

# Adopting Singapore Math- A Case Study

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## Don't You Wish...

- You could teach math in long units?
- at a pace that insures that **all** students are at least at grade level by the end of the unit?
- and allows your best students to develop an even deeper mastery of the concept?



KEYS SCHOOL

*Learning for Life*



## Depth vs Breadth

TEXTBOOK	Grade 1		Grade 3		Grade 6	
	Number of Lessons	Avg. Pages/ Lesson	Number of Lessons	Avg. Pages/ Lesson	Number of Lessons	Avg. Pages/ Lesson
Singapore	34	15	42	12	24	17
Scott-Foresman	157	4	164	4	158	5
Everyday Math	110	2	120	2	113	4

(Source: American Institute for Research - "What the United States Can Learn From Singapore's World-Class Mathematics System")

## Do You Also Wish...

- You could teach math so that it made SENSE to your students?



The 2nd National Assessment contained the following question:

*Estimate* the answer to  $\frac{12}{13} + \frac{7}{8}$

Here is how US thirteen-year-olds answered:

Response	Percent of students
1	7
2	24
19	28
21	27
Don't Know	14

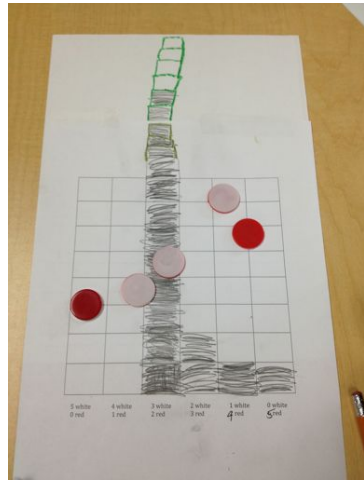


Number Sense starts at the  
**CONCRETE**

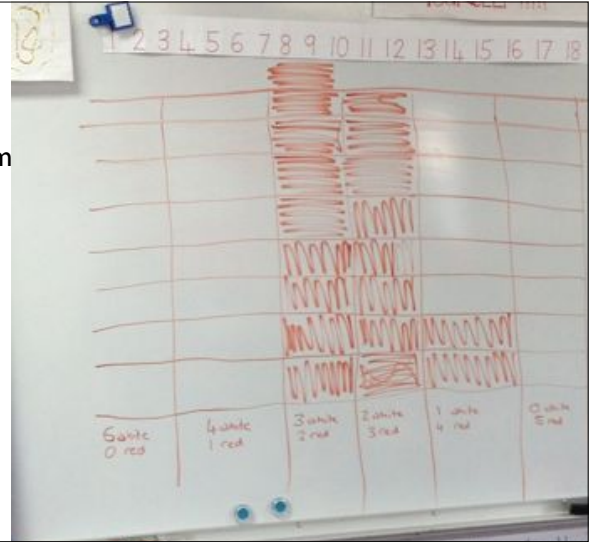
Throw 5  
counters  
and record



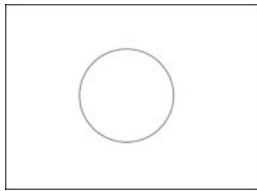
Record a different way



Classroom record



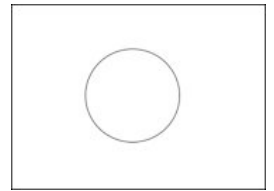
Inside/Outside



Move on to 7

IN	OUT

Inside/Outside



Move on to 7

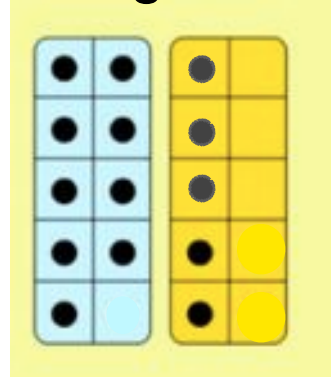
IN the circle	OUT of the circle
3	4
5	2

## The Parent Component

Recommendations for success:

- Parent nights, coffees or events
- attention to the needs and concerns of parents
- Homework should reflect this approach
- Show where the curriculum leads

## Sliding on Ten Frames

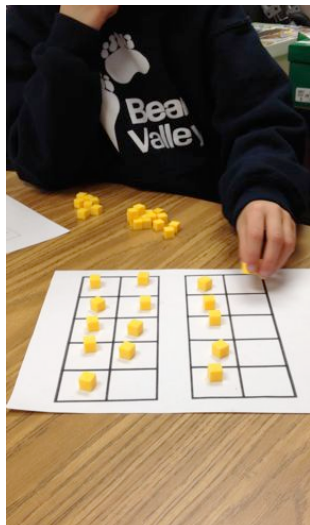


What is  $9 + 5$ ?

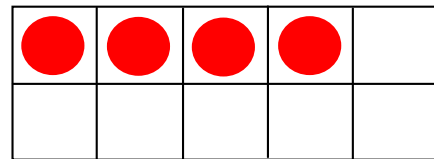
Can you **SHOW** it with the counters?

Can you **SEE** counters moving with your eyes **CLOSED**?

$$9 + 7$$



## 10-frame Visualization

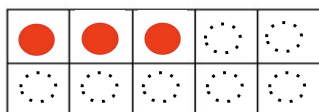
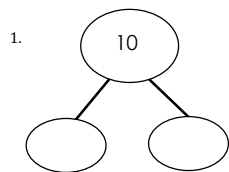


Hold up this 10 - frame. Children hold up

- That many fingers
- One finger **MORE**
- Enough to make 10
- Enough to make 11

## Transfer to Abstract:

Look at the 10-frame. Then fill in the number bond and use it to write 4 number sentences:

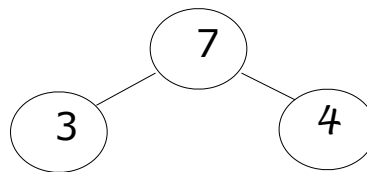


$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

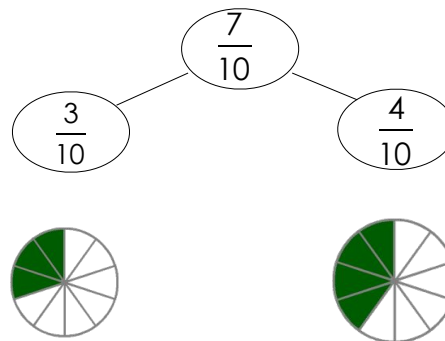
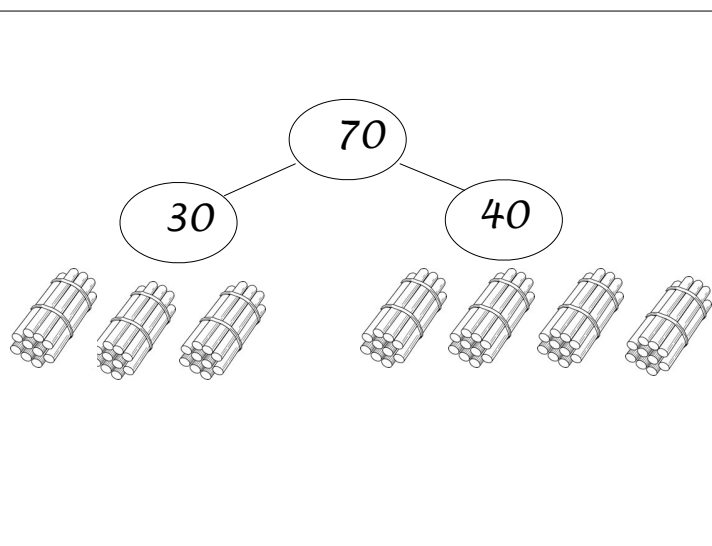
$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

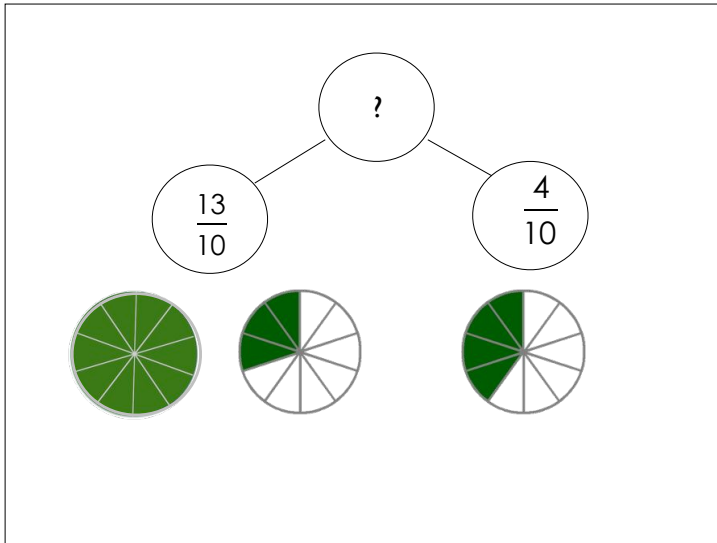
$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$



Emphasis Is Put on Building Number Bonds That Have Concrete Meaning for Students





## The Teacher Component

- Keys teachers went through 3 days of training before the first adoption and 3 half-days during the year.
- Kathleen functioned as on-site lead teacher, coaching the lower school teachers.
- Professional development

Try  $133 + 98$

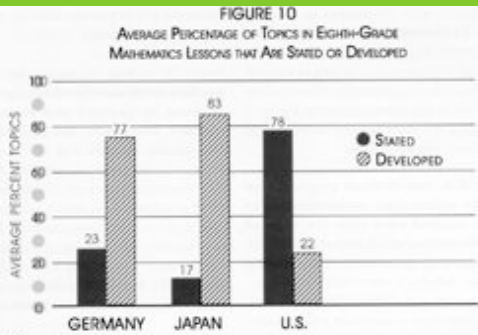
Can you see the number bond for 133?

Research shows that teaching math in a progression from

**CONCRETE > PICTORIAL > ABSTRACT**

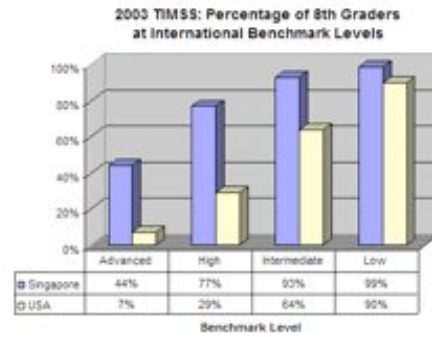
- builds a strong foundation of authentic mathematical understanding
- is more easily transferred to new situations, increasing problem solving skills
- means concepts do not have to be retaught every year
- gives children estimation and checking skills

# Thinking Skills

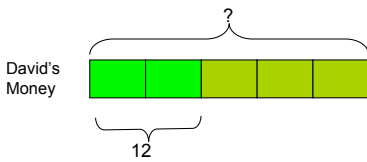


SOURCE:  
Third International Mathematics and Science Study; unpublished tabulations; Videotape Classroom Study, UCLA, 1994.

# 3. Thinking Skills



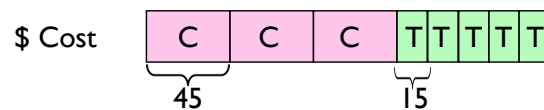
Try this 3rd grade example: David spent  $\frac{2}{5}$  of his money on a book. The book cost \$12. How much money did David have at first?



Equations    2 units = 12  
 $12 \div 2 = 6$  per unit  
 $6 \cdot 5 = 30$  for 5 units

Sentence:    David had \$30 at first.

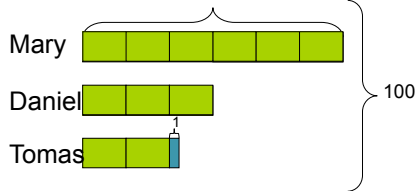
Try this 4th grade example: A coat costs \$45. It costs 3 times as much as a T-shirt. Find the cost of 3 coats and 5 T-shirts.



$$45 + 45 + 45 + 45 + 30 = 210$$

## Introducing Algebra- A 5th grade problem

Daniel has  $\frac{1}{2}$  as much money as Mary. Tomas has \$1 more than  $\frac{1}{3}$  as much as Mary. If they have \$100 altogether, how much does Mary have?



Equations

$$\begin{aligned} 100 - 1 &= 99 \\ 99 \div 11 &= 9 \text{ per unit} \\ 9 \times 6 &= 54 \end{aligned}$$

Sentence Mary has \$54.

## Compare to the Algebraic Solution:

From model, previous slide:

(Subtract one :)  
 $100 - 1 = 99$   
(divide by 11 :)  
 $99 \div 11 = 9$  per unit  
(Multiply by 6 :)  
 $9 \times 6 = 54$   
Mary has \$54.

Algebraically:

$$\begin{aligned} 6x + 3x + 2x + 1 &= 100 \\ 11x + 1 &= 100 \quad (\text{subtract one}) \\ 11x &= 99 \quad (\text{divide by 11}) \\ x &= 9 \\ (\text{Multiply by 6}) \\ \text{Mary has } 54. \end{aligned}$$

## Thinking of Adoption?

Considerations Schools Face in Adopting Singapore Math

## 1. ADOPTION DECISIONS

### Rolling Adoption

Start with Kg, 1st, maybe 2nd, and add one grade every year.

### Universal Adoption

Adopt K - 6 all at once.



## ROLLING ADOPTION: ADVANTAGES

- a) Teaching SPM for the first time to older students is difficult, since they have to relearn concepts.
- b) 4th, 5th and 6th grade teachers often have to go back a whole year in the SPM books until students catch up.

## UNIVERSAL ADOPTION: ADVANTAGES

- a) Even 6th grade students benefit from a year of SPM before going on to pre-algebra and algebra.
- b) 4th and 5th graders can be well ahead of grade level by the end of 6th grade.

## KEYS SCHOOL'S EXPERIENCE

## KEYS SCHOOL'S EXPERIENCE - ADOPTION

Keys adopted Kg - 6th in 2005.

- Most grades started a year behind grade level.
- It took 4 years for Keys to catch all classes up to grade level.

## SUCSESSES

- Keys was able to adopt a challenging Singapore Math curriculum (Discovering Mathematics) for 7th and 8th grades in 2009.
- Keys test scores have risen at the middle school level.
- More importantly, success in algebra at the 8th grade level has become universally achievable by our students.

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## CONTACT US:

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Thanks!!