education through its National Assessment of Educational Progress surveyed the mathematics performance of approximately 250,000 students through two comprehensive surveys: the National Assessment, and the Trial State Assessment. The National Assessment surveyed approximately 26,000 4th-, 8th-, and twelfth-graders attending public and private schools. The Trial State Assessment included a representative sample of approximately 220,000 fourth-, and eight-graders attending public schools in 44 states. Included in the sample were 25,000 students of Hispanic and Asian origin. Both assessments gathered data from the students, their teachers and school administrators. Student background information focused on language, ethnicity, home/parental information, school-related experiences, attitudes toward mathematics, and their mathematics performance. In addition, the corpus for the study included teacher background and education, and the characteristics and policies of the schools attended by the student sample.

The last comprehensive survey of the NAEP mathematics and reading performance of Hispanic and Asian students in the was conducted by Baratz-Snowden, et, al, during the 1985-86 school year (1988). A decade later, there is a need to update the Baratz-Snowden study findings, in order to document changes, if any, in the mathematics achievement and background characteristics of these language minority student populations.

Literature Review

According to the 1990 census data, the Hispanic population will rise from 24 million in 1992 to 39 million in the year 2010. It is projected that this population will reach 81 million by the year 2050 (U.S. Department of Commerce, 1992). Hispanics constitute the largest language minority group in the U.S., yet their academic performance continues to be below that of their White peers and their school dropout rate the highest among minorities (Padron, 1993). Of particular concern is the continued low performance of Hispanics in national mathematics assessments (NAEP Mathematics Report Card, 1993). In addition, the under-representation of Hispanics in high level mathematics and science courses seem to be reflected in their low representation in the technical and scientific professions (The Condition of Education, 1992). The projected growth of the Hispanic population in the United States will undoubtedly continue to impact the nation, particularly in the education domain.

Research on school practices and lower-achieving and disadvantaged students, of which

Hispanics constitute a large number, suggest that schools often devote less time and emphasis to higher-order thinking skills than do schools serving more advantaged students (Padron, 1993). This situation seems to be reinforced by teachers' beliefs that low-achieving students must first master the basic skills before they are ready to develop higher-level skills (Padron, 1993).

In addition, evidence about the potential connection between students' ability to understand the written text and be able to express their mathematical thinking comes from the 1992 NAEP Mathematics Assessments. In 1992, the number of multiple choice questions in the Assessments were decreased for the first time in order to include word problems or problem-solving situations that provide students with opportunities for thoughtful explanations about the processes and approaches they use to solve mathematical problems (Can Students do Mathematical Problem Solving?, 1993). About one-third of all the test items for each grade level being tested were word problems. It was found that the performance of students at all grade levels was poor, particularly that of Hispanics and African-American students. Students' incorrect responses provided evidence that there was little or no understanding of the mathematics concepts involved in the word problems, "or even the question being asked" (ibid, p.2). The researchers found that "most students who did seem to understand the problem had difficulty in explaining their work (ibid, p.2). These findings raise questions about the relationship between English reading and writing skills and math performance.

Findings of the most recent national survey on the reading and mathematics performance of Hispanic and Asian students in the third-, seventh-, and eleventh grades, in the 1985-86 school year, suggested that competency in English has a significant relationship with mathematics achievement, particularly at grades seventh and eleventh (Baratz-Snowden, et, al, 1988). Findings, among others, indicated that Asian students performed significantly better on the mathematics test than all the Hispanic sub-groups --Cubans, Puerto Ricans, and Mexican background students-- after holding other significant variables constant. They also found that mathematics achievement at all three grade levels --third-, seventh-, and eleventh-grade-- was significantly related to the types and amount of literacy-related items in the home.

Studies in the field of educational linguistics suggest that certain individual variables, particularly proficiency in the language of instruction, might be related to the mathematics performance of Hispanic students. Crandall, et, al, (1984) studied the role of language in secondary classrooms math instruction. She and her colleagues found that students, particularly language minorities, had problems in comprehending lexical and referential vocabulary markers whose meaning is math-specific. The researchers suggested that "the resulting under achievement in math slows ... [the students'] overall academic progress and prevents them from pursuing either scientific or technical fields" (p.159).

While implementing an integrated English-as-a-second language program for high school math and science, Spanos (1990) studied the linguistic demands of mathematical and scientific content on students whose native language was other than English. Spanos' research suggests

that "language is a barrier for language minority students because they are limited both in basic [English] language proficiency and in the special mathematics register" (p. 400). Reyhner (1993) found that "the capacity of [limited-English proficient students] to learn mathematics and science is influenced by language, culture, and learning style." (p.569). Other studies (Foster, 1989, Khisty 1993, among others) report similar findings. These studies suggest that Hispanic and other language minority students may have difficulty with mathematics partially as a result of their English language proficiency, and the lack of preparation of their teachers in the teaching mathematics and in working with this student population. Khisty (1993) studied the role of language in the teaching and learning of mathematics in multilingual elementary classrooms contexts. Particularly, she studied teachers' mathematics explanations, and found a "pattern of limited mathematical speaking" (p.640), with teacher explanations being mostly procedural, and "with little or no development of [mathematical] concepts". (p.643)

Finally, research about the relationship between academic achievement and parental involvement suggests that is a correlation between the two variables. For example, Simich-Dudgeon (1993) conducted research with 350 high school students and parents from four ethnic groups (Hispanic, Vietnamese, Khmer, and Lao) who attended high school in suburban, ethnically diverse schools. The parents were given training on how to provide academic support to their children, including tutoring strategies for use at home. Findings indicated "significant gains in the areas of English comprehension..., fluency, vocabulary, grammar knowledge and pronunciation." (p.197) Other research suggest similar findings (Dauber & Epstein, 1993; Clark, 1993, Bauch, 1993).

The Study

The purpose of the study is to compare the background characteristics and the mathematics performance of the fourth- and eight-grade Hispanic and Asian students that participated in the NAEP 1992 Trial State Assessment (TSA), and to determine how their mathematics performance vary as a function of their demographic characteristics, English competence, school-related attitudes, and school behaviors. Survey information regarding the background and education of their teachers, and certain characteristics of the schools they attended were included in the corpus for the study. A breakdown of the number of Hispanic and Asian students in sample is indicated in Table 1.

TABLE 1
Student Sample by Ethnic Group and Grade Level

	Fourth grade	Eighth grade
Hispanics	12,396	10,228
Asians	4,727	4,658
Total	17,123	14,886

The research questions that guided the study are:

1. What are the similarities and differences in demographic characteristics; language exposure and English proficiency; home characteristics, and parental education of Hispanic and Asian students?
2. What are similarities and differences in the attitudes of Hispanic and Asian students toward mathematics?
3. How do Hispanic and Asian students' educational experiences differ?
4. What is the mathematics performance of Asian and Hispanic students?
5. How does the mathematics performance of Hispanic and Asian students vary as a function of their demographic characteristics, English competence, school-related attitudes, and school behaviors?

In this paper, we report our initial descriptive findings regarding the 17,123 fourth-grade Hispanic and Asian students that participated in the 1992 Mathematics Trial State Assessment.

Methodology

Descriptive and multiple regression statistics were used to conduct secondary data analyses on the Hispanic and Asian students data sets. The SAS software package was used to analyze the data. In addition, methods for estimating statistical variance, sampling errors, and statistical procedures tailored to the analysis of the NAEP national assessments data sets were used (Hartka, et, al., 1994). The variables used in both descriptive and relational analyses are those that have been identified in the literature as being related to language minority student achievement in mathematics (Baratz-Snowden, et, al, 1988, Padron, 1994, among other), and those that suggest a correlation between parental involvement and student achievement (Simich-Dudgeon, 1993, Dauber & Epstein, 1993, among others). The unit of analysis is the student in accordance with the 1992 NAEP/TSA analytic procedures. The variables used in the descriptive and relational components of the study are listed in Appendix A. [1] There are two components to the study: descriptive and relational.

Descriptive Analysis

In this part of the study, we compared the background characteristics of Hispanic and Asian students in the sample, the educational supports available to them in their homes, their

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[1] Methodological and other technical information about the 1992 NAEP mathematics assessments have been widely documented. For information, please refer to: Interpreting NAEP Scales, USDOE, 1993, A Description of the Content and Methods of the 1990 and 1992 Assessments, ETS, 1991, Data Compendium for the NAEP 1992 Mathematics Assessment of the Nation and the States, ETS, 1993, and the 1992 NAEP Mathematics Assessments Technical Manual, ETS, 1993.

educational experiences, their attitudes toward mathematics, and their mathematics performance in the 1992 NAEP Trial State Assessment. In addition, the ethnicity, professional background and experience of their teachers , their instructional strategies, and the characteristics of the schools they attended were compared.

The descriptive statistics procedures included, first, selecting and creating the Hispanic and Asian files, second, computing the weighted sums for the total number of students, third, computing percentages and standard errors, and, fourth, calculating the Hispanics and Asian students' mathematics proficiency and its replicate weight.

Forty six variables were selected for the descriptive analysis. These variables were abstracted from three different data files (students, teachers, and schools) and grouped under six categories. These categories were, demographic characteristics, language status, home educational supports, school-related attitudes, students' educational experiences, and school characteristics. Please refer to Appendix A for a complete list of the variables, and their coding patterns, that were used in this component of the study.

Because of the NAEP's complex sampling methods, a special procedure for estimating standard errors was used. (Harka, et, al, 1994, NAEP Technical Manual, 1993).[2] For more information about the descriptive analysis procedures, please refer to Appendix B.

Relational Analysis

The relational analysis component of the study (not reported in this paper) examined the regressions of certain hypothesized explanatory variables on the Hispanic and Asian students' mathematics performance. The regressions were ordered on a path analysis model developed by Baratz-Snowden, et, al, (1988). This model included 27 variables clustered around seven categories, with the students' mathematics performance as the dependent variable, as shown below.

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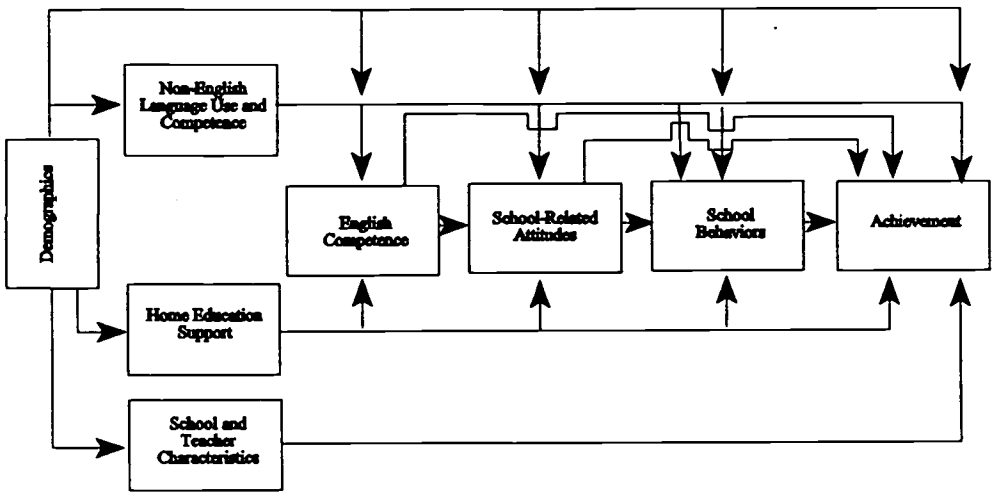
2 A procedure for estimating standard errors , called the jackknife replication procedure, was developed specifically for the analysis of the NAEP national assessment (Hartka, et, al, 1994). "This procedure makes it possible to describe the performance of groups and subgroups of students, [however] the underlying imprecision that makes this step necessary adds an additional component of variability to statistics based on NAEP proficiency." (NAEP 1992 Mathematics Report Card for the Nation and the States, ETS, 1993, p. 360).

FIGURE 1

Hypothesized Explanatory Model*



Source:

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Source: Baratz-Snowden, J., et, al., The educational progress of language minority children: findings from the NAEP 1985-86 Special study, National Assessment of Educational Progress, Educational Testing Service, 1988, p.82

The Baratz-Snowden model (1988), was used with a nationally representative sample of children 9, 13, and 17 years old, in grades three, seven, and eleven, respectively . The total number of students was 10,993. The sample included representative numbers of Mexican Americans, Puerto Rican, Cuban, Other Hispanic, Asian, and Native American children. . According to the researchers, the model is " at best a rough approximation of how things work." (Baratz-Snowden, et, al, 1988, p.81). In this model,

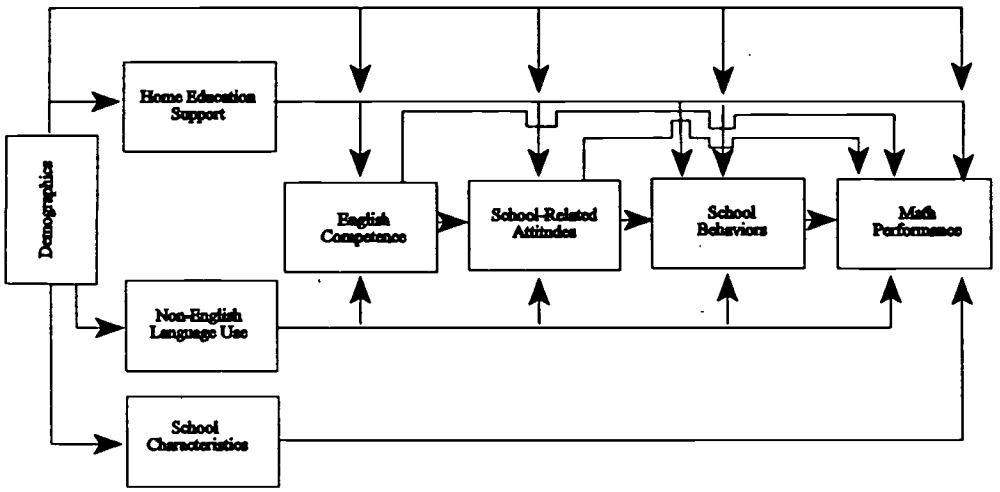
> demographic variables were thought to influence language use and home education support variables. These three categories of variables were then thought to influence school related attitudes. School related variables, along with the previous variables are thought to influence school behaviors. In addition, all these variables, along with school characteristics are assumed to be related to demographics and are thought to influence achievement (Baratz-Snowden, et, al, 1988, p.81).

In the study, similar path analysis procedures were used. However, the Baratz-Snowden, et, al, model (1988) was adapted for two reasons. First the 1992 mathematics TSA was

administered to fourth- and eight-graders, rather than third-, seventh-, and eleven-grade students. Second, the 1992 TSA mathematics survey included only 13 of the original 27 variables used in the Baratz-Snowden model. Therefore, the adapted Baratz-Snowden model includes these 13 variables plus 20 variables that were available to us in the data set, and that are comparable to those used in the Baratz-Snowden model (see Appendix A for a complete list of variables used in the multiple regression analysis). These independent variables were clustered under seven categories, as shown in the model below:

FIGURE 2

Modified Hypothesized Explanatory Model*



Source: Baratz-Snowden, J., et, al., The educational progress of language minority children: findings from the NAEP 1985-86 Special study. National Assessment of Educational Progress, Educational Testing Service, 1988, p.82

As the model indicates, the multiple regressions examine the correlations among the variables in a path-analytic framework. Following the Baratz-Snowden model structure, our model hypothesized that demographic variables influence Non-English language use, home educational support, and school characteristics. Then, demographic, home educational support, and non-English language use variables were thought to influence English competence. All of these variables (demographic, home education support, non-English language use, and English competence) are then thought to influence school-related attitudes. Furthermore, it is thought that all previous variables influence school behaviors, and finally, it is assumed that all of the previous variables in the model influence students' mathematics performance. For additional information about the relational analysis component, please see Appendix C.

Limitations of the Study

At the outset, it is important to identify the limitations of the study, which includes findings reported in this paper. First, the data is self-reported by fourth-grade Hispanic and Asian students. Previous studies (Baratz-Snowden, 1988, Rivera & Penock-Roman, 1987), have questioned the validity of self-reports by young students, including their self-classification. Second, parental education data has a large proportion of missing information, and should be interpreted with care. Third, language minority status was determined in answer to one single question : "How often is a language other than English spoken in the home?" and teachers' determination of the students' English proficiency. This information is inadequate to determine the student sample's proficiency in the language mostly spoken at home, or their proficiency in English in the home and at school, other than on the basis of the teacher's assessment. In addition, the criteria for teachers' determination of the English proficiency of their students is not the same. In the 44 states where the Trial State Assessment data was gathered there could have been as many or more criteria used in determining students' English proficiency. Finally, because of the NAEP survey design, where subjects were not randomly selected and students' math performance scores were not weighted in multiple regression analysis, mathematics achievement scores have plausible values.

Study Findings

Descriptive Analysis Findings

This paper reports on initial descriptive findings regarding the fourth-grade Hispanic and Asian students that participated in the 1992 mathematics Trial State Assessment survey. In this section we report findings to the larger study's first 4 research questions (p. 4). The number of students and teachers that omitted or gave multiple responses to each one of the variables examined in this component of the study are indicated when they represent more than 5 percent of the total number of the student sample.

What are the similarities and differences in demographic characteristics, language exposure and English proficiency; home characteristics, and parental education of Hispanic and Asian students?

Demographic Characteristics

Gender, place of birth, and age were the demographic characteristics examined. Table 2 indicates that there was a closely similar proportion of males and females among Hispanics and Asian students in the sample

TABLE 2
Hispanic and Asian Students by Gender

	Hispanic percent (SE)	Asian percent (SE)
Male	52.02 (0.71)	49.53 (1.41)
Female	47.98 (0.71)	50.47 (1.41)
Total responses	12396	4727

* Percentages and standard errors are weighted.

Place of birth data was obtained with the survey question "were you born in the US, DC, or territories?". The data in Table 3 show that Hispanic students were more likely to report being born in the US, DC, or territories than Asian students.

TABLE 3
Hispanic and Asian students born in the United States, D. C., or Territories*

	Hispanic percent (SE)	Asian percent (SE)
Yes	82.44 (0.72)	65.80 (1.37)
No	16.96 (0.74)	33.80 (1.34)
Total responses	12314	4702

* Percentages and standard errors are weighted.

* 72 Hispanic and 25 Asian students who omitted this question were excluded from this Table.

In order to determine the subgroup identification of Hispanic students, they were asked "if Hispanic, what is your Hispanic background?". Table 4 indicates that Cuban-origin students, and Mexican/Chicano students, were more likely to report having been born in the United States, the District of Columbia, and territories, than Puerto Rican and "Other" Hispanics.

TABLE 4
Subgroups of Hispanic Students Born in the US, D. C., or Territories*

	Mex/Chicano percent (SE)	Puerto Rican percent (SE)	Cuban percent (SE)	Other Hispanic percent (SE)
Yes	85.63 (0.79)	81.43 (1.86)	86.80 (2.77)	75.85 (1.34)
No	14.03 (0.79)	17.92 (1.82)	12.99 (2.78)	23.80 (1.31)
Total responses	6141	1517	365	3845

* Percentages and standard errors are weighted.
* 40 Mexican/Chicano, 11 Puerto Rican, 1 Cuban, and 17 other Hispanic students who omitted this question were excluded from this Table.

The age of the fourth-grade Hispanic and Asian sample was determined by providing a range of age choices, from seven to 13. The data on Table 5 show that about 94 percent of the Hispanic and about 96 percent of the Asian students reported that their ages were between 9 and 10 years old, with a small percentage of students from both ethnic groups reporting age ranges of 5 to 13 years old. Therefore, over 56 percent of the Hispanic students and over 70 percent of the Asian students in the sample were on grade level (9 years old), and over 37 percent of Hispanics and over 26 percent of Asian students were one year behind grade level (10 years old).

TABLE 5
Hispanic and Asian Students Age*

	Hispanic percent (SE)	Asian percent (SE)
7 years old	0.01 (0.01)	0.05 (0.03)
8 years old	0.43 (0.08)	1.02 (0.26)
9 years old	56.64 (0.71)	70.32 (1.41)
10 years old	37.44 (0.66)	26.11 (1.33)
11 years old	5.22 (0.28)	2.30 (0.49)
12 years old	0.21 (0.05)	0.14 (0.08)
13 years old	0.03 (0.01)	0.07 (0.07)
Total responses	12392	4727

* Percentages and standard errors are weighted.
* Four Hispanic students who reported that they were 5, 6, 15, and 19 years old, respectively, were excluded from this Table.

The language status of the Hispanic and Asian students was determined by students' responses to the question "How often is a language other than English spoken in the home?". Table 6 indicates that both Hispanic and Asian students were more likely than not to be exposed to a language other than English in their homes, with about 78 percent of Hispanic and about 74 percent of Asian students reporting that they speak a language other than English at home sometimes or always. From the data, it can be inferred that over half of the students in both ethnic groups speak a language other than English, and English, sometimes at home.

TABLE 6

Hispanic and Asian students Speak a Language other than English at Home*

	Hispanic percent (SE)	Asian percent (SE)
Never	21.14 (0.63)	15.50 (1.17)
Sometimes	58.16 (0.79)	59.78 (1.51)
Always	20.38 (0.75)	24.33 (1.75)
Total responses	12364	4710

* Percentages and standard errors are weighted.

* 32 Hispanic and 17 Asian students who omitted this question were excluded from this Table.

A determination of the English proficiency of the students was made by their teachers. Table 7 indicates that over 86 percent of the students in both groups considered to be English proficient. Of interest is the fact that over 13 percent of the Hispanic and Asian students were identified by their teachers as being limited in their English proficiency, yet met criteria for participation.[3]

TABLE 7

Hispanic and Asian students with Limited English Proficiency (LEP)

	Hispanic percent (SE)	Asian percent (SE)
Yes	13.99 (1.09)	13.53 (2.00)
No	86.01 (1.09)	86.47 (2.00)
Total responses	12396	4727

* Percentages and standard errors are weighted.

When the Hispanic students data is broken down by Hispanic background (Table 8), Mexican-American students have the highest percentage of limited English proficient (LEP) students, followed by "Other" Hispanics.

[3] LEP students were excluded from participation in the survey if they were native speakers of a language other than English; had been enrolled in an English-speaking school for less than two years, and were judged to be "incapable of taking part in the assessment" (NAEP 1992 Mathematics Report Card for the Nation and the States. USDOE, 1993, p.347)

TABLE 8
Hispanic Students by Hispanic Background and LEP

	Mex/Chicano percent (SE)	Puerto Rican percent (SE)	Cuban percent (SE)	Other Hispanic percent (SE)
Yes	16.78 (1.63)	7.09 (1.27)	7.07 (1.94)	10.73 (1.05)
No	83.22 (1.63)	92.91 (1.27)	92.93 (1.94)	89.28 (1.05)
Total responses	6181	1528	366	3862

* Percentages and standard errors are weighted.

Home Educational Supports: Parents at Home

In this section, students responses regarding how many parents lived at home, which parent lived at home, and parental education are described. As the data on Table 9 indicates, Over 72 percent of both Hispanic and Asian students reported that they live with both parents at home. However, the data indicate that Asian students are more likely to report that they live with two parents at home. On the other hand, Hispanic students were more likely than Asian students to report that they lived with one parent at home,

TABLE 9
Hispanic and Asian students Report on How Many Parents Lived at Home*

	Hispanic percent (SE)	Asian percent (SE)
2 parents at home	72.57 (0.70)	81.48 (1.36)
1 parent at home	21.05 (0.64)	12.92 (1.13)
Neither at home	5.88 (0.32)	5.33 (0.66)
Total responses	12353	4717

* Percentages and standard errors are weighted.
* 43 Hispanic and 10 Asian students who omitted this question were excluded from this Table.

Home Education Supports: Parental Education

The parental education data on Table 10 indicates that over 25 percent of the parents of Hispanic and Asian students have graduated from college, yet, Asian students' parents are more likely than Hispanic parents to have done so. The data also suggest that Hispanic students are more likely than Asians to report that their parents did not finish high school. However, these data should be interpreted with care, given the large proportion of missing information.

TABLE 10
Hispanic and Asian Students' Parental Education

	Hispanic percent (SE)	Asian percent (SE)
Didn't finish high school	8.48 (0.53)	2.15 (0.36)
Graduated from high school	12.22 (0.39)	4.76 (0.52)
Some educ. after high schl	7.03 (0.45)	4.15 (0.55)
Graduated from college	25.79 (0.70)	39.42 (1.60)
Didn't know or omitted	46.48 (0.75)	49.52 (1.84)
Total responses	12396	4727

* Percentages and standard errors are weighted.

Home Education Supports: Types of Literacy-Related Items at Home

Hispanic and Asian students were asked to report whether they had 4 types of literacy-related items in their homes: an encyclopedia, subscriptions to a newspaper and magazines, and 25 books or more. Although both ethnic groups report comparable numbers of literacy-related items at home, the data in Table 11 indicate that over 43 percent of both Hispanic and Asian students report having from 0 to 2 literacy-related items at home, with Asian students more likely to report that they have from 0 to 2 items. The data further indicate that Asian students are more likely to respond that they have 3 and 4 types of literacy-related items at home than Hispanic students. Nonetheless, the data does not make it possible to identify the number of students who say that they do not have literacy items available in the home from those who say that they have from 1 to 2 items.

TABLE 11
Hispanic and Asian students' literacy-related items at home *

	Hispanic percent (SE)	Asian percent (SE)
0 - 2 types	48.47 (0.93)	43.72 (1.82)
3 types	28.53 (0.72)	29.68 (1.32)
4 types	21.18 (0.65)	24.71 (1.25)
Total responses	12209	4620

* Percentages and standard errors are weighted.
* 187 Hispanic and 107 Asian students who omitted this question were excluded from this Table.
* Types of literacy-related items available at home: : 25 books, an encyclopedia, newspaper and magazines

Home Supports: Hours of Television Viewing each Day

When asked to report how many hours of television they watched each day, the data on Table 12 indicate that Hispanic students are more likely to watch 6 or more hours of television a day than Asian students, and that Asian students are more likely to report that they watch from 0 to 2 hours of television a day.

TABLE 12
Hispanic and Asian Students: Hours Viewing Television*

	Hispanic percent (SE)	Asian percent (SE)
0 - 2 hours	36.68 (0.82)	45.30 (1.74)
3 - 5 hours	38.22 (0.72)	38.57 (1.39)
6 or more hours	24.95 (0.66)	16.11 (1.47)
Total responses	12382	4722

* Percentages and standard errors are weighted.
* 14 Hispanic and 5 Asian students who omitted this question were excluded from this Table.

Home Supports: How Often Students Discuss Studies at Home

When students were asked how often they discuss their studies with someone at home, Table 13 shows that over 46 percent of the students in both ethnic groups reported that they discuss their studies at home almost every day, although Hispanic students had a slightly higher percentage than Asians. Hispanic students were more likely than Asian students to report that they never, or hardly ever, discuss their studies at home.

TABLE 13
Hispanic and Asian students Discuss Studies at Home*

	Hispanic percent (SE)	Asian percent (SE)
Almost every day	48.68 (0.77)	46.45 (1.90)
Once/ twice a week	23.00 (0.59)	31.03 (1.55)
Once/ twice a month	5.54 (0.28)	7.45 (0.72)
Never/ hardly ever	22.44 (0.62)	14.75 (1.02)
Total responses	12364	4717

* Percentages and standard errors are weighted.
* 32 Hispanic and 10 Asian students who omitted this question were excluded from this Table.

What are the similarities and differences in the attitudes of Asian and Hispanic students towards Mathematics?

Hispanic and Asian students were asked to agree or disagree with eight statements regarding their attitudes toward mathematics. Students responses are organized in the following 4 tables. Table 14 displays students' answers to the statements: I like mathematics, I am good at mathematics, and, I understand most of the mathematics class. Table 15 includes students answers to the statement: mathematics is more for boys than girls. Table 16 includes students' answers to the statements: mathematics is mostly memorizing facts, people use mathematics in jobs, and mathematics is used for solving problems. Finally, Table 17 shows students' answers to the statement: I would not study more mathematics.

The data in Table 14 indicate that Asian students are more likely than Hispanic students to report that they like mathematics - although by a small percentage-, are good at it, and that they understand most of the mathematics instruction in class. The data further shows that over 71 percent of Hispanic students and over 78 percent of Asian students reported that they like mathematics. Asian students were more likely than Hispanics to report that they were good at mathematics (although by a small percentage). Yet, when asked if they thought they were good at mathematics, a lesser number of students in both groups agree: over 55 percent of Hispanic and over 62 percent of Asian students.

TABLE 14
Hispanic Students Attitudes toward Mathematics - 1*

	Like math		Good at math		Understand math	
	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)
Agree	71.72 (0.83)	78.37 (1.19)	55.62 (0.94)	62.33 (1.72)	69.24 (0.84)	76.46 (1.56)
Undecided	14.19 (0.57)	12.52 (0.75)	29.22 (0.82)	27.78 (1.74)	19.08 (0.65)	15.52 (1.10)
Disagree	11.87 (0.47)	6.82 (0.77)	12.20 (0.50)	7.33 (0.77)	7.53 (0.38)	4.75 (0.72)
Total resp	12137	4614	12070	4594	11937	4558

* Percentages and standard errors are weighted.

* 259, 326, and 459 Hispanic students who omitted the question #1, #2, and #3 respectively were excluded from this Table.

* 113, 133, and 169 Asian students who omitted the question #1, #2, and #3 respectively were excluded from this Table.

Table 15 indicates that about 65 percent of Hispanic and Asian students disagreed with the statement, math is more for boys than girls, with Asian students more likely to report that they were undecided than Hispanic students.

TABLE 15
Hispanic and Asian Students Attitudes toward Mathematics:
Math is More for Boys than Girls -2*

	Hispanic Percent (SE)	Asian Percent (SE)
Agree	12.56 (0.59)	10.81 (0.85)
Undecided	15.76 (0.51)	19.65 (1.18)
Disagree	65.76 (0.83)	65.66 (1.58)
Total responses	11756	4494

* Percentages and standard errors are weighted.
* 640 Hispanic and 233 Asian students who omitted this question were excluded from this Table.

Table 16 shows that over half of the students in both ethnic groups agreed with the statement: mathematics is memorizing facts, with Hispanic agreeing at a slightly higher percentage. Asian students being more likely than Hispanic students to report that they were undecided or disagreed with this statement. This finding perhaps suggests that the students' attitudes may have developed from their exposure to the use of certain instructional practices by their teachers (See pp.26-30)

When asked to respond to the statement: people use mathematics in jobs, Asian students were more likely than Hispanics to agree with this statement by over 62 percent to over 58 percent, respectively. At the same time, Asian students were more likely than Hispanic students to report that they were undecided over this statement (over 23 percent of Asian and over 21 percent of Hispanic students). Students' responses to the statement: mathematics is used for solving problems indicate that Asian students are more likely than Hispanic students to report that they agree. At the same time, Asian students are more likely than Hispanic students to report that they are undecided.

TABLE 16
Hispanic and Asian Students Attitudes toward Mathematics - 3*

	Memorizing		Use in jobs		Solve problems	
	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)
Agree	57.26 (0.83)	51.95 (1.19)	58.60 (0.88)	62.73 (1.56)	54.11 (0.71)	58.00 (1.80)
Undecided	23.04 (0.59)	28.15 (1.29)	21.32 (0.65)	23.61 (1.32)	21.79 (0.58)	23.54 (1.32)
Disagree	11.78 (0.49)	14.46 (0.98)	11.69 (0.47)	8.29 (0.80)	14.66 (0.44)	12.76 (0.96
Total resp	11578	4437	11511	4414	11397	4377

* Percentages and standard errors are weighted.
* 818, 885, and 999 Hispanic students who omitted the question #1, #2, and #3 respectively are excluded from this Table.
* 290, 313, and 350 Asian students who omitted the question #1, #2, and #3 respectively are excluded from this Table.

Finally, Table 17 shows that Asian students were more likely to respond that they disagree with the statement: I would not study more mathematics (over 74 percent) than Hispanic students (over 64 percent), with about 25 percent of the Hispanic and about 19 percent of Asian students agreeing or undecided.

TABLE 17
Hispanic Students Attitudes toward Mathematics - 4 (No more math)*

	Hispanic Percent (SE)	Asian Percent (SE)
Agree	10.65 (0.47)	7.03 (0.82)
Undecided	14.55 (0.46)	12.23 (0.64)
Disagree	64.92 (0.97)	74.82 (1.31)
Total responses	11365	4357

* Percentages and standard errors are weighted.
* 1031 Hispanic and 370 Asian students who omitted this question are excluded from this Table.

How do Hispanic and Asian students' educational experiences differ?

In this section we analyze the preschool, nursery, or day care experiences of the Hispanic and Asian students in the sample. We also report on the responses of Hispanic and Asian students' teachers regarding the types of mathematics instructional strategies they used in their classrooms, their demographic characteristics, education and professional experience.

Demographic Characteristics of Hispanic and Asian Students' Teachers

Tables 18 and Table 19 show that the teachers of students in the sample were mostly white and female, suggesting that by far, the teacher population in the 1992 mathematics TSA assessment, which included 44 states, was not representative of the student population diversity represented in their classrooms.

TABLE 18
Hispanic and Asian Students' Teachers by Gender*

	Hispanic percent (SE)	Asian percent (SE)
Male teachers	17.11 (1.27)	13.75 (1.68)
Female teachers	82.51 (1.27)	85.86 (1.71)
Total responses	10936	4351

* Percentages and standard errors are weighted.
* 42 Hispanic and 19 Asian students' teachers who omitted this question were excluded from this Table.

TABLE 19
Hispanic and Asian Students: Teachers' Ethnicity*

	Hispanic percent (SE)	Asian percent (SE)
White teachers	74.45 (1.38)	74.85 (2.40)
Black teachers	10.19 (0.78)	7.31 (1.41)
Hispanic teachers	11.07 (1.39)	3.57 (1.16)
Asian teachers	2.91 (0.70)	13.52 (1.66)
Am. Indian teachers	0.15 (0.06)	0
Total responses	10853	4332

* Percentages and standard errors are weighted.
* 125 Hispanic and 38 Asian students' teachers who omitted this question were excluded from this Table.

Teachers' Education

The data in Table 20 indicate that over two-thirds of the Hispanic and Asian students' teachers reported that their undergraduate major was in education, with a very small percentage reporting mathematics as a major. A small percentage of all teachers said their major was other.

TABLE 20
Hispanic and Asian Students: Teachers' Undergraduate Majors*

	Hispanic percent (SE)	Asian percent (SE)
Majored in math	5.65 (0.79)	5.33 (1.20)
Majored in math ed.	1.29 (0.31)	1.36 (0.50)
Majored in education	68.29 (1.65)	70.51 (2.34)
Other majors	21.99 (1.53)	20.42 (2.25)
Total responses	10718	4268

* Percentages and standard errors are weighted.
* 260 Hispanic and 102 Asian students' teachers who omitted this question were excluded from this Table.

A similar pattern is shown in Table 21. about two-third of the teachers reported that their graduate major was in education, with a small percentage of teachers reporting that their graduate major was in mathematics education. However, these data should be interpreted with caution due to the number of omissions.

TABLE 21
Hispanic and Asian Students: Teachers' Graduate Majors

	Hispanic percent (SE)	Asian percent (SE)
Majored in math	1.87 (0.39)	1.87 (0.52)
Majored in math ed.	1.97 (0.47)	2.54 (0.75)
Majored in education	60.71 (1.39)	61.20 (2.04)
Other majors	12.04 (1.08)	9.95 (1.46)
Omitted	23.40 (1.30)	24.44 (1.78)
Total responses	10978	4370

* Percentages and standard errors are weighted.

When asked if they had received training in how to teach students from different cultures, over 58 percent of all the teachers reported that they had been trained (Table 22). Since the data indicate that a majority of the teachers of Hispanic and Asian students are white, it can be said that about 40 percent of the Hispanic and Asian students in the sample were taught by white, mostly female teachers who have little understanding about teaching students from cultural backgrounds different than those of the mainstream.

TABLE 22
Hispanic and Asian Students' Teachers Had Training in Teaching Students from Different Cultures*

	Hispanic percent (SE)	Asian percent (SE)
Yes	59.90 (1.34)	58.97 (2.36)
No	39.36 (1.35)	40.47 (2.34)
Total responses	10881	4343

* Percentages and standard errors are weighted.
* 97 Hispanic and 27 Asian students' teachers who omitted this question are excluded from this Table.

Students' Reports of Schooling and Mathematics Instructional Experiences

In this section we analyze students' reports of attending pre-school, nursery, or day care. In addition, we report on students and teachers answers to 7 instructional strategies question: How often do you do math problems from textbooks, do math problems on worksheets, solve math problems in groups, work with rulers, blocks, shapes, use a calculator, use a computer, and take math tests?

Pre-school, Nursery, or Day Care Experiences

Table 23 summarizes students' responses to whether or not they attended pre-school, nursery, or day care. The data show that over 1/2 of the Hispanic students and about two-thirds of the Asian students reported that they had attended either pre-school, nursery, or day care.

TABLE 23
Hispanic and Asian Students' Pre-school, Nursery, or Day Care Experience*

	Hispanic percent (SE)	Asian percent (SE)
Yes	52.38 (0.92)	61.66 (1.56)
No	33.52 (0.80)	28.07 (1.62)
Total responses	10850	4085

* Percentages and standard errors are weighted.
* 1546 Hispanic and 642 Asian students who omitted this question are excluded from this Table.

Students' Responses: Instructional Experiences

Students answers to these questions are organized in three tables. Table 24 includes three questions: how often do you do math problems from textbooks?, how often do you do math problems on worksheets?, and how often do you do math problems in groups? Table 25 include questions regarding the use of technology and other resources: how often do you work with rulers, blocks, shapes?, how often do you use a calculator?, and, how often do you use a computer? Finally, Table 27 reports on answers to the question: how often do you take math tests?

The data in Table 24 indicate that over 1/2 of the Hispanic students and about two-thirds of the Asian students reported doing math problems from textbooks almost every day, with a small percentage of students of both ethnic groups that they use textbooks once or twice a month (over 7 percent for Hispanics and over 5 percent for Asian students).

When answering the second question, how often do you do mathematics problems on worksheets, about 42 percent of the Hispanic and Asian students report that they do math on worksheets almost every day. A slightly higher percentage of Hispanic students reported that they use worksheets almost every day, followed by over 32 percent of both Hispanic and Asian students who stated that they do mathematics problems on worksheets once or twice a week, with a slightly higher percentage of Hispanics reporting that they use worksheets once or twice a week. About 12 percent of the Hispanic students and about 11 percent of the Asian students reported that they do mathematics problems on worksheets never or hardly ever.

The data in Table 24 also summarizes the students' responses to the third question, how often do you solve math problems in groups? According to the data, Hispanic students are more likely than Asian students to report that they work in groups almost every day. Over 40 percent of the Hispanic students and over 39 percent of the Asian students report that they never, or hardly ever work in groups to do math problems. When the answers of the students that said they solve math problems in groups once or twice a month is added to those who say they never, hardly ever work in groups to do math problems, about 54 percent of Hispanic and over 60 percent of Asian students report that they have never, hardly ever, or once/twice a month have the opportunity to solve math problems in groups.

TABLE 24
Hispanic and Asian Students Reports of Instructional Experiences - 1*

	Textbooks		Worksheets		In Groups	
	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)
Almost every day	57.37 (1.02)	65.35 (1.35)	47.05 (0.84)	42.08 (1.36)	18.71 (0.52)	12.96 (1.02)
Once/twice a week	19.35 (0.63)	19.45 (1.20)	32.08 (0.74)	35.12 (1.39)	25.89 (0.70)	25.53 (1.63)
Once/twice a month	7.36 (0.43)	5.45 (0.93)	8.21 (0.40)	10.65 (0.90)	14.03 (0.56)	21.45 (1.86)
Never/hardly ever	15.36 (0.92)	9.35 (0.97)	11.91 (0.47)	11.31 (1.10)	40.20 (0.85)	39.13 (2.06)
Total resp	12330	4707	12308	4694	12268	4688

* Percentages and standard errors are weighted.

* 66, 88, and 124 Hispanic students who omitted the question #1, #2, and #3 respectively are excluded from this Table.

* 20, 33, and 39 Asian students who omitted the question #1, #2, and #3 respectively are excluded from this Table.

Regarding the use of technology and other resources as instructional strategies, Table 25 indicates that there were no major differences among the responses of the two ethnic groups, with over 38 percent of the Hispanic and about 34 percent of the Asian students reporting that they never or hardly ever use rulers, blocks, or shapes. However, in response to the question regarding calculator use, the data show that Asian students are more likely to report that they use calculators once or twice a week, or once or twice a month, than Hispanic students. Of interest is the finding that almost 55 percent of Hispanic students and almost 45 percent of Asian students report that they never, or hardly ever, use calculators when doing math problems.

A similar pattern develops when comparing students' responses about computer use. Almost 55 percent of Hispanic students and Asian students report that they never, or hardly ever, use computers to do math problems, and over 25 percent of both students groups report that they use computers once or twice a week.

TABLE 25
Hispanic and Asian Students Instructional Experiences - 2*

	Rulers		Calculator		Computer	
	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)
Almost every day	16.40 (0.59)	13.95 (1.17)	9.95 (0.37)	7.07 (0.89)	9.08 (0.63)	6.15 (0.70)
Once/twice a week	24.50 (0.69)	24.37 (1.33)	17.04 (0.54)	21.05 (1.40)	25.49 (1.09)	25.57 (1.67)
Once/twice a month	19.59 (0.59)	26.61 (1.32)	17.10 (0.63)	25.95 (1.27)	7.95 (0.38)	11.49 (1.03)
Never/hardly ever	38.46 (0.86)	34.04 (1.62)	54.38 (1.07)	44.88 (2.06)	54.49 (1.04)	54.59 (1.46)
Total resp	12267	4691	12225	4673	12027	4617

* Percentages and standard errors are weighted.
* 129, 171, and 369 Hispanic students who omitted the question #1, #2, and #3 respectively are excluded from this Table.
* 36, 110, and 493 Asian students who omitted the question #1, #2, and #3 respectively are excluded from this Table.

Finally, when asked how often they take math tests, the data in Table 26 indicate that Hispanic students are more likely to report that they take tests almost every day, or once or twice a week, than Asian students.

TABLE 26
Hispanic and Asian Students: How Often Math Tests- 3*

	Hispanic Percent (SE)	Asian Percent (SE)
Almost every day	14.04 (0.45)	8.52 (0.68)
Once/twice a week	35.93 (1.01)	29.77 (1.57)
Once/twice a month	39.57 (1.00)	54.43 (1.87)
Never/hardly ever	9.67 (0.45)	6.68 (0.72)
Total resp	12308	4706

* Percentages and standard errors are weighted.
* 88 Hispanic and 580 Asian students who omitted this question are excluded from this Table.

Teachers' Reports: Instructional Approaches

In this section we first examine teachers reports of students' time spent on mathematics instruction per week (Table 27), and how much homework they assign the students per day (Table 28). Second, we analyze teachers' responses to six instructional questions: how often do students do math from textbooks, do math on worksheets, do math in small groups, work with ruler/objects, use a calculator, use a computer, write about problem-solving, discuss math with other students, and work real-life math problems. This information is organized in two tables. Table 29 table include the questions: how often do students do math from textbooks, how often do students do math on worksheets and, how often do students do math in small groups. Table 30 include the questions: how often do students work with ruler and other objects, how often do students use a calculator, and how often do students use a computer. Questions in Tables 29 and 30 were asked the students in the sample (see pp.23-25).

Next, we examine teachers' responses to three additional questions related to other instructional approaches. These questions are: how often do students write about problem-solving (Table 31), discuss math with other students (Table 32), and, how often students work with real-life math problems (Table 33).

The data on Table 27 indicate that over 71 percent of the Hispanic and Asian students spend 4 hours or more on math instruction per week, with no major differences in the percentage of Hispanic and Asian students whose teachers report that they spend 2.5 hours or less in math instruction, and teachers who reported that they spend more than 2.5 but less than 4 hours on math instruction.

TABLE 27
Teachers' Reports: Hours Spent on Math Instruction per Week*

	Hispanic percent (SE)	Asian percent (SE)
2.5 hours or less	5.18 (0.83)	3.35 (0.65)
More than 2.5, less than 4 hrs	21.38 (1.29)	24.97 (2.45)
4 hours or more	73.18 (1.38)	71.42 (2.50)
Total responses	10941	4366

* Percentages and standard errors are weighted.

* 37 Hispanic and 4 Asian students' teachers who omitted this question were excluded from this Table.

Regarding mathematics homework assignments per day, the data in Table 28 indicate that over 86 percent of both Hispanic and Asian students are assigned from 15 to 30 minutes of homework per day, with small percentages of Hispanic and Asian students not being assigned any daily homework.

TABLE 28
Teachers' Reports: Math Homework Assignments per Day*

	Hispanic percent (SE)	Asian percent (SE)
None	4.73 (0.58)	3.86 (0.84)
15 minutes	42.59 (1.47)	39.07 (2.50)
30 minutes	44.32 (1.24)	48.89 (3.04)
45 minutes	5.48 (0.74)	6.20 (1.29)
1 hour	2.27 (0.37)	1.13 (0.31)
More than 1 hour	0.31 (0.12)	0.28 (0.27)
Total responses	10928	4349

* Percentages and standard errors are weighted.
* 50 Hispanic and 21 Asian students' teachers who omitted this question are excluded from this Table.

Teachers' Reports of the Use of Textbooks, Worksheets, and Group Work

Table 29 indicate that over 93 percent of Hispanic and Asian students use textbooks almost every day or once/twice a week, with the percentage of Asian students slightly higher than that of Hispanic students (Table 29). A small number of Hispanic and Asian students use textbooks once or twice a month, or never or hardly ever, according to their teachers.

Teachers reports of how often students do mathematics problems on worksheets indicate that over 72 percent of both Hispanic and Asian students do mathematics on worksheets almost every day, or once/twice a week. Over 15 percent of both Hispanic and Asian students do math on worksheets once/twice a month. A small number of Hispanic and Asian students do mathematics on worksheets never or hardly ever, according to their teachers. .

Lastly, the data show that about 50 percent of both Hispanic and 50 percent of the Asian students do mathematics in small groups once or twice a week. Findings indicate that about 24 percent of both Hispanic and Asian students report that they do mathematics in groups once or twice a month. A small percentage of Asian and Hispanic students never, or hardly ever do math in groups, according to their teachers.

TABLE 29
Teachers' Reports: Students' Use of Textbooks, Worksheets, and Group Work - 1*

	Textbooks		Worksheets		In Groups	
	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)
Almost every day	71.05 (1.32)	75.62 (2.00)	28.85 (1.68)	24.35 (2.19)	18.15 (1.48)	17.80 (2.16)
Once/twice a week	22.91 (1.32)	19.89 (1.91)	48.38 (1.62)	48.55 (1.98)	48.12 (1.51)	50.84 (2.23)
Once/twice a month	3.78 (0.93)	3.21 (0.74)	15.75 (1.03)	17.58 (1.77)	24.53 (1.24)	23.83 (1.74)
Never/hardly ever	2.04 (0.65)	0.91 (0.22)	6.86 (0.79)	9.00 (1.32)	8.94 (0.89)	6.98 (1.23)
Total resp	10941	4360	10937	4348	10937	4356

* Percentages and standard errors are weighted.

* 37, 41, and 40 Hispanic students' teachers who omitted the question #1, #2, and #3 respectively are excluded from this Table.

* 10, 22, and 14 Asian students' teachers who omitted the question #1, #2, and #3 respectively are excluded from this Table.

Teachers' Reports: Use of Resources, Calculators and Computers

According to their teachers, Table 30 indicates that over 81 percent of both Hispanic and Asian students use rulers and other objects once/twice a week , or once/twice a month, with over 10 percent of both Hispanic and Asian students using rulers and other objects almost every day. Over 71 percent of both Asian and Hispanic students use calculators once/twice a month, or never/ hardly ever. The data also indicate that Hispanic students are more likely than Asian students to use calculators never or hardly ever (over 45 percent and 36 percent, respectively). Furthermore, Asian students are more likely to use calculators once or twice a week than Hispanic students.

Regarding computer use in the mathematics classroom, Over 45 percent of both Hispanic and Asian students use computers once or twice a week . However, over 25 percent of both Hispanic and Asian students use computers never or hardly ever, with Hispanic students more likely than Asian students not to use computers at all or to use them "hardly ever".

TABLE 30
Teachers' Reports: Students' Use of Resources, Calculators, and Computers - 2*

	Rulers		Calculator		Computer	
	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)	Hispanic Percent (SE)	Asian Percent (SE)
Almost every day	11.19 (1.26)	10.15 (1.87)	3.00 (0.47)	4.65 (1.09)	10.32 (1.13)	8.62 (1.33)
Once/twice a week	38.64 (1.59)	41.25 (2.29)	17.30 (1.34)	22.80 (2.40)	45.67 (1.79)	49.13 (2.89)
Once/twice a month	42.71 (1.60)	41.42 (2.66)	34.26 (1.56)	35.65 (2.94)	15.71 (1.07)	15.81 (1.80)
Never/hardly ever	6.89 (0.62)	6.57 (1.33)	45.15 (1.61)	36.16 (2.85)	27.64 (1.75)	25.33 (2.10)
Total resp	10923	4352	10934	4349	10897	4303

* Percentages and standard errors are weighted.

* 55, 44, and 81 Hispanic students' teachers who omitted the question #1, #2, and #3 respectively are excluded from this Table.

* 18, 21, and 67 Asian students' teachers who omitted the question #1, #2, and #3 respectively are excluded from this Table.

Teachers' Reports: Use of Other Instructional Strategies

The data in Table 31 indicates that, according to the teachers, over 67 percent of both Hispanic and Asian students write about problem-solving once/twice a month, or never/hardly ever, with Hispanic students more likely than Asian students never, or hardly ever being able to engage in this activity, according to their teachers.

TABLE 31
Teachers' Reports: How Often Students Write about Problem-Solving*

	Hispanic percent (SE)	Asian percent (SE)
Almost everyday	4.54 (0.56)	5.14 (1.56)
Once/twice a week	20.88 (1.24)	25.33 (2.38)
Once/twice a month	37.64 (1.38)	37.86 (2.20)
Never/ hardly ever	36.25 (1.71)	30.80 (2.18)
Total responses	10900	4338

* Percentages and standard errors are weighted.
* 78 Hispanic and 32 Asian students' teachers who omitted this question were excluded from this Table.

According to their teachers, about 72 percent of Hispanic and Asian students discussed mathematics with other students almost everyday, or once/twice a week, and over 18 percent of both Hispanic and Asian students discussed mathematics with peers once or twice a month. Although the data in Table 32 indicate that there are no major differences between the experiences of Hispanic and Asian students regarding this question, Hispanics were more likely than Asian students not to discuss mathematics with peers or to do so "hardly ever".

TABLE 32
Teachers' Reports: How Often Students Discuss Math with other Students*

	Hispanic percent (SE)	Asian percent (SE)
Almost everyday	33.76 (1.51)	33.98 (2.61)
Once/twice a week	38.81 (1.48)	41.51 (2.50)
Once/twice a month	19.12 (1.22)	18.19 (1.91)
Never/ hardly ever	7.91 (0.78)	5.81 (1.13)
Total responses	10931	4350

* Percentages and standard errors are weighted.
* 62 Hispanic and 20 Asian students' teachers who omitted this question are excluded from this Table.

Finally, according to their teachers, Table 33 indicates that over 43 percent of both Hispanic and Asian students work with real-life math problems once or twice a week. In addition, over 27 percent of students in both ethnic groups work with real-life math problems almost every day, and over 21 percent of both ethnic groups once or twice a month.

TABLE 33
Teachers' Reports: How Often Students Work Real-Life Math Problems*

	Hispanic percent (SE)	Asian percent (SE)
Almost everyday	29.69 (1.63)	27.65 (2.23)
Once/twice a week	43.59 (1.48)	44.03 (2.07)
Once/twice a month	21.98 (1.09)	24.13 (2.14)
Never/ hardly ever	4.52 (0.54)	3.59 (0.88)
Total responses	10949	4355

* Percentages and standard errors are weighted.
* 29 Hispanic and 15 Asian students' teachers who omitted this question were excluded from this Table.

Characteristics of Schools Attended by Hispanic and Asian Students

In this section we describe the schools attended by the Hispanic and Asian students in the study in terms of the percent of their student population on subsidized lunch, and the type of communities in which these schools were located.

The data on Table 34 indicate that schools attended by the Asian students in the sample are more likely to report that they had none, or from 1 to 25 percent of students on subsidized lunch. The data also show that schools attended by Hispanic students were more likely to report that 51% to over 90% of their student population was on subsidized lunch.

TABLE 34
Schools' Reports: Percent of Students that Receive Subsidized Lunch*

	Hispanic percent (SE)	Asian percent (SE)
None	0.31 (0.16)	0.58 (0.19)
1-5%	3.62 (0.50)	12.37 (1.90)
6-10%	6.33 (0.88)	10.71 (1.53)
11-25%	15.85 (1.56)	22.71 (3.11)
26-50%	20.21 (1.30)	26.36 (3.15)
51-75%	19.87 (2.13)	12.40 (2.17)
76-90%	16.56 (1.82)	9.83 (1.27)
Over 90%	14.33 (2.22)	3.24 (0.77)
Total responses	12044	4595

* Percentages and standard errors are weighted.
* 217 Hispanic and 94 Asian students' schools which omitted this question were excluded from this Table.

Table 35 shows that over 19 percent of Asian students attend schools located in advantaged urban areas, whereas only over 5 percent of Hispanics attend schools in comparable areas. The data also indicate that Hispanics are more likely than the Asian students to attend schools in disadvantaged urban areas. Finally, over 46 percent of both Hispanic and Asian students attend schools in "non-extreme' areas.

TABLE 35
Schools' Reports: Type of Community of Schools that Hispanic and Asian Students Attended*

	Hispanic percent (SE)	Asian percent (SE)
Extreme Rural	4.55 (0.34)	2.19 (0.41)
Disadvantage Urban	26.03 (2.11)	18.01 (2.42)
Advantage Urban	5.13 (0.62)	19.28 (3.25)
Other: Non-extreme	48.84 (2.42)	46.27 (3.25)
Total responses	10546	4038

* Percentages and standard errors are weighted.
* 1850 Hispanic and 689 Asian students' schools which omitted this question were excluded from this Table.

What is the mathematics proficiency of Hispanic and Asian Students

In this section we report the mathematics proficiency of the fourth-grade Hispanic and Asian students that participated in the TSA assessment using achievement levels established by the National Assessment Governing Board (NAGB) to interpret NAEP data. According to the NAGB achievement levels are: Basic, Proficient, and Advanced, on a scale of 0 to 500. The Basic level

> denotes partial mastery of the knowledge and skills fundamental for Proficient work at each grade. Proficient, the central level, represents solid academic performance and demonstrated competence over challenging subject matter. *This is the achievement level the Board has determined all students should reach.*[italics were added]. The Advanced level signifies superior performance beyond Proficient. (NAEP 1992 Mathematics Report Card for the Nation and the States, ETS, 1993, p.6)

Findings for the Asian and Hispanic students in our sample are compared to the national overall average mathematics proficiency and achievement levels of males (218), females (216), Hispanics (199), and Asian (232) fourth-grade students (ibid. p.19). The mathematics proficiency cutpoints corresponding to each achievement level are shown below.[4]

TABLE 36
1992 National Mathematics Proficiency: Scale-Score Cutpoints for Each Achievement Level, Grades 4, 8, and 12

Grades	Advanced	Proficient	Basic
4	280	248	211
8	331	294	256
12	366	334	287

Source: NAEP 1992 Mathematics Report Card for the Nation and the States, ETS, 1993, p. 7

[4] The 1992 Trial State Assessment fourth-grade average mathematics performance levels have been reported on a regional and state by state basis (NAEP 1992 Mathematics Report Card for the Nation and the States, ETS, 1993) and they differ from the national average proficiency levels. For example, the Northeast average proficiency level for fourth-grade males is 223, the Southwest proficiency level for the same student population is 209 (ibid, p.19).

Table 37 indicates that the average mathematics proficiency level for the fourth-grade, male Hispanic students in the study, was 200.6. This indicates that the male Hispanic students are below the national average of 218 for fourth-grade males, and that their average mathematics performance fits the Basic achievement level (p.32). When compared to the 199 national mathematics proficiency level for Hispanics, the male Hispanic students in our study are slightly above, at 200.6.

The average mathematics proficiency level for the fourth-grade, male Asian students in the study, was 226, higher than the national average of 218 for fourth-grade males. It also indicates that these students are at the Proficient achievement level. When compared to the 232 national mathematics proficiency level for Asians, these students are below.

The average mathematics proficiency level for the fourth-grade, female Hispanic students in the study was 198.9, which places them below the national average mathematics proficiency for females, and in the Basic achievement level. When compared to the 199 national mathematics proficiency level for Hispanics, the students are proficiency levels are almost at the national level.

The average mathematics proficiency level for fourth-grace, female Asian students in the study was 224.7, which places these students above the national average proficiency for females, and in the Proficient achievement level. When compared to the 232 national average proficiency level for Asians, our students are below.

TABLE 37
Hispanic and Asian Students' Math Performance by Gender*

	Hispanic mean (SE)	Asian mean (SE)
Male	200.61 (0.88)	226.12 (1.60)
Female	198.92 (0.78)	224.70 (1.42)
Total responses	12396	4727

* Means and standard errors are weighted.

When the Hispanic students' sample is broken down by Hispanic subgroup, the data on Table 38 indicate that male Puerto Rican students have the lowest average mathematics proficiency level, at 198.6, with the "other Hispanic" males having the highest average mathematics proficiency scores, followed by the Cuban origin students.

When we look at the female Hispanic sample, by Hispanic subgroup, again, the Puerto Rican students show the lowest average mathematics proficiency scores, at 196.9. The female Cuban students have the highest average mathematics proficiency scores, at 207.7.

TABLE 38
Subgroups of Hispanic Students' Math Performance by Gender*

	Mex/Chicano mean (SE)	Puerto Rican mean (SE)	Cuban mean (SE)	Other Hispanic mean (SE)
Male	199.85 (1.19)	198.64 (1.99)	201.76 (4.25)	204.98 (1.13)
Female	199.45 (1.17)	196.88 (1.53)	207.67 (4.43)	201.43 (1.24)
Total responses	6141	1517	365	3845

* Means and standard errors are weighted.

Discussion of Findings

Demographics

Hispanic students were more likely to report being born in the United States, the District of Columbia or territories than their Asian peers. When Hispanic students were separated into Hispanic subgroups, Cuban-origin, and Mexican-origin students were more likely to report being born in the United States, District of Columbia or territories than Puerto Rican and "Other" Hispanics. In 1988, Baratz-Snowden, et., al., reported that the Mexican-American students in their sample were "more likely than other groups to report being born in this country" (p.37).

The data also indicate that a majority of the students in both ethnic groups were 9 or 10 years old. Over two-thirds of the Asian students and over half of the Hispanic students reported that they were 9 years old, indicating that more Asian students than Hispanics were on grade level.

Both Hispanic and Asian students were more likely than not to be exposed to a language other than English always or sometimes in their homes. Furthermore, as reported by their teachers, a majority of the students in both ethnic groups were English proficient. A minority of the students in the sample - over 13 percent for both ethnic groups- were identified as being limited English proficient, yet met criteria for participation in the survey, with Mexican-origin students having the highest percentage of students with limited English proficiency: over

Home Educational Supports

Although over 72 percent of Hispanic and over 81 percent of Asian students said that they live with both parents at home, Hispanic students were more likely than Asian students to report that they live with one parent at home.

Regarding the number of literacy-related items available to them at home (encyclopedia,

subscriptions to newspapers and magazines, and 25 books or more), there were no major differences between the reports of Hispanic and Asian students in the study. Yet, Asian students were more likely to report that they have 3 or 4 items at home, and Hispanics were more likely to report that they do not have literacy-related items at home, or that they have up to 2 items. Baratz-Snowden found that Asian students that participated in the study were less likely to report no or fewer items and were more likely to report having all 4 items (dictionary, encyclopedia, newspapers and magazines and 25 books or more) available to them at home.

We did not find large discrepancies between Hispanic and Asian students in their responses about how often they discuss their studies at home. About 50 percent of students in both ethnic groups reported that they discuss their studies at home almost everyday, and over one-fourth of the Hispanics and about one-third of the Asians reported once or twice a week.

Finally, when asked how many hours of television they watch a day, we found that Hispanic students are more likely to watch 6 or more hours of television a day than Asian students, with Asian students more likely to report that they watch from zero to 2 hours each day.

Attitudes towards Mathematics

The data suggest that Asian students are more likely than Hispanic students to report that they like math, are good at math, and understand math, although by small percentages. Yet, the percent of all students who agree that they are good at math is smaller than the percent of their responses agreeing that they like math.

We also found that over half of the students in both ethnic groups agree that math is memorizing facts, is used in jobs and is for solving problems. Hispanic students were more likely than Asian students to agree that math is for memorizing, and Asian students were more likely to agree that math is used in jobs and to solve problems.

Lastly, we found that about two-thirds of the Hispanic and Asian students disagreed with the statement that math is more for boys than girls, with Asian students more likely than Hispanic students to be undecided.

Teachers' demographics, education, and experience

The data indicate that the majority of teachers of Hispanic and Asian students in the study were female and white. Over two-thirds of all teachers reported undergraduate degrees in education, and over half of them said they had been trained in how to teach students from different cultures. Therefore, about 40 percent for all the students in the study were taught by white, female teachers who have had little or no training on how to teach students from cultural backgrounds different from those of the mainstream.

School Characteristics

We found that Asian students were more likely than Hispanics to attend schools where 1 to 25 percent of the student population receive subsidized lunch, a powerful indicator of poverty level. Hispanics were more likely than Asians to attend schools where from 51 to 100 percent of the student population receive subsidized lunch. Furthermore, Asian students were more likely than Hispanics to attend schools in advantaged urban areas. Baratz-Snowden, et., at., reported similar findings (1988).

The Mathematics Achievement of Hispanic and Asian Students

Overall, the data shows that male and female Asian students outperformed Hispanic male and female students in mathematics achievement.

Hispanic Students Mathematics Proficiency

According to the data, the average mathematics proficiency level for the fourth-grade, male Hispanic students in the study was 200.6. This indicates that the male Hispanic students were below the national average level of 218, and that their performance is at the Basic achievement level (see p.32). When compared to 199, the national math proficiency level for Hispanics, the male Hispanic students in our study are slightly above it.

The average mathematics proficiency level for the female Hispanic students in the study was 198.8, below the national average for females of 216. However, they are almost at the national overall average mathematics proficiency levels for Hispanics.

When the Hispanic student sample is broken down by Hispanic subgroup, Puerto Rican students, both males and females, have the lowest average mathematics proficiency levels. Cuban-origin females have the highest average of 207.67, and Puerto Rican females have the lowest average, 196.88, when compared to other Hispanic students in the sample.

Asian Students Mathematics Proficiency

The average mathematics proficiency level for the fourth-grade, male Asian students in the study was 226.12, higher than the national average of 218 for fourth-grade males but lower than the national proficiency level of 232 for Asians.

The average mathematics proficiency level for the fourth-grade female Asian students in the study was 224.70, higher than the national average mathematics proficiency for females, 216, but lower than the national average for Asians.

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Appendix A

Variables Selected for Descriptive Analysis

46 independent variables were selected for descriptive analysis. The following list presented the variable's code, description, and possible answers. Most variables provid codes 8 or 88 for omission and 0 or 00 for multiple responses. These have not been included in this appendix.

I. STUDENTS' DEMOGRAPHIC CHARACTERISTICS

DSEX	DERIVED SEX 1 MALE 2 FEMALE
DAGE	ACTUAL AGE
DRACE	DERIVED RACE 3 HISPANIC 4 ASIAN
B003101A	IF HISPANIC, WHAT IS YOUR HISPANIC BACKGROUND 1 NOT HISPANIC 2 MEX, MEX AMER, CHICANO 3 PUERTO RICAN 4 CUBAN 5 OTHER SPANISH/HISPAN
B007801A	WERE YOU BORN IN US, DC, OR TERRITORIES? 1 YES 2 NO

II. STUDENTS' LANGUAGE STATUS

LEP	LIMITED ENGLISH PROFICIENCY 1 YES 2 NO
LANGHOM (or B003101A)	HOW OFTEN OTHER LANGUAGE SPOKEN IN HOME 1 NEVER 2 SOMETIMES 3 ALWAYS

III. HOME: EDUCATION SUPPORTS

SINGLEP	HOW MANY PARENTS LIVE AT HOME 1 2 PARENTS AT HOME 2 1 PARENT AT HOME 3 NEITHER PARENT HOME
PARED	PARENTAL EDUCATION (FOR WEIGHTING) 1 DIDN'T FINISH HIGHSC 2 GRAD FROM HIGHSCHOOL 3 SOME ED AFTER HIGHSC 4 GRAD FROM COLLEGE 7 I DON'T KNOW
HOMEEN2	HOME ENVIRONMENT - ARTICLES (NEWSPAPER, ENCYCLOPEDIA, BOOKS, MAGAZINE) IN HOME 1 0 - 2 TYPES 2 3 TYPES

3 4 TYPES

TVWATCH — HOW MUCH TIME SPEND EACH DAY ON VIEWING TELEVISION
1 0 - 2 HOURS
2 3 - 5 HOURS
3 6 OR MORE HOURS

B007401A — HOW OFTEN DISCUSS STUDIES AT HOME?
1 ALMOST EVERY DAY
2 ONCE/TWICE A WEEK
3 ONCE/TWICE A MONTH
4 NEVER/HARDLY EVER

IV. STUDENTS' SCHOOL-RELATED ATTITUDES

M811101B — AGREE/DISAGREE: I LIKE MATH
M811103B — AGREE/DISAGREE: I AM GOOD AT MATH
M811106B — AGREE/DISAGREE: I UNDERSTAND MOST OF MATH CLASS
M811104B — AGREE/DISAGREE: MATH MORE FOR BOYS THAN GIRLS
M811107B — AGREE/DISAGREE: MATH IS MOSTLY MEMORIZING FACTS
M811102B — AGREE/DISAGREE: PEOPLE USE MATH IN JOBS
M811105B — AGREE/DISAGREE: MATH USED FOR SOLVING PROBLEMS
M811108B — AGREE/DISAGREE: WOULD NOT STUDY MORE MATH
1 AGREE
2 UNDECIDED
3 DISAGREE

V. EDUCATIONAL EXPERIENCES & SCHOOL-RELATED BEHAVIORS

B004201A — DID YOU GO TO PRESCHOOL, NURSERY OR DAYCARE
1 YES
2 NO

M811601B — HOW OFTEN? DO MATH PROBLEMS FROM TEXTBOOKS
M811602B — HOW OFTEN? DO MATH PROBLEMS ON WORKSHEETS
M811603B — HOW OFTEN? SOLVE MATH PROBLEMS IN GROUPS
M811604B — HOW OFTEN? WORK WITH RULERS, BLOCKS, SHAPES
M811605B — HOW OFTEN? USE A CALCULATOR
M811606B — HOW OFTEN? USE A COMPUTER
M811607B — HOW OFTEN? TAKE MATH TESTS
1 ALMOST EVERY DAY
2 ONCE/TWICE A WEEK
3 ONCE/TWICE A MONTH
4 NEVER/HARDLY EVER

VI. TEACHER CHARACTERISTICS

T040001 — ARE YOU (THE TEACHER) MALE OR FEMALE?
1 MALE
2 FEMALE

T040101 — WHICH BEST DESCRIBES YOUR (THE TEACHER'S) RACE/ETHNICITY?
1 WHITE (NOT HISPANIC)
2 BLACK (NOT HISPANIC)
3 HISPANIC, ANY RACE
4 ASIAN OR PACIFIC ISL
5 AMER INDIAN/AK NATIVE

TUNDMJB — TEACHERS' UNDERGRADUATE MAJOR
TGRDMJB — TEACHERS' GRADUATE MAJOR
1 MATH
2 MATH EDUCATION
3 EDUCATION
4 OTHER

T041707 — TRAINING IN TCHG STUDENTS OF DIFF CULTURES?

0 NO
1 YES

VII. TEACHERS' INSTRUCTIONAL INFO

T044300 HOW MUCH TIME SPENT PER WEEK ON MATH INSTRUCTION?
1 2 1/2 HOURS OR LESS
2 MORE THAN 2 1/2 BUT LESS THAN 4 HRS
3 4 HOURS OR MORE

T044400 HOW MUCH MATH HOMEWORK ASSIGNED PER DAY?
1 NONE
2 15 MINUTES
3 30 MINUTES
4 45 MINUTES
5 AN HOUR
6 MORE THAN AN HOUR

T044501 HOW OFTEN DO STUDENTS DO MATH FROM TEXTBOOKS?
T044502 HOW OFTEN DO STUDENTS DO MATH ON WORKSHEETS?
T044503 HOW OFTEN DO STUDENTS DO MATH IN SMALL GROUPS?
T044504 HOW OFTEN DO STUDENTS WORK W/RULER/OBJECTS?
T044505 HOW OFTEN DO STUDENTS USE A CALCULATOR?
T044506 HOW OFTEN DO STUDENTS USE A COMPUTER?
T044507 HOW OFTEN DO STUDENTS WRITE ABOUT PROBLEM-SOLVING?
T044509 HOW OFTEN DO STUDENTS DISCUSS MATH W/OTHER STDNTS?
T044510 HOW OFTEN DO STUDENTS WORK REAL-LIFE MATH PRBLMS?
1 ALMOST EVERY DAY
2 ONCE OR TWICE A WEEK
3 ONCE OR TWICE /MONTH
4 NEVER OR HARDLY EVER

VIII. SCHOOL CHARACTERISTICS

C032001 WHAT % OF STUDENTS RECEIVE SUBSIDIZED LUNCH?
01 NONE
02 1-5%
03 6-10%
04 11-25%
05 26-50%
06 51-75%
07 76-90%
08 OVER 90%

TOC TYPES OF COMMUNITY
1 EXTREAM RURAL
2 DISADVANTAGE URBAN
3 ADVANTAGE URBAN
4 OTHER: NON-EXTREAME

Variables Selected for Multiple Regression Analysis

33 variables were selected for multiple regression analysis. these variables might be classified as different categories as the previous descriptive analysis because of the adjustment for original model that Baratz-Snowdon, et, al. developed.

DEMOGRAPHICS

1	DAGE	AGE
2	DRACE	RACE
		0 HISPANIC
		1 ASIAN
3	DSEX	SEX

		0 MALE
		1 FEMALE
4	PARED	PARENTAL EDUCATION
		1 DIDN'T FINISH HIGHSC
		2 GRAD FROM HIGHSCHOOL
		3 SOME ED AFTER HIGHSC
		4 GRAD FROM COLLEGE
5	B005601A	DOES MOTHER OR STEPMOTHER LIVE AT HOME?
		0 YES
		1 NO
6	B007801A	"WERE YOU BORN IN US,DC, OR TERRITORIES? "
		0 YES
		1 NO
HOME: EDUCATION SUPPORT		
7	HOMEEN2	HOME ENVIRONMENT - HOW MANY TYPES OF ARTICLES (NEWSPAPER, ENCYCLOPEDIA, MORE THAN 25 BOOKS, AND MAGAZINE) IN HOME
		1 0 - 2 TYPES
		2 3 TYPES
		3 4 TYPES
8	B007401A	HOW OFTEN DISCUSS STUDIES AT HOME?
		1 ALMOST EVERY DAY
		2 ONCE/TWICE A WEEK
		3 ONCE/TWICE A MONTH
		4 NEVER/HARDLY EVER
9	B004201A	ATTENDED PRESCHOOL?
		0 YES
		1 NO
LANGUAGE USE		
10	LANGHOM	HOW OFTEN OTHER LANGUAGE SPOKEN IN HOME?
		1 NEVER
		2 SOMETIMES
		3 ALWAYS
ENGLISH COMPETENCE		
11	LEP	LIMITED ENGLISH PROFICIENCY
		0 YES
		1 NO
SCHOOL-RELATED ATTITUDE		
12	M811101B	I LIKE MATH
13	M811103B	I AM GOOD AT MATH
14	M811106B	I UNDERSTAND MOST OF MATH CLASS
15	M811104B	MATH MORE FOR BOYS THAN GIRLS
16	M811107B	MATH IS MOSTLY MEMORIZING FACTS
17	M811102B	PEOPLE USE MATH IN JOBS
18	M811105B	MATH USED FOR SOLVING PROBLEMS
19	M811108B	WOULD NOT STUDY MORE MATH
		1 AGREE
		2 UNDECIDED
		3 DISAGREE
SCHOOL BEHAVIORS		
20	M811301B	HOW MUCH TIME SPENT EACH DAY ON MATH HOMEWORK?
		1 NONE
		2 15 MINUTES
		3 30 MINUTES
		4 45 MINUTES
		5 AN HOUR
		6 MORE THAN AN HOUR
21	B007301A	HOW MANY TIMES CHANGE SCHOOLS IN PAST 2 YEARS?
		1 NONE
		2 ONE
		3 TWO
		4 THREE OR MORE

22	M811601B	HOW OFTEN? DO MATH PROBLEMS FROM TEXTBOOKS?
23	M811602B	HOW OFTEN? DO MATH PROBLEMS ON WORKSHEETS?
24	M811603B	HOW OFTEN? SOLVE MATH PROBLEMS IN GROUPS?
25	M811604B	HOW OFTEN? WORK WITH RULERS, BLOCKS, SHAPES?
26	M811605B	HOW OFTEN? USE A CALCULATOR?
27	M811606B	HOW OFTEN? USE A COMPUTER?
28	M811607B	HOW OFTEN? TAKE MATH TESTS?
29	M811401B	DO YOU GET HELP IN MATH FROM SPECIAL TEACHERS?
		1 ALMOST EVERY DAY
		2 ONCE OR TWICE A WEEK
		3 ONCE OR TWICE /MONTH
		4 NEVER OR HARDLY EVER

SCHOOL & TEACHER CHARACTERISTICS

30	PCTMIN	PERCENT MINORITY (1 - PCTWHT)
31	C032001	% OF STUDENTS RECEIVE SUBSIDIZED LUNCH
32	TYPLOCL	TYPE OF LOCALITY
		1 LARGE CENTRAL CITY
		2 MID-SIZE CITY
		3 URBAN FRINGE - LARGE
		4 URBAN FRINGE - MID
		5 LARGE TOWN
		6 SMALL TOWN
		7 RURAL

MATH PERFORMANCE

33	SCORE	MEAN OF MRPCM1 TO MRPCM5

Appendix B

The following is the description of technical procedures related to sampling weights, replication weights, subgroups forming, and missing data. This information was mainly derived from the NAEP 1992 user guide (USDOE/OERI, 1993), and a companion technical report of the Trial State Assessment Program in Mathematics (USDOE/OERI,1993).

Weighting Procedures: Sampling Weights

In the 1992 NAEP sampling design, approximately 2,500 grade 4 students in each state or territory were assessed. Because students did not have an equal probability of being selected, each student was assigned a sampling weight. The larger the probability of selection for students within a particular demographic group, the smaller the weights for those students would be. When computing descriptive statistics or conducting inferential procedures, the data should be weighted properly for each student by using full sample weights.

Each student was assigned a full sample weight called ORIGWT which contained three components, a base weight, an adjustment for school non participation, and an adjustment for student non participation. ORIGWT was scaled so that the sum of weights for all students in each state could estimate the total number of fourth-grade assessable students in that state's public schools. The sampling weight, ORIGWT, was used for all analyses in this study to make valid inferences from the student samples to the respective populations from which they were drawn.

Weighting Procedures: Replication Weights

The NAEP sampling scheme involved the selection of clusters of students from the same school. The sampling frame was first stratified by the urbanization status of the area in which the school was located. Within urbanization strata, schools were further stratified explicitly on the basis of minority enrollment in those states. Within minority strata, schools were sorted by median household income of the ZIP code area where the school was located.

Because observations were not independent of one another as they were in a simple random sample, use of ordinary formulas for estimating the standard error of sample statistics would result in values that were too small. Therefore, in addition to estimation weights, a set of replication weights was provided for each student. The replicate weights (SRWT01-SRWT56) were used to calculate the sampling errors of estimates obtained from the data variance. When the jackknife variance estimation procedure was implemented as intended, approximately unbiased estimates of sampling variance would result. Jackknifing had a number of properties that made it particularly suited to the analysis of NAEP data in this study:

1. It provided unbiased estimates of the sampling error arising from the complex sample selection procedure for linear estimates such as simple totals and means, and does so approximately for more complex estimates.

2. It reflected the component of sampling error introduced by the use of weighting factors, such as non response adjustments, that are dependent on the sample data actually obtained.

3. It was adapted readily to the estimation of sampling errors for parameters estimated using statistical modeling procedures, as well as for tabulation estimates such as totals and means.

4. Once appropriate weights were derived and attached to each record, Jackknifing was used to estimate sampling errors. A single set of replicate weights was required for all tabulations and model parameter estimates that may be needed.

The study student sample

This study focused on several student subgroups - Hispanic, including 4 Hispanic subgroups: Cuban-background, Mexican-background, Puerto Rican, and "Other", and Asian students. Hispanic and Asian students were chosen by using variable DRACE which was an imputed definition of race/ethnicity, derived from up to three sources of information. Hispanic subgroups were identified by using the variable B003101A which classified Hispanic students as Mexican/Chicano, Puerto Rican, Cuban, and other Hispanic. There were 12396 Hispanic students in total when the variable DRACE was used for analysis. On the other hand, variable B003101A, identified a total of 11,937 Hispanic students (6181 Mexican/Chicano, 1528 Puerto Rican, 366 Cuban, and 3862 other Hispanics), thus generating 495 less Hispanic students than the variable DRACE. The discrepancy was caused by students' omissions or multiple responses to B003101A which asked the question: "if Hispanic, what is your Hispanic background?".

Missing Data

In the multiple regression analysis, there were a total of 32 regressors with math achievement scores as the dependent variable. Subjects were deleted if they did not know the answer (usually with the code 7), omitted the answer (usually with the code 8), or provided multiple responses (usually with the code 0) to any of these questions involved in the multiple regression analysis. Therefore, the more the variables were selected, the more of a possibility that the subjects would be excluded. In the last step of multiple regression analysis, more than half of subjects, 9588 students, were deleted and only 7535 observations were left in the final model in which 32 regressors were used to predict Hispanic and Asian students' math performance.

Owing to the significant amounts of missing data on the variable of parental education

level, a dummy variable, PDUM, was entered to substitute the variable PARED. By assuming such data were not missing at random, the dummy variable was coded according to the presence or absence of the data. Hence, as shown in Table 1, subjects were increased to the original sample size, 17123 students.

We found that the parental education of the students who omitted responding to this question had lower math performance than that of the parents of students who answered the questions. A significance at .05 level was found on this dummy variable (Beta weight = 0.090, p = 0.0001, and R-square = 0.0080 were explained)

TABLE 1
Test of the Dummy Variable Used to Substitute PARED

Model: MODEL1
Dependent Variable: SBAR

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	137822.65753	137822.65753	138.765	0.0001
Error	17121	17004712.49	993.20790199		
C Total	17122	17142535.148			

Root MSE	31.51520	R-square	0.0080
Dep Mean	204.09167	Adj R-sq	0.0080
C.V.	15.44169		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	200.837701	0.36648060	548.017	0.0001
PDUM	1	5.727556	0.48621588	11.780	0.0001

Variable	DF	Standardized Estimate
INTERCEP	1	0.00000000
PDUM	1	0.08966497

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