

Introduction to the Reports and Studies about the College Preparatory Mathematics Program (CPM)

The student results reported here summarize various kinds of studies conducted about CPM, the College Preparatory Mathematics Program. The reports cover a wide variety of topics, reflecting the different audiences who are concerned about different measures of success. As a result of these studies and reports, cumulatively involving tens of thousands of students, we can say with great certainty that CPM is an effective mathematics program that teaches basic skills, problem solving strategies, and conceptual understanding. In short, it is a complete, balanced mathematics curriculum.

The studies conducted from 1992-1995 were designed to, first, verify that the CPM curriculum is at least as effective with teaching students basic skills and procedures as those available from major publishers and, second, that CPM students benefited from other elements of the curriculum, such as acquiring systematic problem solving strategies and communicating mathematical ideas.

The studies conducted from 1998-2002 were in response to California's adoption of content standards and state-mandated testing. Once again the studies confirmed that CPM students learn basic skills and procedures at least as well but usually somewhat better (and occasionally much better) than students who use other programs. The five-year report for California SAT9 results is based on CPM usage in about 20% of California's high schools.

The studies conducted from 2003-2008 are more diverse. There are results for CPM schools on state tests for California, Colorado, Pennsylvania, and Washington. There are studies that examine CPM student performance at both the high and low ends of the achievement spectrum. One study examines course-taking patterns in inner city schools. Another looks at the results of an exemplary implementation of CPM in a three-county area of California, and is followed by three more years of test data comparisons for the school.

When CPM was named an "Exemplary Mathematics Program" by the U.S. Department of Education in 1999, the report from the team that evaluated the research supporting CPM's submission said, "While there is no single study that proves the effectiveness of the program, the preponderance of evidence is convincing." With the addition of the studies from 1998-2008, there can be no doubt that CPM is one way to effectively teach mathematics. Students of all abilities learn the basic skills while they benefit from the added features of the program: understanding concepts, acquiring problem solving strategies, developing the ability to communicate ideas clearly and effectively, and learning to work with others.

For more information about CPM, visit the web site at www.cpm.org. Additional studies and extensions of some of the studies included here will be posted there as they become available.

1992-1995 Studies

A study using the Mathematics Diagnostic Testing Program (MDPT)

The MDTP is an independent group funded by the University of California and California State University to provide multiple-choice tests to high school classes. These devices are used for internal assessment of student readiness for subsequent mathematics courses. For this study, the MDTP scores of approximately 4,200 students in five schools that used these examinations were analyzed. The results showed that CPM students scored about 20% higher on the algebra examination and about 10% higher on the geometry examination when compared to non-CPM students at the same school. (1993)

A comparison of the performance of students of different ability levels.

In a sub-study of the 1992 CPM End-of-Year Assessment study, we investigated which students were most likely to be helped by taking CPM. This study indicated that students of all ability levels seem to improve their scores by about the same amount. (1992)

A study of the likelihood of taking calculus four years after taking algebra in eighth grade.

A study of three eighth-grade honors algebra classes showed that before CPM was introduced, about 50% of these students were taking calculus four years later, while after CPM was introduced, about 80% of the students were taking calculus. (1995)

1992 CPM Written Response Study.

Approximately 2400 algebra and geometry students participated in an assessment where each student had 20 minutes to solve two written-response items. The results favored CPM students for both genders and all ethnic groups. Overall, CPM students scored about 35% higher on algebra and 28% higher on geometry on the average test item. (1992)

1993 CPM Written Response Study.

Approximately 3700 algebra and geometry students participated in an assessment where each student had 20 minutes to solve two written-response items, one of which was taken directly from another examination. The results favored CPM students for both genders and all ethnic groups and were significant at the .05 level. CPM students scored 27% and 18% higher on algebra and geometry respectively than the non-CPM students. (1993)

1994 CPM Written Response Study.

Approximately 13,000 algebra, geometry and algebra 2 students participated in an assessment where each student had 30 minutes to solve three written-response items with grading done at three sites. For the third year in a row, CPM students scored significantly higher in algebra and algebra 2 and slightly higher in geometry. (1994)

1998-2002

Comparison of California SAT9 Scores for CPM High Schools, 1998-2002

The SAT9 mathematics examination was the annual performance assessment required to be given in all California public schools for the school years 1997-98 through 2001-02. The analysis of the scores posted on the California Department of Education Web site shows that for five consecutive years the algebra 1, geometry, and algebra 2 students at high schools using CPM (about 20% of the state's 900 high schools), scored higher than the state average for all schools by margins ranging from 6% to 10%. (2002)

Study of Santa Barbara High Schools

The Santa Barbara school district wanted to examine the effectiveness of the CPM program in its schools. For this study, each school was compared to the average of the ten schools in California that had the nearest School Characteristic Index (SCI) as defined by the State. The results showed that the API (Academic Performance Index) scores for each school and the SAT Math 1 scores were significantly higher than comparison schools and that enrollments in science classes, particularly for minority students, far exceeded the enrollments in these courses at comparison schools. (2001)

Master's thesis comparing performances on a common Algebra 1 final exam for students at a CPM school and a non-CPM school.

A teacher at a CPM school in Northern California organized all of the algebra 1 teachers in his district's two high schools to create a common final examination and grade it together. The results favored CPM students on almost every question, usually by a significant margin. (2000)

2003-2008

Results for CPM high schools on the California Standards Test (CST) for 2004-2008.

This report compares the CST results for about 100 CPM high schools in California to the state average on the Algebra 1, Geometry, and Algebra 2 CST exams. CPM schools scored equal to or higher than the state average for “proficient and advanced” students in 50 of the 55 comparisons. Algebra 1 scores average 50% higher in 8th grade and 28% higher in 9th grade over the five years. Geometry results equal or exceed the state average in all 20 comparisons, with a general trend over the five years of CPM schools scoring 85% proficient and advanced. Over the five years, the average for CPM schools for Algebra 2 has improved from about 8% below the state average (2004) to 18% above it in 2008. (2008)

Results for CPM middle schools on the California Standards Test (CST) for 2004-2008.

This report compares the CST results for about 50 identified CPM middle schools in California to the state average on the 6th and 7th grade tests. For all five years and in both grades, the CPM schools have a greater percentage of students performing at the proficient or better level. The 6th grade results average 13.2% higher for the five years, while the 7th grade results average 24.6% higher. (2008)

CPM School Performance on the Colorado CSAP Test: 2005-2008

This report compares CSAP results for students at schools that use CPM mathematics courses with the state average for “proficient and advanced” for each grade. In all grades for all courses for all four years, the CPM schools score one to nineteen percentage points higher than the respective state averages. The weighted average for all grades for all courses at schools that use the CPM program is 11.71% more students “proficient or advanced” than the state average. (2008)

Pennsylvania CPM schools compared to the state average for 8th and 11th grades

For 2008, the 12 schools identified as using the College Preparatory Mathematics (CPM) program have higher proficiency rates than the state averages. On average, CPM middle schools are 19.6 (2005), 15.3 (2006), 16.0 (2007), and 12.8 (2008) percentage points higher than the state average. CPM high schools are 18.9 (2005), 16.6 (2006), 14.1 (2007), and 13.4 (2008) points higher. (2008)

Washington State CPM schools compared to the state average on the WASL

The results for middle schools and high schools that use the CPM program show that they have a significantly higher percentage of proficient math students than the state average in each of the years reported. On average, CPM 7th grade results are 15.4 (2005), 18.2 (2006), 13.1 (2007), and 17.3 (2008) percentage points higher than the state average. The four-year average is 16 points higher. In the 8th grade, they are 18.5 (2006), 12.2 (2007), and 12.8 (2008) points higher. The three-year average is 14.5 points higher. CPM high schools are 13.2 (2005), 13.3 (2006), 8.3 (2007), and 14.6 (2008) points higher. The four-year average is 12.4 points higher. (2008)

Impact of CPM on the state test scores in the Issaquah, WA School District

The performance of students in the three Issaquah, WA high schools since 1999 has been above the state average. However, scores declined significantly from 2001 to 2003. After the implementation of CPM in 2002, the scores rebounded dramatically and by 2005 the District average was back to 23 percentage points higher than the state average. Since the 2003 testing year, the state average has increased 9.9 percentage points. The increase for the three Issaquah schools is significantly better: Liberty High School with 31.0 Issaquah High School with 18.1, and Skyline High School with 24.9 percentage point gains. The District is now 30.1 percentage points above the state average. (2008)

Comparison of Center High School in Antelope, CA to the schools in the tri-county Sacramento region

Center High School, ranked in the 58th percentile by the California Department of Education, has the highest 2004 California Standards Test (CST) mathematics scores in the three adjacent counties: Sacramento, El Dorado, and Placer. These scores exceed traditionally high performing high schools in the same area that rank from the 79th to the 94th percentile as well as the state average. (2004)

Center High School results follow-up: 2005-2007

The scores for Center High School for the three years following the initial report in 2004 are significantly higher than any comparison school or district in the greater Sacramento area, as well as the state average. (2007)

Course-taking patterns for advanced math scores and science enrollment in two San Francisco high schools

This study compares student enrollment in advanced mathematics and science courses in two schools in San Francisco, CA to their nearest ten comparison schools based on the California Department of Education School Characteristic Index. The percentage of students taking advanced mathematics at the two CPM schools is about double that in the comparison schools and the data is even stronger in chemistry course-taking patterns. (2005)

CPM use at high performing California high schools: SAT and ACT

We are often asked how “high ability” students do when they use CPM. This report looks at scores from two high performing high schools in university towns in California and compares their results on the SAT and ACT exams with the ten schools with comparable School Characteristic Indices (SCI). The results demonstrate that students at these schools do at least as well and mostly better than most of the students at comparison schools. (2006)

Comparison of the lowest quartile California CPM schools with non-CPM schools

This study examined the 10 California CPM schools that are in the lowest quartile of the School Characteristic Index (SCI) with non-CPM schools within one percent of the 10 schools’ SCI scores. For both the California High School Exit Exam and SAT scores, eight of the ten CPM schools had, respectively, higher pass rates and scores than the non-CPM schools. (2004)

ACT scores for Gillette, Wyoming

The mean ACT score in one teacher’s pre-calculus class for 1999-2004 went from 21.82 to 27.92 in the first year that his students had completed three or more previous CPM courses. (2006)

Closing the Achievement Gap in Oceanside, CA

El Camino High School was recognized by the U.S. Department of Education in 2004 for closing the achievement gap for Hispanic students by 24 percentage points. It also closed the gap by 13 points for African American students. (2004)