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# CPM Impact Over Time 5/05

Over the years, CPM teachers have reported that the enrollment in higher math courses has increased after CPM has been introduced to the school. This outcome is not unexpected, since one of the goals of the CPM program is to increase the success rate of students in mathematics, especially in Algebra 1. In the spring of 2005 CPM surveyed its mentor teachers and asked two questions about the effects of using CPM at their schools. Their responses follow the questions.

1. Are there more students successfully taking geometry than in the past? (Or was there an increase after it was implemented?)
2. Are more students taking more higher levels of math (Algebra 2, Analysis, and/or Calculus)?

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We implemented our first CPM courses in 1992 with Algebra 2 (pilot year). In 1994 we started using Algebra 1 and then brought in Geometry in 1995. We started using Math Analysis in the first year it was available (1998) and Calculus in the second year (2001). Here are the details of how the transformation of our courses occurred.

In 1994 we had two pre-calculus classes (total students enrolled around 55). We had four Algebra 2 sections with approximately 30 students in each. We had no AP courses.

The number of sections of math increased in combination of using CPM and going to a 4x4 block schedule. We first implemented AP Statistics in 2000 and AP Calculus in 2002. Both courses are taught in the spring. The following table shows the changes in advanced mathematics courses enrollment from 1994 through 2005.

	1994		2004-05		2005-06
	# sections	# students	# sections	# students	Pre-registration
Algebra 2	4	120	9	240	298 Students
Trig/Pre-Calculus	2	55	5	143	170 Students
AP Statistics		0	1	24	56 Students
AP Calculus AB/BC		0	2	31	54 Students

Since we did not have AP courses prior to CPM we cannot do any comparisons of pass rates. As for current AP courses, I have about an 80% passing rate in AP Statistics (3 or better on AP exam) and 95% passing on AP Calculus (80% scoring 4 or 5). This is the first year teaching BC Calculus. I anticipate approximately half the students will get a score of 5.

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Before Oceanside High School adopted CPM, many of our students would never have made it through a traditional Geometry class. Now they are finishing Algebra 2, with many of them going on to take Math Analysis (Pre-Calculus). All our students must take Geometry to graduate and most students are successfully completing the course. Enrollment in higher-level courses has shown significant growth.

- 1986: One Pre-Calculus Class, 3 Algebra 2 classes are offered in the school.
- 1990: Math A/B-a California reform general math curriculum was taught in place of remedial math.
- 1991: Teachers explore reform math for Algebra 1 students. Several sites were visited to determine the reform math program best for our students.
- 1992: Teachers decide to pilot College Preparatory Math (CPM-UC Davis Program)
  - CPM was selected since it appeared to be a “bridge” curriculum between traditional and reform mathematics.
  - Three teachers attended an Algebra 1 eight-day workshop taught by CPM teacher leaders. (Three days in the summer and five school year workdays.)
  - Six classes of Algebra 1 were given to the pilot program. These classes consisted of students who had either failed Algebra 1 or who were 9<sup>th</sup> grade students who did not qualify for traditional Algebra 1.
  - At the end of the year, students told visiting teachers what they liked about the program. For the first time they understood factoring and the story “word” problems were their favorite. All students for the first time had success in Algebra.
- 1993: Two of the three teachers continue the pilot with the next course: Geometry.
  - CPM was now offered to more students; more math teachers agree to teach the Algebra 1 curriculum.
  - Once again students love their math class and have success in higher-level mathematics.
- 1994: Two CPM Algebra 2 classes were offered. These students were the ones who had completed the initial Algebra 1 Pilot course.
  - These Algebra 2 students were excited that they completed the course successfully and they actually enjoyed their math experience.
  - CPM Algebra 1, Geometry and Algebra were offered to all students.
  - More students were taking higher-level math classes.
  - Two Pre-Calculus classes, five Algebra 2 classes were taught.
- 1995: Two Math Analysis classes were offered.
- 1999: AP Calculus is offered. 100% of the students passed with a score of 5
- 2002: Intermediate Algebra is offered for those students not ready for Math Analysis
- 2003: AP Statistics is offered
- 2004: Four AP Math Classes, five Math Analysis/Pre-Calculus Classes, 14 Algebra 2 (Intermediate Algebra) classes are offered.

	<b>Algebra 2</b>	<b>Pre-Calculus</b>	<b>AP courses</b>
1986	3	1	0
1994	5	2	0
2004	14	5	4

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I am currently a “Teacher on Special Assignment” in the Thompson R2-J School District in Loveland, CO. Our district implemented CPM Algebra and Geometry in 2001 and then added *Foundations for Algebra: Years 1 and 2*, (FFA) Algebra 2 and math analysis a year later. Some of the strongest points of the FFA/CPM materials are:

- 1) When CPM was constructed, grade level teachers in collaboration with university teachers wrote the activities. They knew the population they were writing for and, during the piloting, they served as “researchers in the classroom” in editing and adapting the materials. The curriculum really has students developing their own initial understanding of the mathematical concepts instead of mimicking a teacher’s procedures without understanding the concepts. The CPM Directors are always listening to the updates that are recommended for the courses from classroom teachers. I served on a writing committee for the FFA 1 and 2 materials last summer (2004) to incorporate teacher-suggested enhancements for the two courses. This fall, the new editions for Algebra 1 and Geometry called “Connections” become available. They are more problem driven, open-ended, and seem to be excellent improvements to the courses we are using. Once again, this evolution of the curriculum was developed by grade level classroom teachers.
- 2) In our district, we find the curriculum very conducive to differentiating at all levels. There is very deep “rigor” for the gifted and talented students. Explaining, articulating, and writing the “whys” of concepts and procedures really challenges these kids. On the other hand, our special needs teachers are very excited about the concreteness of the discoveries and connections their students are able to make. Now these so-called “lower ability” students often shine due to the opportunity in the CPM curriculum to use their spatial strength. They often draw models and explain ideas to the students we used to think were our strongest. One element critical to our success was (and is) having all math teachers and resource teachers attend the CPM-sponsored professional develop workshops.
- 3) My previous teaching assignment in the classroom was primarily 7<sup>th</sup> and 8<sup>th</sup> graders. Each year as I recommended the students who should take an algebra, college-bound path, I truly felt like a “gate-keeper,” even to the point of imposing parameters upon the careers these students would be allowed to pursue. The CPM materials have removed this judgment that I so hated to make. All of our 8<sup>th</sup> graders now take a one or two-year course of study with CPM Algebra 1. These courses use the same materials, although CPM A takes two years to complete the first year algebra course. The number of students completing Geometry and Algebra 2 has risen dramatically in the past three years. More students are seeing deeper, more conceptual mathematical ideas – a very equitable situation in our district. No students are underachieving in a general math track for their high school years!
- 4) The strongest plus for the FFA/CPM materials is their ongoing training during implementation. At no additional cost, three intense days of training are offered in the summer prior to the fall the curriculum is to be started. During the first year, there are five follow-up days approximately one month apart. I now help teach these workshops. Teachers learn the philosophy of the curriculum, strategies for using multiple teaching methodologies, and become familiar with the lessons and their mathematics. The networking from teachers from around the state and our local area is really tremendous as people who are using the materials tend to stay in touch and serve as resources for each other.

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Certainly CPM geometry is not the obstruction to most students that was the typical formal, proof-based course we offered a decade ago. At that time typically a third of each class would drop by first progress report. Many of our students met the two-year math requirement then in place by taking algebra "twice" albeit under two different course titles.

The CPM geometry course, with its algebra review topics, a less formal, more experiential format, and its focus on cooperative learning has proved much friendlier to students at all levels. With the spiraling of Algebra I topics and the emphasis on coordinate geometry, CPM geometry has proven to be a gateway to Algebra II.

We have used CPM texts exclusively at my school for nearly ten years. During that time we have gained 12 sections of math overall while our school population has remained stable at about 2000 students. We now have a three-year math requirement in place with geometry being the minimum exit level course. We therefore see students of every ability level in our geometry classes.

We use CPM Geometry for our honors level freshman course for those students (15%) expecting to take AP Calculus as seniors. In that course we emphasize more formal proof and constructions. All other students take algebra their freshmen year and geometry their sophomore year. Most of these students (80%) then take Algebra II their junior year to meet their three-year requirement. Some (about a third of those having completed Algebra II) will then choose Pre-Calculus or Statistics as a fourth year course their senior year.

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When Dover changed to CPM our Algebra 1 enrollment doubled. Even though our standardized test scores were average for our district and county, our numbers in Algebra 1 were more than double compared to other middle school (8th grade). In addition, our Golden State Exam awards were higher than any other middle school in our district (1999-2002).