

A Randomized Control Group Study of Student Achievement on the New York State Mathematics A Regents High School Examination

**Thomas Mariano
Mathematics Department Chair
Ithaca High School
Ithaca, NY**

Ithaca, NY is a city with a population of approximately 30,000, located in the Finger Lakes region of upstate New York. The chief industry is education. Cornell University, Ithaca College, and Tompkins Cortland Community College are all in the immediate vicinity. Ithaca High School is a comprehensive public high school with an enrollment of 1,660 students in grades 9–12. It has a diverse student body representing 43 countries. Approximately 21% are minority students (8.6% African American, 8.9% Asian, 2.8% Hispanic, 0.4% Native American). There are 141 professional staff including 123 classroom teachers. Over 85% of the faculty have earned a master's degree or higher.

In the fall of 2001, with school board approval, Ithaca High School began using the Core-Plus Mathematics program (CPMP) in a carefully designed research study. Students, not accelerated or in prealgebra classes, were randomly assigned to Core-Plus Mathematics courses and more traditional mathematics courses.

A five-day summer workshop was provided for teachers using Core-Plus Mathematics materials as this was the first time these teachers would be teaching the program with its new expectations for the work of teachers and students.

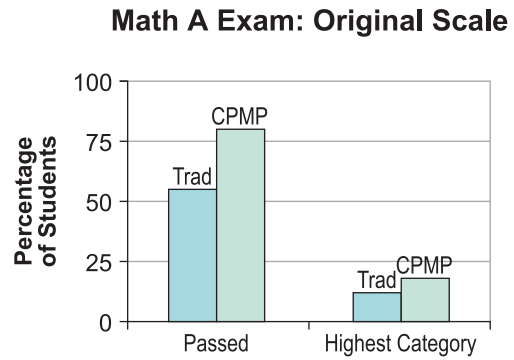
Students in the CPMP cohort studied Course 1 in the 9th grade and Course 2 in the 10th grade. Students in the more traditional program studied a two-year sequence of courses tailored for the state standards and based on Houghton Mifflin “Unified Mathematics” Books 1 and 2 that had been used in the school for several years.

Both cohorts of students took the New York State Math A Regents Exam in June 2003 at the end of the 10th grade. The Math A Regents Exam is the mathematics test that all students in New York State must pass in order to graduate from high school. The test requires students to demonstrate their ability to apply facts and definitions, solve problems, and show their understanding of mathematical procedures and problem-solving strategies. It was the goal of the New York State Board of Regents, in creating this new assessment, to set higher learning standards for all students.

Performance of both groups of students in the comparison study are summarized in the following table and graph. Percentages of students passing the exam and performing in the highest category are reported for each group.

**Performance on the Math A Regents Exam:
Original State Department of Education Scale**

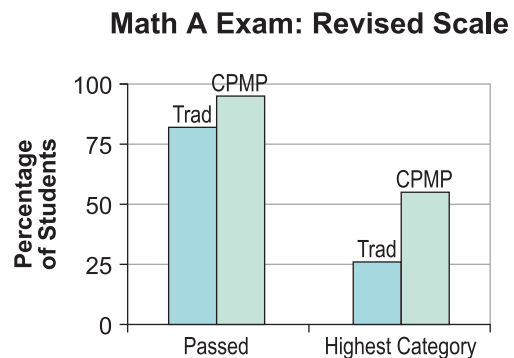
	Traditional (n = 96)	CPMP (n = 87)
Passed	55.2%	80.5%
Highest Category	12.5%	18.4%



Since the overall results in the state were poor (approximately 25% passing rate), the State Education Department lowered the cut scores that define a passing grade and the highest category. Performance for both groups of students at Ithaca High School relative to the revised scale are reported in the following table and graph.

**Performance on the Math A Regents Exam:
Revised Scale**

	Traditional (n = 96)	CPMP (n = 87)
Passed	82.3%	95.4%
Highest Category	26.0%	56.3%



On the original scale, the difference between the proportion of students in CPMP passing the exam (70 out of 87) and the proportion of students in the traditional program passing the exam (53 out of 96) is highly statistically significant ($z \approx 3.63$, p -value ≈ 0.0003). This result and those reported below are based on Fisher's exact test.

On the original scale, the proportion of students in CPMP scoring in the highest category on the exam (16 out of 87, or about 0.184) is larger than the proportion of students in the traditional program scoring in the highest category (12 out of 96, or 0.125), but the difference does not reach statistical significance ($z \approx 1.11$, p -value ≈ 0.2690).

On the revised scale, the proportion of students in CPMP passing the exam (83 out of 87, or 0.805) is larger than the proportion of students in the traditional program passing the exam (79 out of 96, or 0.552), and the difference is highly statistically significant ($z \approx 2.78$, p -value ≈ 0.0055).

On the revised scale, the proportion of students in CPMP scoring in the highest category on the exam (49 out of 87, or about 0.563) is larger than the proportion of students in the traditional program scoring in the highest category (25 out of 96, or 0.26), and this difference is highly statistically significant ($z \approx 4.17$, p -value ≈ 0.00003).

Summary

At the beginning of 9th grade, students at Ithaca High School were randomly assigned to classes using the CPMP integrated mathematics curriculum or to classes using more traditional textbooks. Both cohorts of students took the New York State Math A Regents Exam at the end of the 10th grade, after two years in their randomly assigned program.

A higher proportion of students using the CPMP curriculum passed the Regents Exam, on both the original and revised scales, than did students using the more traditional textbooks. Both differences are statistically significant.

The proportion of students scoring in the highest category also was higher for the students using the CPMP curriculum on both scales, but reached statistical significance only on the revised scale.