MATH TRANSFORMATIONS

Leading Vertical Math Lesson Study:

How to Authentically Improve Math Instruction across the Grades

NCTM Session

Thursday, April 4

9:45 - 11:00 AM

ANDREA BARRAUGH, VERONICA KITTS, ARTEMISA PERUCHO-GREEN.

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In this session we will . . .

Explore Lesson Study alongside a vertical team of elementary teachers.

Table Group Discussion

What experiences have you had with Lesson Study?

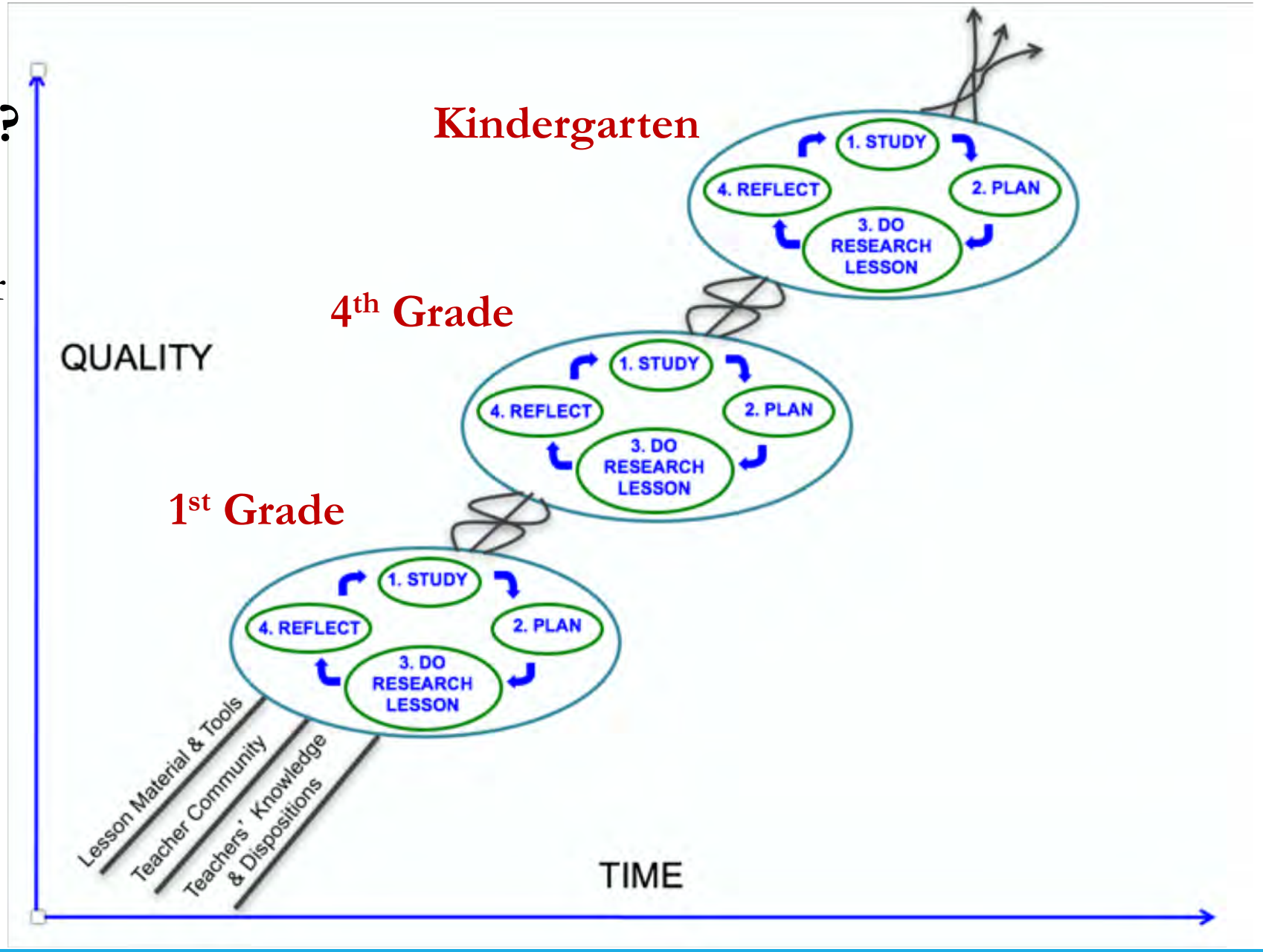
What is Lesson Study?

An iterative process of action research and teacher collaboration.

Cycles of Teacher Learning

Research Lesson

Student Learning



(Image from Mills College Lesson Study Group)

Instructional Improvement Time in the United States and in Japan (Lewis & Hurd, 2011)

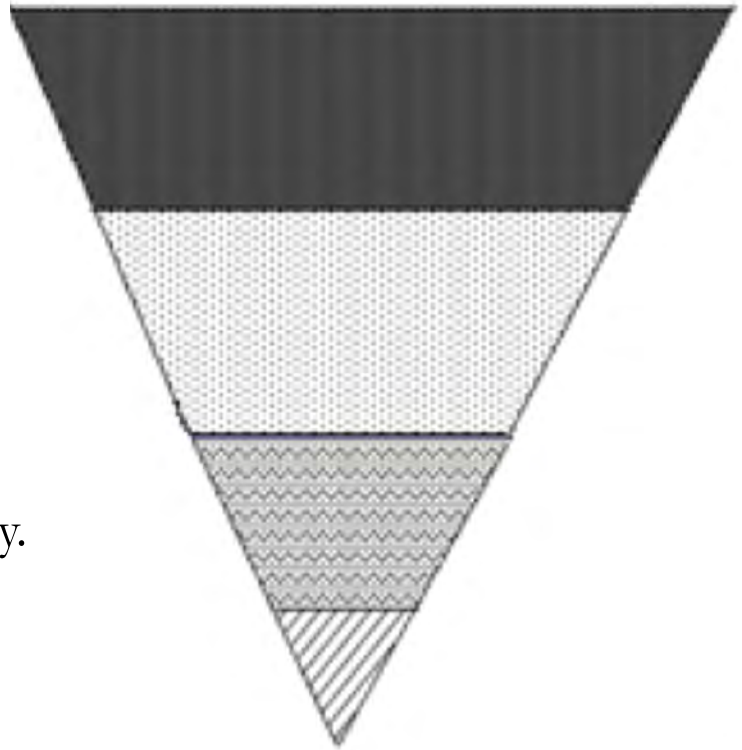
Teachers' Activities to Improve Instruction

Find or write curriculum. Try to align it with standards (local, state, national). Develop local frameworks and articulation across grades.

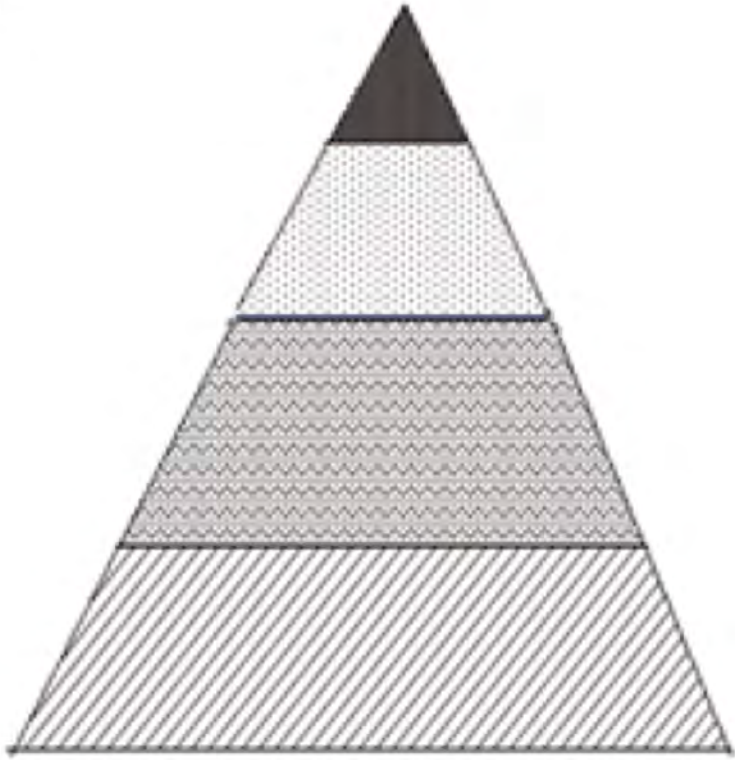
Plan lessons individually.

Plan lessons collaboratively.

Watch and discuss each other's classroom lessons.



U.S.



JAPAN

Interaction of Factors Affecting a Teacher's Instructional Decisions

Beliefs and Mathematical Knowledge for Teaching

Social interactions and professional networks

Policies and "sense-making" of them

Curriculum resources and use of them

Vertical Lesson Study

Valley Elementary: Kinder, 1st, 3rd, & 4th Grades

Elba

Veronica

Danielle

Artemisa

Maribel

Andrea

Video

Getting Started: Overarching Goal

As our students grow and develop as learners in our world, what do we want them to realize about mathematics?

Valley's Goal:

We want our students . . .

- To understand that math is a way to make sense of the world,
- To be curious about the math that is everywhere in their lives,
- To know they can solve any math problem by thinking critically, being resourceful, and persisting.

Valley's Vertical Lesson Study Wonderings

How does students' strategic thinking about whole number operations progress across the grades?

How do our questions affect students' strategic thinking? Are the most effective questions the same for each grade or do they vary?

How does the depth of student mathematical thinking vary across the grades?

Getting Started: Research Question

Based on evidence of student need . . .

How does _____ affect _____?

What are the _____ that will allow students to _____?

<u>Valley's Math Problem Solving Research Question:</u>

What are the key questions and timing of the questions that will allow students to be curious, to make sense of the problem, to persevere, and go beyond?

Are these questions and timing consistent across the grades or do they vary?

Lesson Study Overarching Goal:

We want our students to be curious about math in their world and inspired to make sense of it.

Lesson Study Research Question:

How do our instructional decisions affect curiosity?

- visuals
- questions
- choice
- timing
- grouping
- amount and timing of scaffolding

We are intrigued by:

Differentiation with Dignity

What does curiosity look like with the La Croix task?

- Asking questions
- Making connections
- Risk taking
- Engagement
- Sharing ideas
- Wondering
- Ownership
- Choosing to be involved
- Extending the task themselves
- Not wanting to stop
- Eager
- Playful

Choosing the Task

What do you notice?

What do you wonder?

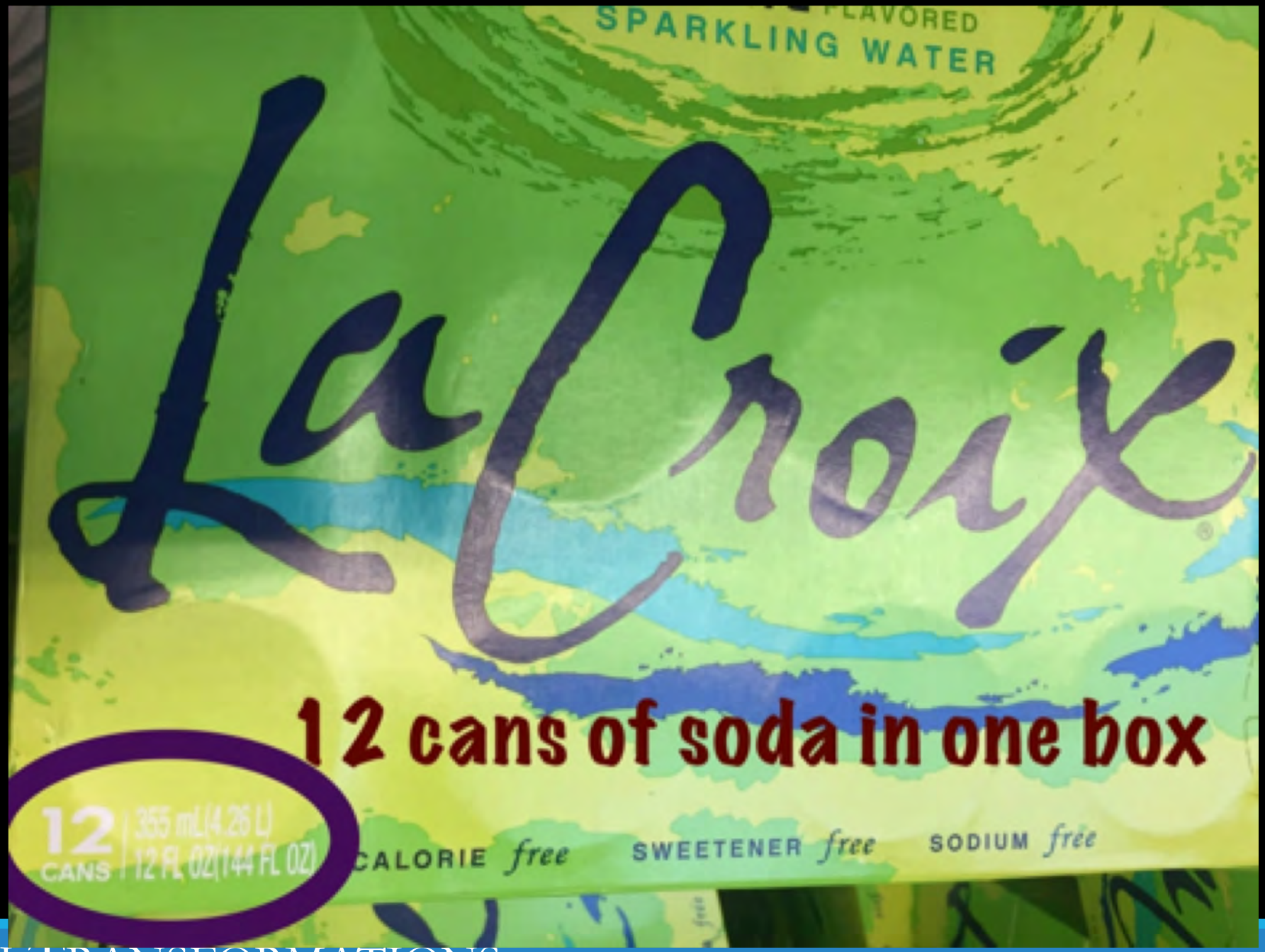
What might the math problems be?

Task Source: Kristen's Blog - Mind of an April Fool

The Math Problem

Mr. Jones is stacking boxes of soda. He created a display out of the boxes. He wonders how many cans are in the display. Please help him figure it out.

What questions do you have?


SPARKLING WATER
La Croix
12 cans of soda in one box
12 CANS
CALORIE free
SWEETENER free
SODIUM free

Challenge

Now that you know how many boxes and cans are in this display . . .

If you kept building the display upward, how many boxes and cans would be in a display that is 10 boxes tall? 20 boxes tall? 100 boxes tall? Any number of boxes tall?

What tools might you use to organize your work?

Lesson Study Template

How might you design a problem solving lesson with this task at the center?

Lesson Study

Part I: Introduction

Lesson Topic:

Lesson Study Overarching Goal:

Lesson Study Research Question:

What are some of the instructional strategies you are interested in exploring?

Relevant Standards:

What will a successful student be able to do as a result of this lesson.

Part II Research:

What will you do to learn more about the strategies you are interested in? What resources will you use? Who will you talk to?

Part III: Situating the Lesson:

What unit is this lesson part of? Where does it fall within the unit?

What prior knowledge do students have?

Part IV: Lesson Plan

Student Learning Goal:			
Timing	**Lesson Parts**	**Activity Description**	**Teaching Roles**
	Launch		
	Explore		
	Summary		
What evidence of student learning will we look for?			
Differentiation:			

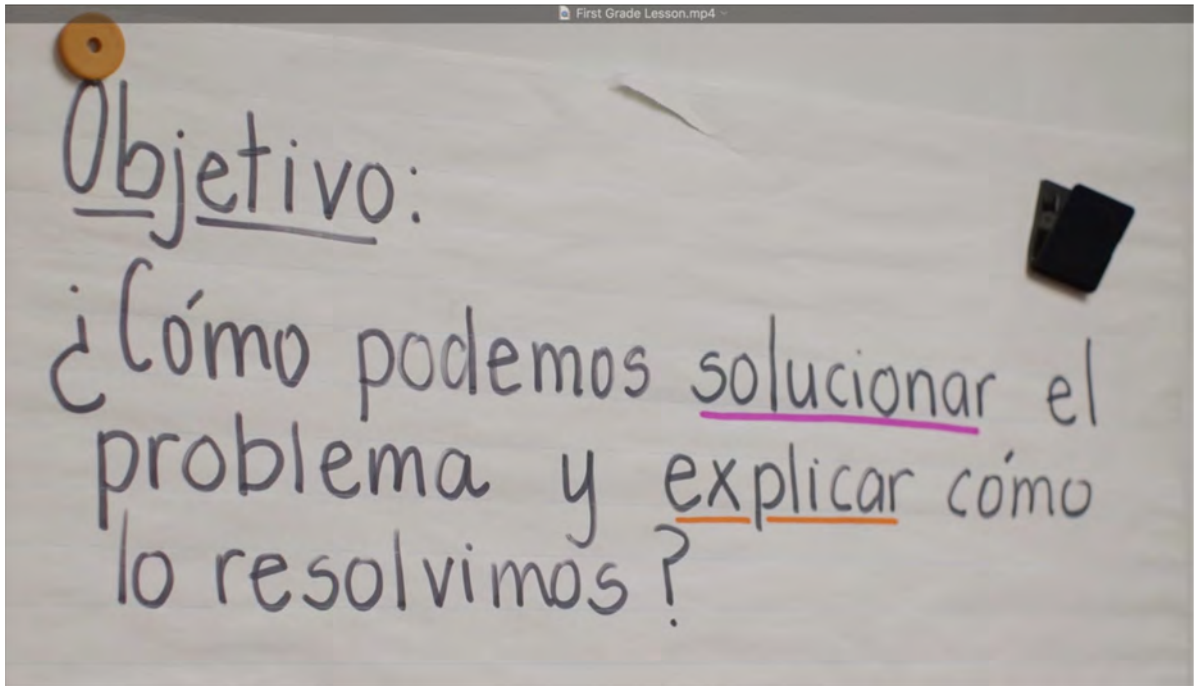
Part V: Reflections

Planning the Research Lesson

What do you notice about their collaboration?


Video

First Grade Implementation

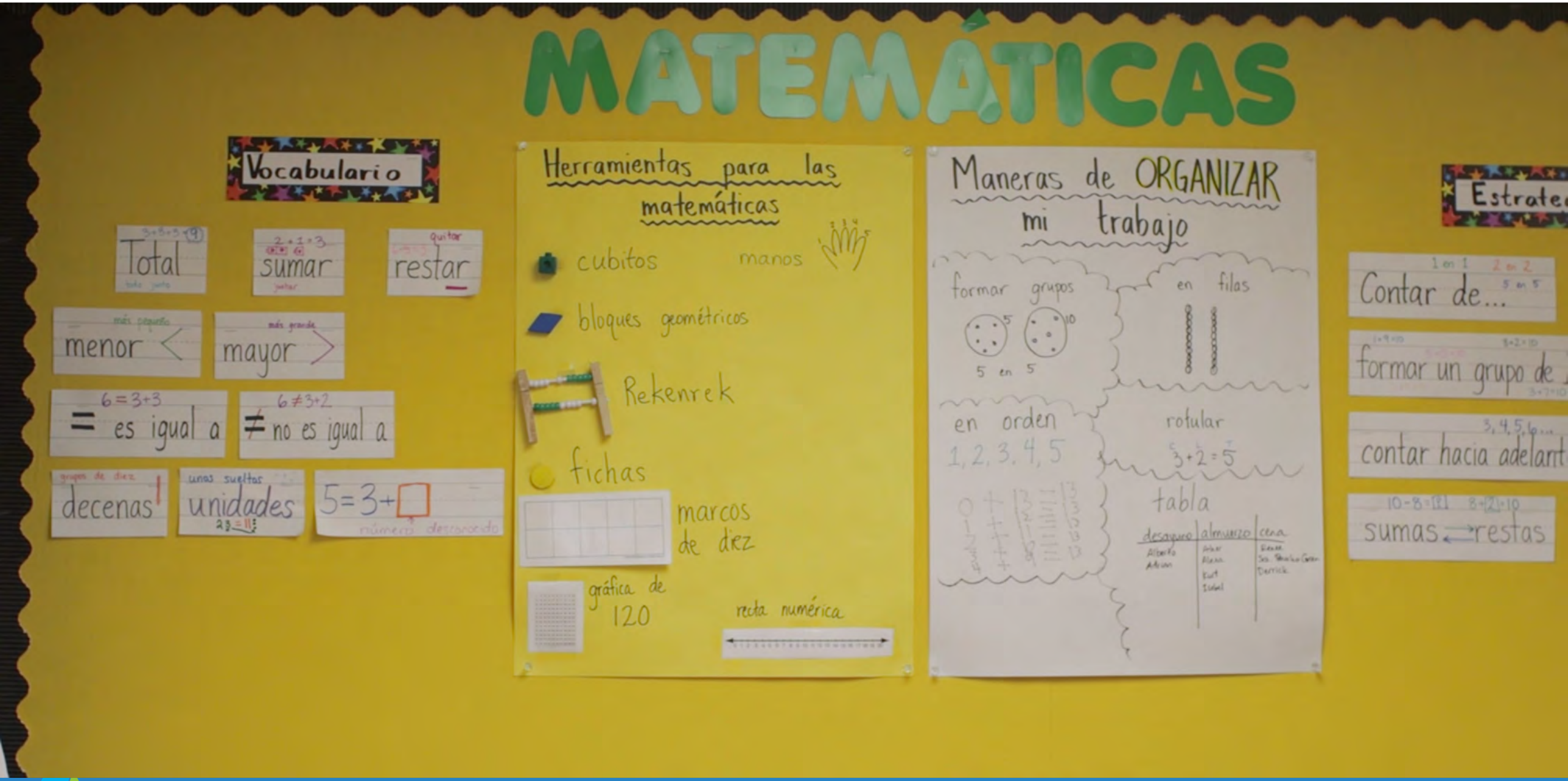


How can we solve the problem and explain how we solved it?


¿Qué ves?
Aa Bb Cc CH ch Dd Ee
Pregunta:
¿Cuántas cajas hay apiladas?
¿Cómo lo sabes?
Objetivo
¿Cómo podemos solucionar el problema y explicar cómo
la bandera
las formas
círculo
rectángulo

What do you notice? What do you wonder?

Photo removed to protect student privacy.


MATEMÁTICAS
Vocabulario
Total
sumar
restar
menor
mayor
es igual a
no es igual a
decenas
unidades
Herramientas para las matemáticas
cubitos
manos
bloques geométricos
Rekenrek
fichas
marcos de diez
gráfica de 120
recta numérica
Maneras de ORGANIZAR mi trabajo
formar grupos
en filas
en orden
rotular
tabla
desayuno
almuerzo
cena
Contar de...
formar un grupo de
contar hacia adelant
sumas
restas

How are you solving the problem?
How is that helping you solve the problem?

Photo removed to protect student privacy.

What is the problem you are solving?
How is that helping you solve the problem?

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What do these numbers mean?

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How did they solve the problem?

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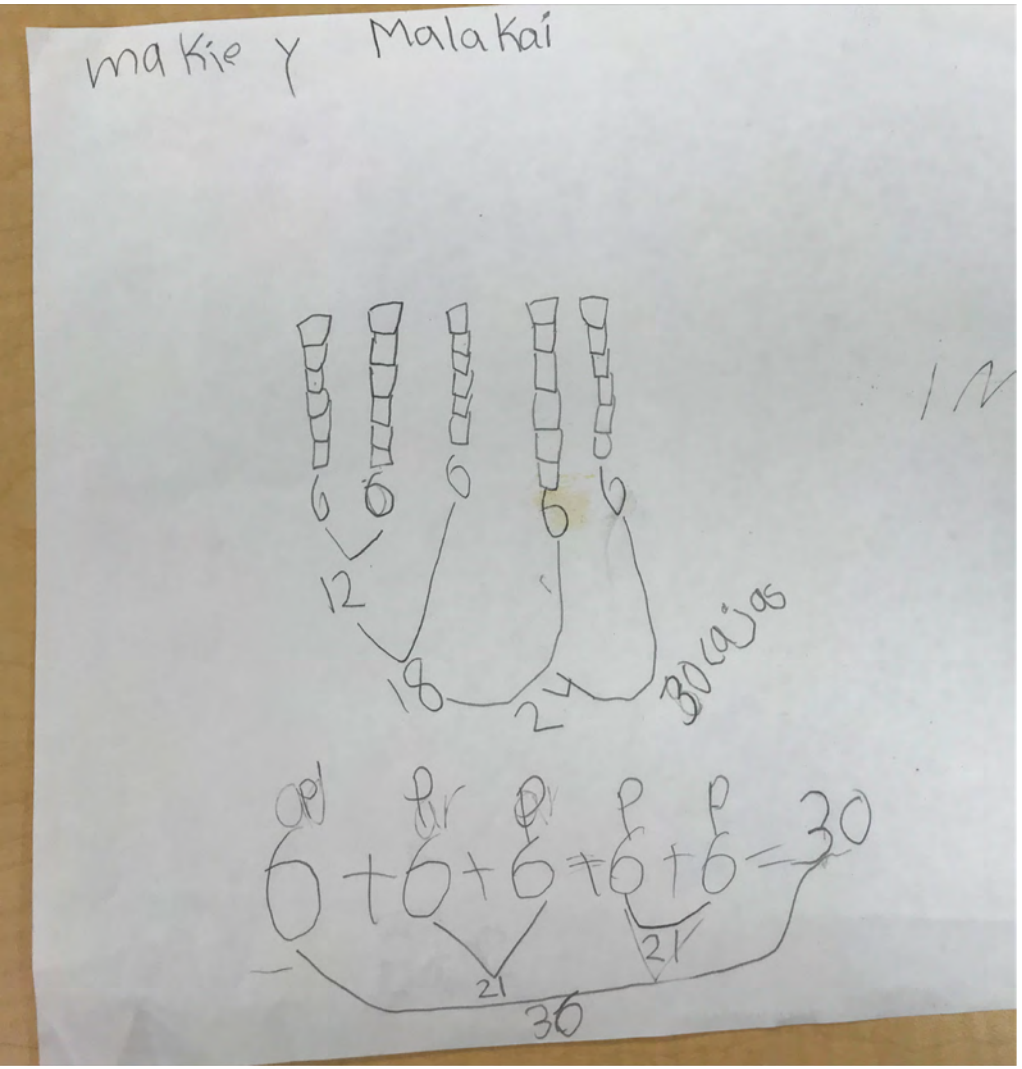
makie y Malakai



Estrategias .formar grupos Carlos y Maya
.Cubitos

Usamos los cubitos para resolver este Proplema.con grupos grupos de 6.

6+6=12

12+6=18

18+6=24

24+6=30

Treinta cajas de soda es la respuesta.

First Grade Analyze Data, Reflect and Revise

What do you notice about how they process the lesson?


Video

Fourth Grade Implementation

Research Question: What are the key questions and timing of them that will allow students to be curious, to make sense of the problem, to persevere, and go beyond?

Photo removed to protect student privacy.

What changes do you notice from the first lesson? How is student learning affected?


Stacking Sodas
Video
MARCH
Calendar Kalendario
Objetivo:
How will you solve the math problem and show your thinking?

Processing

Research Question: What are the key questions and timing of them that will allow students to be curious, to make sense of the problem, to persevere, and go beyond?

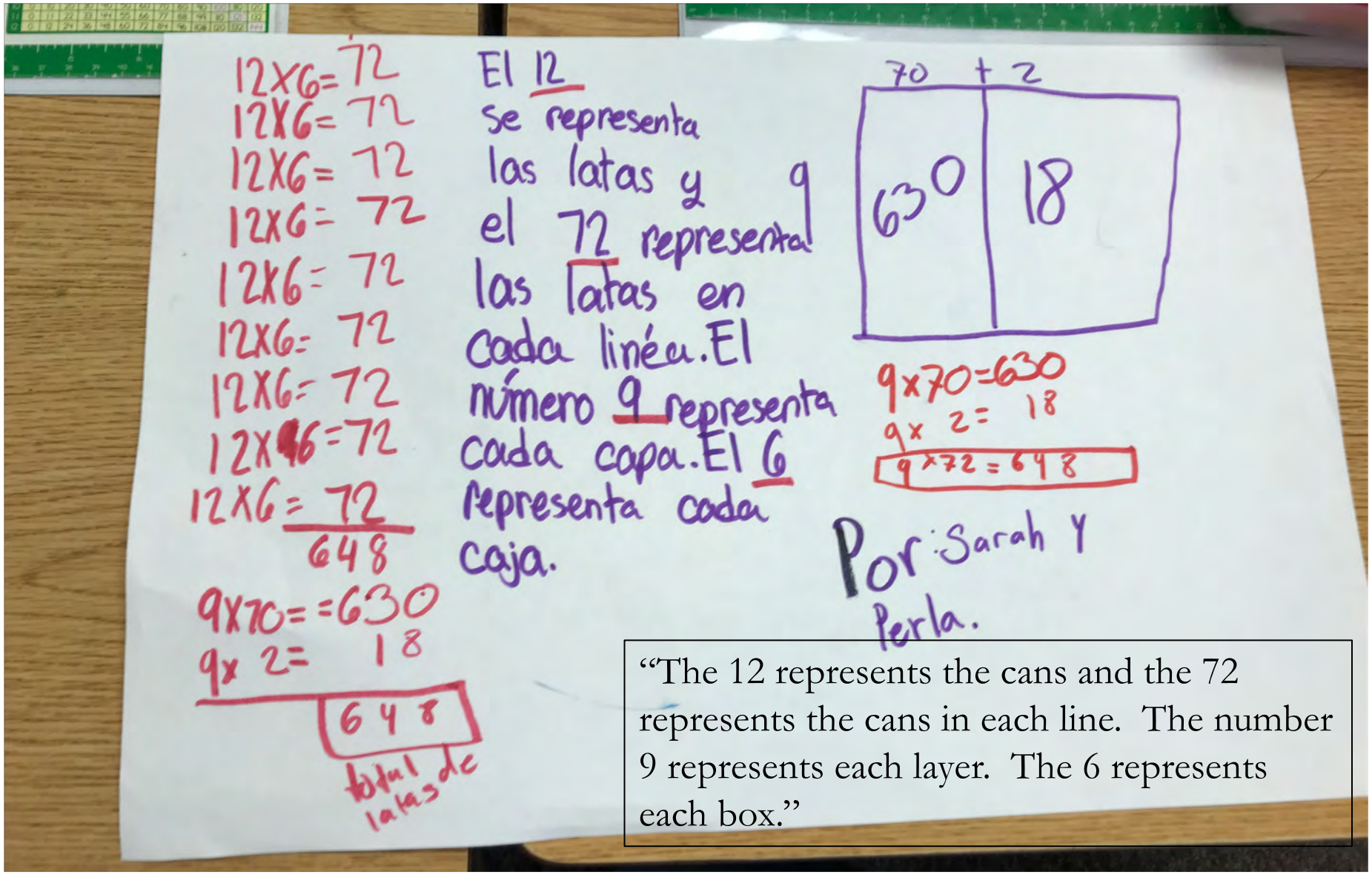
What did you notice?

Students who typically struggle had access.

A Key Goal

We want our students:

To know they can solve any math problem by thinking critically, being resourceful, and persisting.



"The 12 represents the cans and the 72 represents the cans in each line. The number 9 represents each layer. The 6 represents each box."

9 Boxes (at the moment)

Key Information:
12 cans per box.

How many cans?

We know that there are five boxes in each row.

We can multiply nine times five, which gets us forty-five.

We know that there are nine boxes in the middle because in the first pictures they stack one row and one box in the middle.

Then, we add nine to the forty-five, which lets us finish with fifty-four. Finally, we multiply 54 times 12.

×	50	+4
10	500	40
+2	100	8

500
+100
600
+ 40
640
+ 8
648

648 cans in total!

By: Sofia and Emma

Fourth Grade Analyze Data, Reflect, Revise


Video

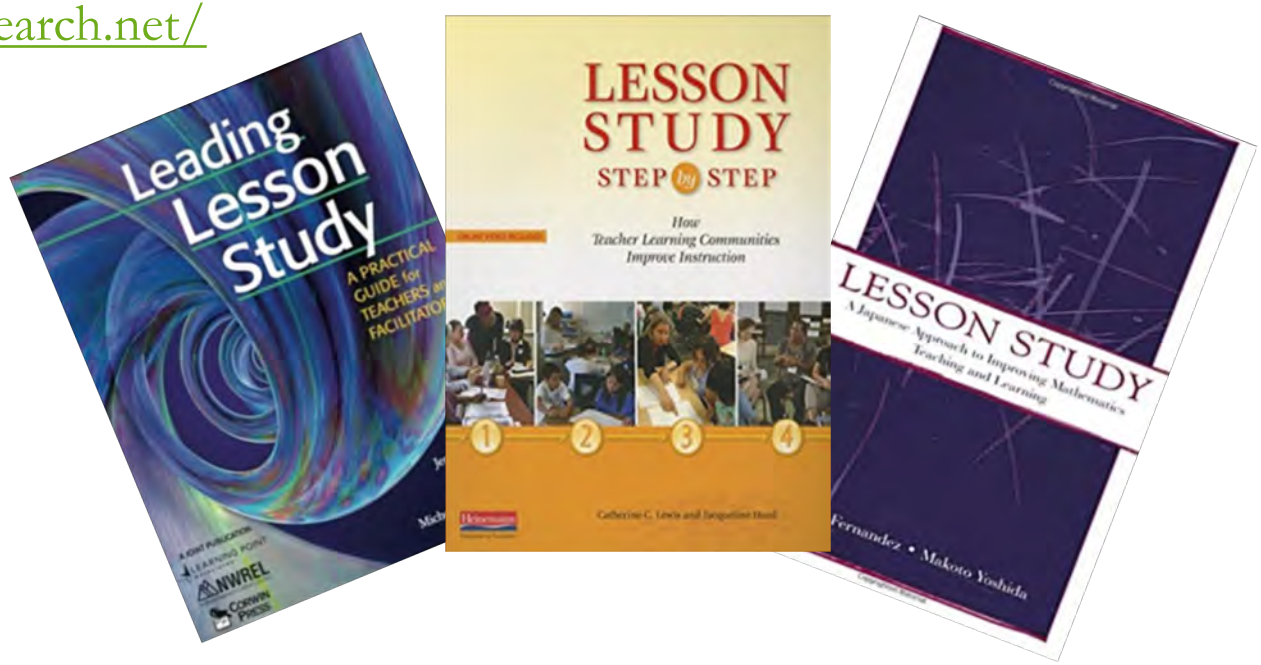
"This whole experience has brought back a sense of control, ownership, creativity, and trust in our ability as teachers to discover what works when teaching our students. It brings back a level of professionalism to our careers that had been stripped away by such an intense focus on testing, curriculum pacing, and evaluative feedback."

Artemisa Perucho
1st Grade Teacher
San Diego, CA

Key Resources

Lesson Study at Mills College

http://www.lessonresearch.net/



Lesson Study Template
Uploaded to NCTM

Lesson Study

PART I: INTRODUCTION

Lesson Topic:

Lesson Study Overarching Goal:

Lesson Study Research Question:

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Relevant Standards:

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Differentiation:			

Part V: Reflections

Questions?

Share Your Feedback

We strive to continually improve our educational programming. Please take a moment to evaluate this session by following the instructions below:

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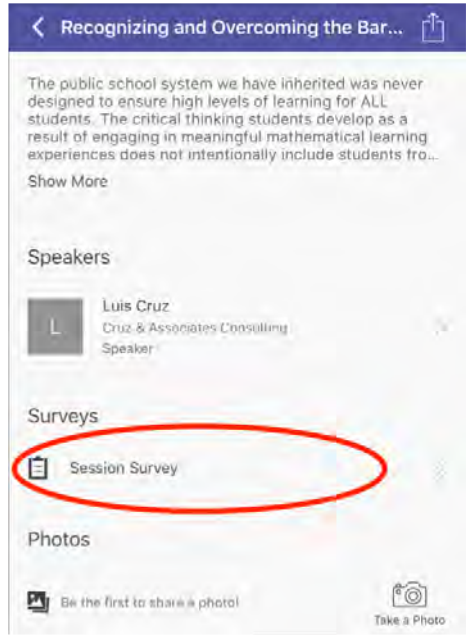
On the session page, scroll down to the "Surveys" section and click on "Session Survey" to begin



Thank you for sharing your feedback with us!

Math Transformations