

Primary Singapore Mathematics A Revolutionary Program Designed to Improve Student Mathematics Achievement

Background

During the spring and summer of 2008, the CCDS teaching staff reviewed several elementary school mathematics textbooks that had been approved for adoption by the California State Board of Education (CSBOE). In this CCDS review, the staff noted that the U.S. National Council of Teachers of Mathematics (NCTM) advocated a problem-solving approach for the teaching and learning of mathematics.

We learned from the Hoover Institution “Education Next” page of the Hoover Institution web site, the following information concerning the recent Trends in International Mathematics and Science (TIMSS) test results :

“Headquartered at the international Study Center at Boston College, and taken by tens of thousands of students in more than three dozen countries, TIMSS has become a respected standard of international achievement. In three consecutive TIMSS test results (in 1995, 1999. And 2003), 4th and 8th grade students in the former British trading colony of Singapore beat all contenders, including math powerhouses Japan and Taiwan.” The staff later learned that in 2007, Singapore’s 4th graders ranked #2nd in the world behind Hong Kong and their 8th graders ranked #3 (behind Taipei in 1st place and the Republic of Korea in 2nd place). In 2007, U.S. 4th graders ranked 11th just behind Latvia, England, the Russian Federation and Kazakhstan. U.S. 8th graders in 2007 ranked 9th just behind The Russian Federation and England.

This all led the staff to their review of Singapore Math and the newly CSBOE approved in 2008 Singapore Math textbook titled **Primary Mathematics Standards Edition**. The books were kid friendly and one of the things we liked most about them was the very effective method to solve complex problems using pictorial diagrams called bar models. CCDS adopted **The Primary Mathematics Standard Editions** for grades k-5 that summer to implement the Singapore Math curriculum during the 2008-2009 academic year. The textbooks for the 6th grade were not available that academic year, so it was not until the next academic year, 2009-2010, that CCDS adopted **The Primary Mathematics Standard Edition** for the 6th grade.

What is Singapore Math?

By Sandra Chen

South River School District, South River, New Jersey

- **A collection of math teaching strategies common in the Singaporean classrooms.**
- **Problem Solving centered curriculum.**
- **Emphasizes skills needed to be a “good thinker”.**
- **De-emphasizes procedural skills and rote memorization.**
- **Greater depth/ Less breadth. More time spent on each topic. Fewer topics are covered in a year.**
- **A higher level of expectation is implicit in the instruction.**

Singapore Math: A Strong Curriculum

Emphasizes the development of:

- Strong number sense
- Excellent mental math skills
- Deep understanding of place value

Progression from Concrete to Abstract

- Concrete Stage: use of manipulatives
- Pictorial Stage: creating a “model”
- Abstract Stage: Use of the algorithm/formula

Model Drawing:

- Visual approach to solving word problems.
- Step by steps approach to solving that organizes information.

Mastery Versus Spiral

- Never re-taught but always revisited.
- Focuses on understanding

What Singapore Math is Not

By Bill Jackson

From Bill Jackson's article titled **Singapore Math Demystified-go to <http://www.thedailyriff.com/2010/05/singapore-math-demystified-why-we-should.php>**) to read all four of Mr. Jackson's articles and access his two PDF power point presentations that demonstrate basic math/bar modeling steps in solving problems.

1) Singapore math is NOT the way we learned math as kids (that is ,unless you went to school in a developed East Asian nation).

In Singapore math, traditional algorithms are learned but conceptual understanding is taught before procedural fluency. For example, the long division algorithm taught in Singapore Math textbooks is the same one we traditionally learn in the U.S., but it is presented and explained quite differently than the way we learned. (Click on Bill's Power Point Presentation in the second of his four articles to see the "different" explanation.) In Singapore math, students not only learn how to do an algorithm but also how every step of the algorithm works.

2) Singapore math is not "drill and kill", facts memorization, or rote learning of procedures.

In Singapore math, students learn their addition, subtraction, and multiplication facts and eventually memorize them. But they also learn the structure and patterns behind the facts so if they forget them, they are able to reconstruct them in their minds. From early grades, children learn how to compose and decompose numbers and manipulate them in useful ways in order to calculate mentally.

3) Singapore math is about students solving problems, thinking deeply, sharing their ideas, and learning from one another. Conceptual, procedural, and factual understanding is developed through problem solving and carefully structured practice. As a result, students learn to think deeply and appreciate mathematics.

Singapore Math Informational Resources

- a) Please visit <http://www.singaporemath.com/> for various instructional resources, student assessment resources, as well as additional tools. This site also provides background information about the Singapore Math Program, including the history surrounding the implementation of this program in the United States. Scientific research supporting the program is presented on this website. Frequently asked questions are addressed on this site as well.
- b) ***Singapore Math Demystified*** by Mr. Bill Jackson is a superbly written series of four articles about Singapore Math and can be read at <http://www.thedailyriff.com/2010/05/singapore-math-demystified-why-we-should.php>. In Part 2 and Part 4 of ***Singapore Math Demystified*** Mr. Jackson provides outstanding PDF PowerPoint examples of "How to do" the math.
- c) ***Trends in International Mathematics and Science (TIMSS) test results and information*** at <http://nces.ed.gov/timss/> . TIMSS 2007 Results can be viewed directly at http://nces.ed.gov/timss/table07_1.asp .
- d) ***South River Public Schools Singapore Math Resource Curriculum Guide*** located at [http://www.srivernj.org/Singapore Math Resource Curriculum Guide.pdf](http://www.srivernj.org/Singapore%20Math%20Resource%20Curriculum%20Guide.pdf)—This guide, developed by Sandra Chen. contains detailed information about all Grade Level Topics. *If you are confused by the meanings of the mathematical terms Number Bonds ,Branching method of addition ,Mental Math strategies for Rearranging, for Left to right, for Compensation, and for Multiplying and dividing, and bar modeling , then THIS is a great source to review and study.*
- e) ***Podcast-"Number Sense"***—This podcast/video by second grade teacher, Mrs. Patty Dempsey, beautifully explains how Singapore Math first and second graders are taught "Number Sense". To access this podcast go to Mrs. Dempsey's school website page at <http://www.scarsdaleschools.k12.ny.us/202620625134045260/site/default.asp> and click on "Math"—the podcast is at the bottom of page. If you download the podcast, you can play it on Quick Time Movie by dragging the download into your Quicktime icon.

