Leading High Quality Math Lesson Study: What, Why, & How

NCTM Session 212

Thursday, April 26
3:15 PM - 4:30 PM

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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.
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
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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 ________?

Valley’s Math Problem Solving Research Question:

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?
Choosing the Task
What do you notice?

What do you wonder?

What might the math problems be?
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?
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**

<p>| Student Learning Goal: |
|---|---|</p>
<table>
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What evidence of student learning will we look for?

Differentiation:

**Part V: Reflections**
Planning the Research Lesson

What do you notice about their collaboration?
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First Grade Implementation

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

Objetivo: ¿Cómo podemos solucionar el problema y explicar cómo lo resolvimos?
¿Qué ves?
What do you notice? What do you wonder?
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Herramientas para las matemáticas

- cubitos
- manos
- bloques geométricos
- Rekenrek
- fichas
- marcos de diez
- gráfica de 120
- regla numérica

Maneras de ORGANIZAR mi trabajo

- formar grupos
- en filas
- en orden
- rotular
- tabla
- sumas/restas

1 en 1, 2 en 2, 5 en 5
Contar de...
- formar un grupo de
- contar hacia adelante
- 1, 2, 3, 4, 5
- 5, 7, 2
- sumas, restas
How are you solving the problem?
How is that helping you solve the problem?
What is the problem you are solving?  
How is that helping you solve the problem?

Image Removed to Protect Student Confidentiality
What do these numbers mean?
How did they solve the problem?

Image Removed to Protect Student Confidentiality
Estrategias: Formar grupos (Carlos y Maya)

Usamos los cubitos para resolver este problema con conjuntos de 6.

\[
\begin{align*}
6 + 6 &= 12 \\
12 + 6 &= 18 \\
18 + 6 &= 24 \\
24 + 6 &= 30
\end{align*}
\]

Treinta cajas de soda es la respuesta.
First Grade Analyze Data, Reflect and Revise

What do you notice about how they process the lesson?
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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?

As you watch . . .

What do you observe that can help us answer our research question?

What changes do you notice from the first lesson? How is student learning affected?
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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 observe that can help us answer our research question?
- What changes did you notice from the first lesson? How was student learning affected?
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.
We think that there is 648 cans in all of those boxes.

We counted 9 boxes in 1 row and 5 around. We multiplied those and that was 45. We added the boxes in the middle and we have 54 in total. There is 12 cans in each box so when we multiply 541 x 12 that made 648.

9 x 5 = 45
9 + 5 = 54

Boxes in a row

4
5

Boxes in middle

50 x 10 = 500

50 x 2 = 100
4 x 10 = 40
4 x 2 = 8

500 + 100 + 40 + 8 = 648

Mikki & Seonna
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 picture 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.

\[
\begin{array}{c|c|c}
10 & 500 & 40 \\
2 & 100 & 8 \\
\hline
\end{array}
\]

500 + 100 = 600

600 + 90 = 690

690 + 80 = 770

670 + 8 = 678

648 cans in total!

By: Sofia and Emma
First, we multiplied 976; 6 boxes in each row and 12 boxes in each layer, coming up with 574. Then, we knew that since there are 12 cans in each box, 574 x 12 must be 6484. So, the answer is 6484 cans in the whole display.

By Scott J, Andrew J 08
6 boxes per layer and 10 layers and 12 cans per box and
6 boxes × 12 = 72 so 72 × 10 = 720 cans per layer

70 × 10 = 700
2 × 10 = 20

720 cans total

6 boxes per layer and 20 layers and 12 cans per box and
6 boxes × 12 = 72 so 72 × 20 = 1,440 cans per layer
70 × 20 = 1,400
total 72 × 20 = 40

1,440

see back for more amazing math →

Teagan & Kendall
Fourth Grade Analyze Data, Reflect, Revise
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“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

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Differentiation:

**PART V: REFLECTIONS**
Questions?
Thank you!

Andrea Barraugh
Math Transformations
mathtransformations.com