

Evaluation of Student Math Performance in California School Districts Using *Houghton Mifflin Mathematics*

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Raleigh, North Carolina

EXECUTIVE SUMMARY

EDSTAR, Inc., an independent consulting firm, explored the relationship between elementary students' math achievement and the use of the *Houghton Mifflin Mathematics* (©2002) program in selected California public school districts.

In the 2001–2002 school year, numerous districts in California adopted *Houghton Mifflin Mathematics* for their elementary schools, and eight were selected to participate in this study based on the ethnic and geographic diversity of their student populations. A total of 624 schools are included in the study.

For each district, EDSTAR identified a control district by matching prior math achievement scores, student demographic characteristics (such as percentages of minorities, relative wealth indicator, and percentages of students receiving free lunch), and district sizes. The Mean Scaled Scores (MSS) and the National Percentile Ranking (NPR) for the Stanford 9 test were evaluated to measure the effect of the Houghton Mifflin math program. The control districts and Houghton Mifflin districts had no statistically significant difference in math achievement scores for the baseline year, 2001, prior to implementation of *Houghton Mifflin Mathematics*. Math score gains from 2001, the baseline, to 2002 were also evaluated for each grade.

The students in California districts using the *Houghton Mifflin Mathematics* program made statistically significant greater gains in math achievement in one year of use than students using other programs in well-matched comparison districts. The results of this study provide strong evidence that *Houghton Mifflin Mathematics* is helping districts close the achievement gap between English and non-English learners in math while also increasing math performance of students overall. The gains from use of *Houghton Mifflin Mathematics* were most significant (nearly 10 times greater) for students with Limited English Proficiency. However, all demographic groups benefited from the *Houghton Mifflin Mathematics* program, experiencing at least a doubling of their gains in math achievement. Statistically significant conclusions from comparisons of the Houghton Mifflin schools with the control districts are as follows:

- For all students at every grade level, the districts using *Houghton Mifflin Mathematics* made greater gains in NPR and MSS than the control districts using other math programs.
- For all students grades 2 through 5 combined, the increases in the percentages of students who scored above the national norm (NPR) were more than five times higher for districts using *Houghton Mifflin Mathematics* than for the matched comparison districts.

- At every grade level, the Limited English Proficiency (LEP) students in districts using *Houghton Mifflin Mathematics* made greater gains in math achievement than LEP students in the control districts.
- For all grades combined, the increases in the percentages of LEP students who scored above the national norm were nearly 10 times higher for Houghton Mifflin districts than for the matched comparison districts.
- At grades 4 and 5, the English Only (EO) students in districts using *Houghton Mifflin Mathematics* made greater gains than EO students in the control districts.
- For all grades combined, the increases in the percentages of EO students who scored above the national norm were more than two times higher for Houghton Mifflin schools than for the matched comparison districts.
- At every grade level, the economically disadvantaged students in districts using *Houghton Mifflin Mathematics* made greater gains than disadvantaged students in the control districts.
- For all grades combined, the increases in the percentages of economically disadvantaged students who scored above the national norm were more than four times higher for Houghton Mifflin schools than for the matched comparison districts.
- At every grade level, female students in districts using *Houghton Mifflin Mathematics* made greater gains than females in the control districts.
- For all grades combined, the increases in the percentages of female students who scored above the national norm were more than five times higher for Houghton Mifflin schools than for the matched comparison districts.
- For grades 2 and 4, male students in districts using *Houghton Mifflin Mathematics* made greater gains than males in the control districts.
- For all the grades combined, the increases in the percentages of male students who scored above the national norm were more than five times higher for Houghton Mifflin schools than for the matched comparison districts.

All of the findings mentioned above were statistically significant at the $p < .05$ level.

OBJECTIVE

The objective of this project was to determine the effect of one year of use of *Houghton Mifflin Mathematics* on student math achievement in grades 2 through 5 in eight California school districts and to determine how this achievement compared to that attained by districts using other programs.

INTRODUCTION

During the 2001–2002 school year, most school districts in California implemented new elementary math programs as part of the statewide textbook adoption. *Houghton Mifflin Mathematics* was one of six programs approved for purchase in these districts, and it captured 25–30 percent of the market.

METHODOLOGY

Houghton Mifflin identified eight school districts in California, each of which had adopted the *Houghton Mifflin Mathematics* program for use in school year 2001–2002, for inclusion in this study. These districts represent the demographic and geographic diversity within the state. All had received standard in-service from the publisher prior to using the program.

For each Houghton Mifflin district, EDSTAR identified comparable control school districts that used other math programs by matching prior math achievement scores (such as percentages of students at or above the national norms, mean scaled scores, and Academic Performance Index, or API, scores); student demographic characteristics (such as percentages of minorities, relative wealth indicator, and percentages of students receiving free lunch); and district size. EDSTAR obtained data from three separate sources to ensure the validity and accuracy of the control group selection. (See EDSTAR'S technical report for a complete description of the methodology.) The control group school districts include ABC Unified, Bakersfield City Elementary, Capistrano Unified, North Monterey County Unified, Placentia-Yorba Linda, Riverside Unified, South Bay Union Elementary, and Vacaville Unified.

Math achievement was defined by Mean Scaled Scores (MSS) and National Percentile Ranking (NPR) of Standardized Testing and Reporting (STAR) Stanford 9 (SAT-9) tests, which were obtained from the California Department of Education for all Houghton Mifflin schools and

control schools for 2001 and 2002. The STAR test is administered annually at every grade, beginning at grade 2, in California.

Gains were calculated for the MSS as well as NPR values. The conclusions reached for the MSS were consistent with the conclusions reached for the NPR values and are not given in this report.

Further analyses were done for all students and for the following demographic subgroups:

- Limited English Proficiency (LEP) students (English-learner students)
- English Only (EO) students, Non-English-learner students
- Economically disadvantaged students
- Female students
- Male students

FINDINGS

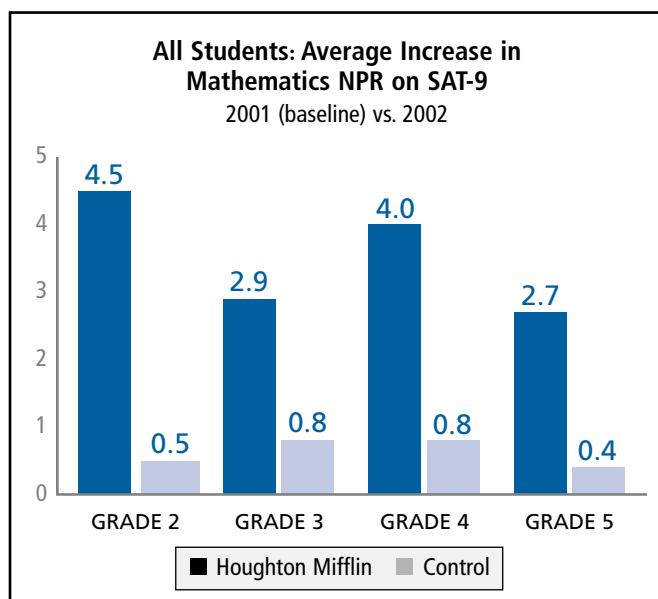
The control districts and Houghton Mifflin districts showed no statistically significant difference in math achievement scores for the baseline year, 2001, prior to implementation of *Houghton Mifflin Mathematics*.

Figure 1 (see page 52) illustrates the gains in average NPR for districts using *Houghton Mifflin Mathematics* and comparison districts for each grade. The numerical results (i.e., the number of schools, the average NPR gain, standard deviation, and the p-values) for the statistical tests performed are provided in the Appendix.

For all students at every grade level, the districts using *Houghton Mifflin Mathematics* made greater gains in NPR and MSS than the control districts using other math programs. All of the comparisons were statistically significant. For grades 2 through 5 combined, the increases in the percentages of students who scored above the national norm (NPR) were more than five times higher for districts using *Houghton Mifflin Mathematics* than for the matched comparison districts, and the difference was significant at $p < 0.0001$.

Furthermore, all demographic groups examined (Limited English, English Only, economically disadvantaged, and gender) using *Houghton Mifflin Mathematics* showed statistically significant greater gains in MSS and NPR than their matched comparison counterparts in districts using other math programs. Some of these gains were as great as 10 times those of the control group. Each of these demographic groups is presented separately below.

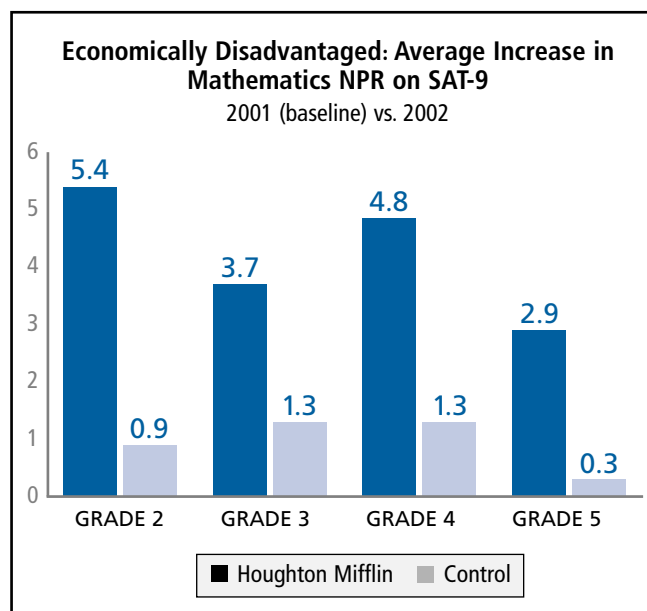
FIGURE 1



ECONOMICALLY DISADVANTAGED STUDENTS

At every grade level, economically disadvantaged students in districts using *Houghton Mifflin Mathematics* made greater gains than disadvantaged students in the control districts, and these gains were statistically significant at all grades. For all grades combined, increases in the percentages of economically disadvantaged students who scored above the national norm were more than four times higher for Houghton Mifflin schools, and the difference was significant at $p < 0.0001$. These results are illustrated in Figure 2, and the numerical results are provided in the Appendix (see page 63).

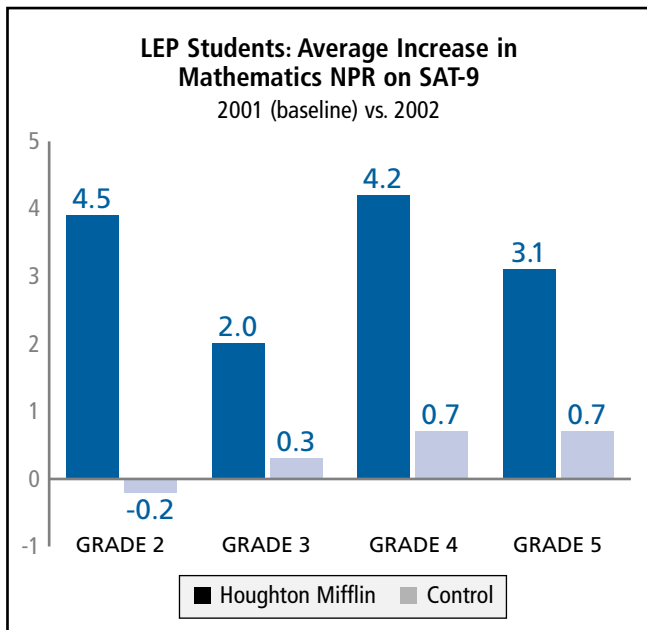
FIGURE 2



LIMITED ENGLISH PROFICIENCY (LEP) STUDENTS

At every grade level, LEP students in districts using *Houghton Mifflin Mathematics* made greater gains than LEP students in the control districts, and all of the comparisons were statistically significant. For all grades combined, the increases in the percentages of LEP students who scored above the national norm were nearly 10 times higher for Houghton Mifflin districts, and the difference was significant at $p < 0.0001$. These results are illustrated in Figure 3, and the numerical results are provided in the Appendix (see page 62).

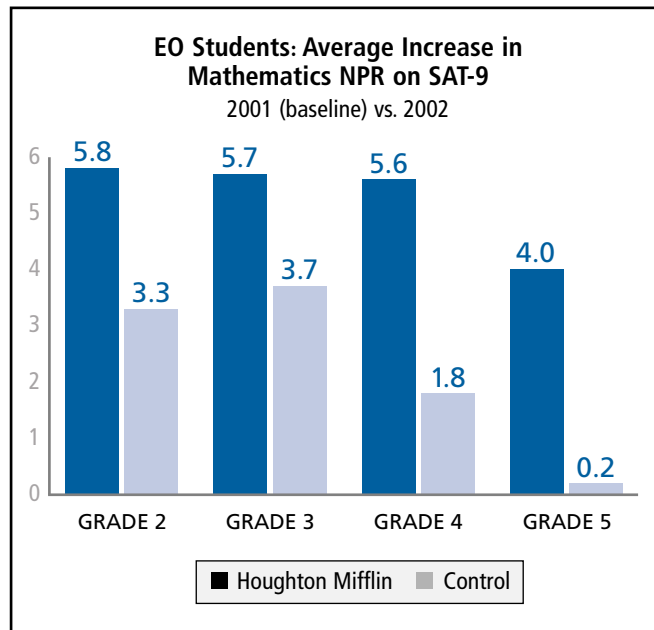
FIGURE 3



ENGLISH ONLY (EO) STUDENTS

At every grade level, English Only (EO) students in districts using *Houghton Mifflin Mathematics* made greater gains than EO students in the control districts, and these gains were statistically significant for grades 4 and 5. For all grades combined, the increases in the percentages of EO students who scored above the national norm were more than two times higher for Houghton Mifflin schools, and the difference was significant at $p < 0.0006$. These results are illustrated in Figure 4, and the numerical results are provided in the Appendix (see page 63).

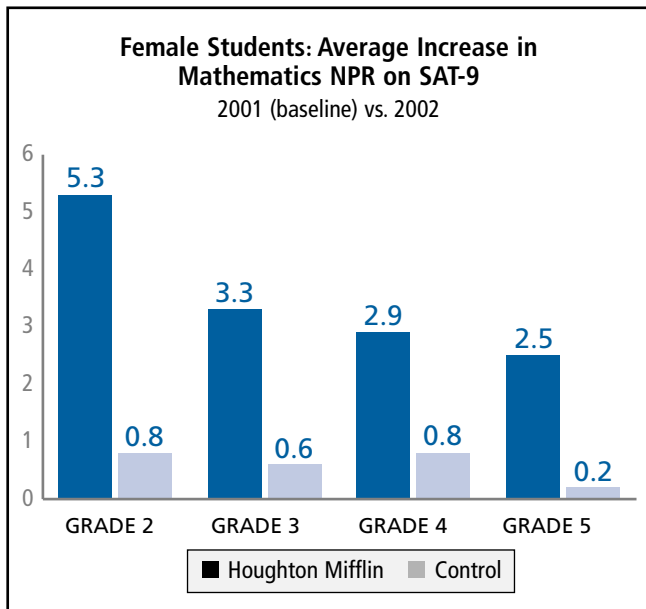
FIGURE 4



FEMALE STUDENTS

At every grade level, female students in districts using *Houghton Mifflin Mathematics* made greater gains than females in the control districts, and these gains were statistically significant at all grades. For all grades combined, the increases in the percentages of female students who scored above the national norm were more than five times higher for Houghton Mifflin schools, and the difference was significant at $p < 0.0001$. These results are illustrated in Figure 5, and the numerical results are provided in the Appendix (see page 64).

FIGURE 5



MALE STUDENTS

At every grade level, male students in districts using *Houghton Mifflin Mathematics* made greater gains than males in the control districts. These gains were statistically significant at the $\alpha = 0.05$ level for grades 2 and 4 and for all grades combined. For grades 3 and 5 these gains were statistically significant at the $\alpha = 0.10$ level (i.e., not as strongly significant). For all the grades combined, the increases in the percentages of male students who scored above the national norm were more than five times higher for Houghton Mifflin schools, and the difference was significant at $p < 0.0001$. These results are illustrated in Figure 6, and the numerical results are provided in the Appendix (see page 64).

FIGURE 6

