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Teaching math, Singapore style

By *JENNIFER PRICE*
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WILMINGTON -- In Monica Callender's fourth-grade classroom at Kuumba Academy, a recent math lesson was more like a pep rally.

"If I say five, seven and two, you say ..." Callender began.

"Six!" her students yelled in unison during an addition exercise to reach the number 20.

In John Vitsorek's nearby kindergarten classroom, the lesson resembled an aerobics class, as children did jumping jacks while counting in multiples of five.

The teaching was part of Singapore Math -- a math curriculum that is being piloted over three years at Kuumba and Academy of Dover charter schools and Red Clay Consolidated School District's Baltz Elementary.

The curriculum is modeled after math teaching in Singapore -- a country that consistently ranks first internationally in math student achievement. The United States generally ranks in the middle among industrialized countries.

The cornerstone of the Singapore method is teaching each concept to mastery before moving on to a new concept.

Most U.S. math curricula cover the same concepts for just a few days over the course of several grade levels -- a practice called spiraling. Singapore math covers fewer concepts but makes sure all children are proficient in a topic. It assumes students cannot move forward until they understand the fundamentals of an idea and can use it in abstract applications.

"We want them to be fluent in math," said Colleen Sheeron, a Kuumba third-grade teacher.

The thin Singapore Math books don't offer the colorful graphics or narrative explanations of thick American texts. Instead they just have pages of problems and questions, totaling around 100 pages as opposed to almost 1,000 pages of U.S. books.

A major criticism of American math is that it's taught out of sequence: students begin to learn fractions before they master basic multiplication and division. Singapore Math, however, introduces topics in a logical fashion, Callender said. And it teaches children to use visual representations such as charts and boxes to understand word problems.

Jennifer Hernandez-Thomas credits Singapore Math's direct and hands-on instruction for transforming her daughter's math grade. Two years ago, Niyah Thomas needed math tutoring, but this year she received a distinguished honors award on the math Delaware Student Testing Program.

"Numbers don't lie," she said. "This program works."

Erasing the stereotype that math is a painful and dreaded subject is another major component of Singapore math.

"We try to make math fun," said Sondra Shippen, principal of Kuumba -- a kindergarten to fifth-grade school. "The students don't see math as a chore anymore. They actually like it."

Each 90-minute math class begins with two "sprints" in which students see how many basic problems they can finish in 60 seconds.

"On your mark, get set, sprint!" Callender yelled as she clicked her stopwatch during class Wednesday.

With big smiles on their faces, the fourth-graders quickly turned over their worksheets and raced their way through the 44 addition problems.

"They get so into it," Callender said. "They think it's a game."

Before they start on their second sprint, the students take a break by working up a sweat. Callender leads her class in touching their knees to their opposite elbows while counting in multiples of three -- a practice known as skip counting.

"The objective is to get their adrenaline going," said Sally Maldonado, Kuumba's upper school dean.

Instead of calling on individual students to answer questions, Kuumba teachers wait for all of their students to raise their hands and then the class answers in unison--a tactic that the teachers say help to engage all students instead of just highlighting the students who are always the first to know the answer.

"If I just call on one student, I only know how that student is doing," Sheeron said. "But if I call on all of the students, they all want to get the answer right."

For Kuumba, the program's success shows in their DSTP scores. In 2008, before switching to Singapore Math, 64 percent of students were proficient on the DSTP math test compared with 81 percent in 2009 after the school adopted the program.

"We are just not seeing the same challenges we used to have with math," Shippen said.

The Delaware Foundation for Science and Mathematics Education provided the training and materials for all three schools.

"It made sense that we try to do something spectacularly different instead of just trying to improve what we already had," said F.M. Ross Armbrecht, the foundation's executive director.

Armbrecht wants to wait two more years until the pilot is over and there is substantial data before trying to get more schools to adopt the curriculum. Shippen recommends it to any school.

"What it has done for us is absolutely unbelievable," she said. "Our scores have just excelled."
