

NEW MATH = HIGH SCORES: Singapore system working at Santa Catalina

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It seems a small thing, concentrating on basics, making sure students master concepts before moving on, but proponents of Singapore Math say the system is dramatically improving math scores at Santa Catalina School.

"We had a good math program before, but we wanted a great math program," said Christy Pollacci, division head at the private K-12 independent Catholic school in Monterey.

The program was developed in the 1980s in Singapore schools, which previously imported math textbooks from other countries. By 2003, with the new curriculum in place, Singapore placed at the top of the world in fourth- and eighth-grade mathematics.

The U.S. placed 25th that same year, among the lowest of industrialized nations.

Singapore Math specialist Bill Davidson said the curriculum builds upon preceding levels of knowledge to achieve mastery.

"It's like rungs in a ladder," he said. "Before you move up to the higher rung, you have to master the rungs below. We go into more detail covering fewer topics."

A first-grader, for instance, learns every combination of numbers that falls between one and 10 — but not above 10 — counting forward and backward, adding and subtracting.

Santa Catalina began using the curriculum in August 2009, Pollacci said.

Davidson trains the school's teachers to teach the system in pre-kindergarten through fifth grade, and teaches two classes of sixth-graders.

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He stands before his eight pupils like a symphony conductor, signaling with his right hand as his students chant off numbers in rapid cadence, called skip counting — "8, 16, 24, 32, 40," then backward.

The children exercise, jumping forward and back as they call off the numbers.

The students then sit and do a written word problem. One problem asked, "Joyce mixed orange syrup with water in the ratio of 2 to 7 to make 18 liters of orange drink. How many liters of orange syrup did she use?"

To solve the problem, the students each made a drawing of a bar model, the number 2 in two boxes and the number 7 in seven boxes below that.

"The bar model is a diagram that tells a story of the problem, so the student can visualize how to solve it," Davidson said.

Speed in answering is emphasized, and all students are kept constantly active and challenged. Being idle, daydreaming, depending on a student next to you for answers, or cheating, are impossible.

Fourth-graders are immersed in the use of fractions, decimals and units of measure. By the middle of fifth grade, students have mastered multiplication and the division of fractions, preparing them for algebra in middle school.

Davidson, 33, was a creative writing major at the University of Pennsylvania, where he received a master's in elementary education. He taught English at a refugee school for girls in the Sudan, and the past four years at a charter school in Philadelphia.

"I always enjoyed math and liked teaching elementary school," Davidson said. "The Philadelphia school system is different. They have a standardized test in seventh grade that is an entrance exam for high school. If you don't do well on it, you don't get into one of the better high schools. I wanted to help struggling students get into a better high school. I thought math was the way to do it."

Davidson credited Yoram Sagher, a math professor at Florida Atlantic University, for being his mentor and trainer. Sagher came to Philadelphia to teach Davidson and four other teachers the principles of Singapore Math at the invitation of a mathematics foundation official who was impressed with it.

Davidson said a lack of emphasis on teaching basic skills in the lower grades is partly to blame for poor test results at schools nationwide. For example, students are expected to grasp algebra and geometry without having mastered fractions and ratios.

"What makes Singapore Math special is the sequence in which the skills are taught," Davidson said. "Addition and subtraction aren't taught as separate subjects, but simultaneously, instead of being compartmentalized."

The school recently sent a team of four students to the Mathcounts competition, and for the first time, they all placed first, qualifying them for the state finals.

Sophia D'Amelio, a Santa Catalina sixth-grader, said math wasn't always her favorite class.

"It is now," she said.

Nikki Hoonsbeen, also in sixth grade, said she learned a lot more with the new program. Classmate Jessica Oh agreed.

"Counting up and down is fun," Jessica said.

Davidson called math a fundamental skill connecting to all other types of learning.

"Math teaches you how to think," he said. "I want our students to learn to be great thinkers."