

The Lesson Study Group
at Mills College

Lesson Study:

Can We Imagine a New “Business as Usual” for Teacher Learning?

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IES SIGnetwork

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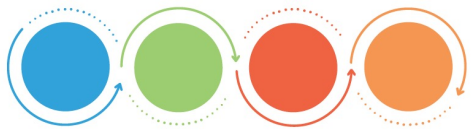
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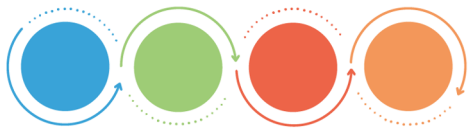
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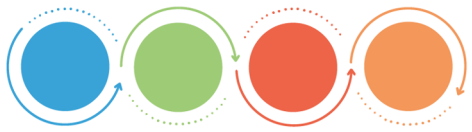


How I became interested in Lesson Study....



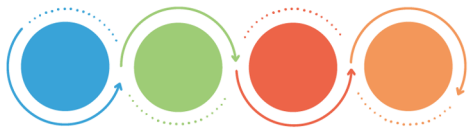
Topics for Today

- The Lesson Study Cycle
- When/why Lesson Study is effective
- Potential growth areas for Lesson Study
- Resources and caveats

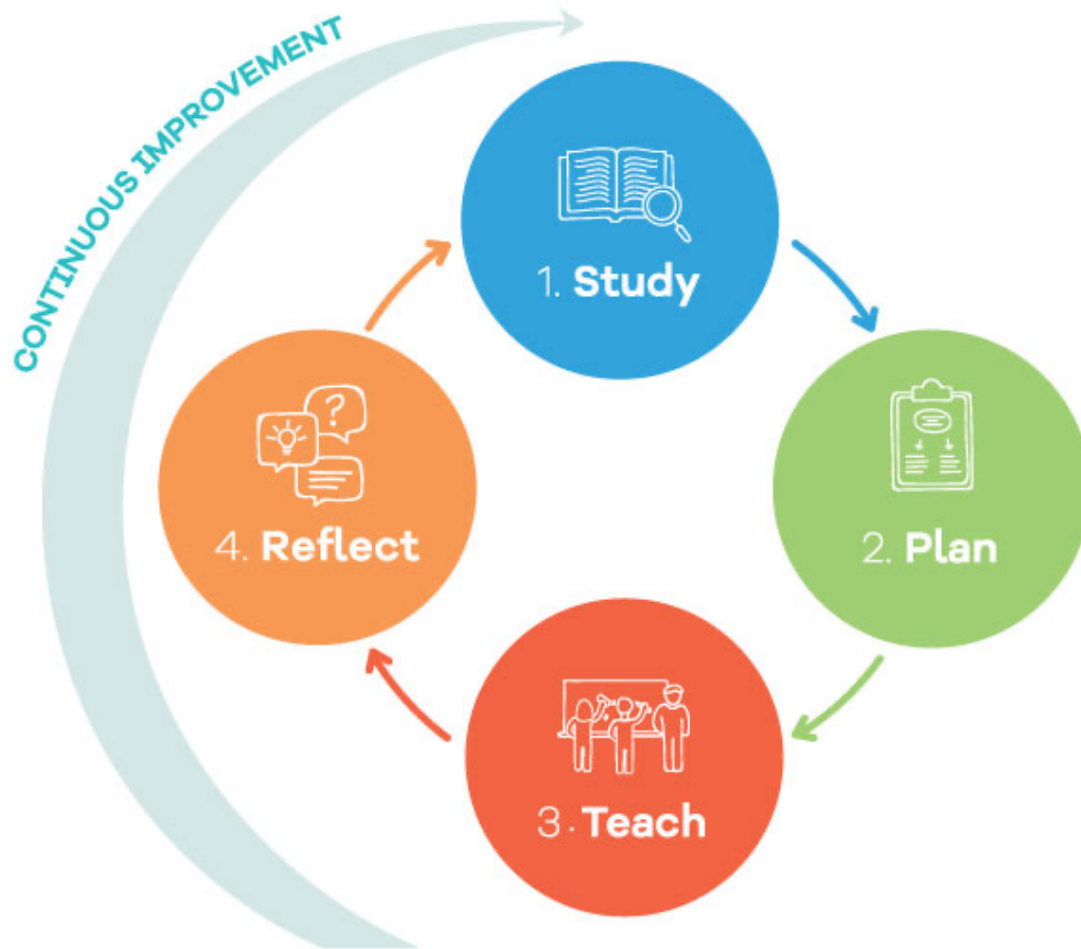


Call to mind a time when you experienced great professional growth

- What sparked your growth?
- Jot down a few ideas about what sparked your growth—share 1-2 ideas in chat if you wish

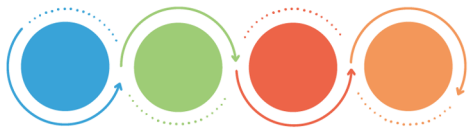


Lesson Study

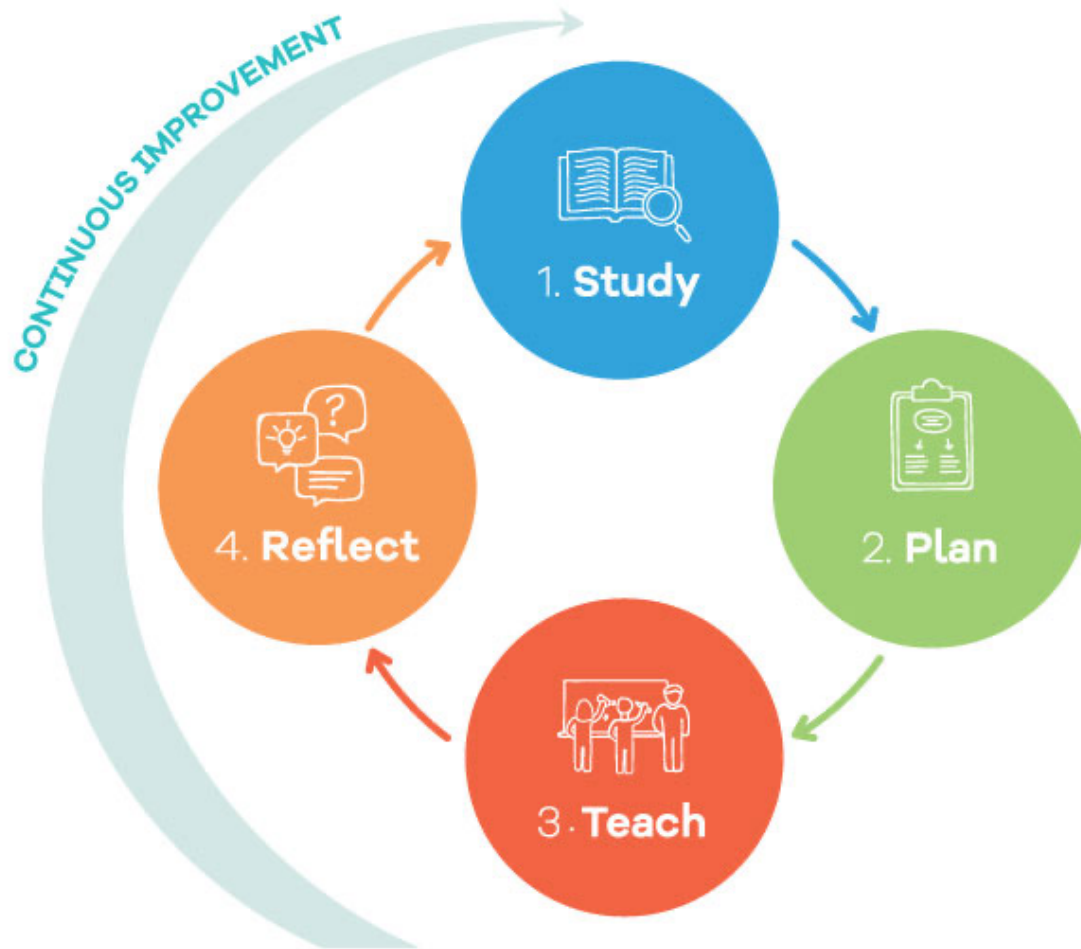


A collaborative inquiry cycle
with a live “research lesson”

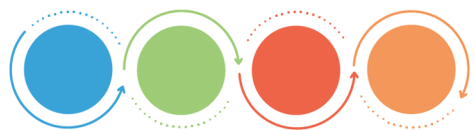
Team of 3-6 educators



Lesson Study: Study Phase



- Consider your long-term hopes for your students
- Choose a content focus for the cycle
- Study what's known about teaching and learning related to your content focus

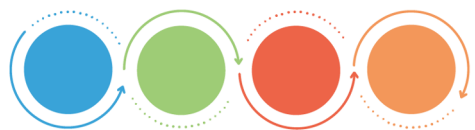


STUDY Phase: Choosing a Lesson Study Theme

Think about the students you serve.

Your Ideals:

What qualities would you like these students to have 5-10 years from now?

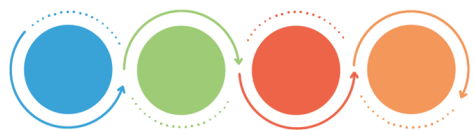


Choosing a Lesson Study Theme

Think about the students you serve.

The Actual:

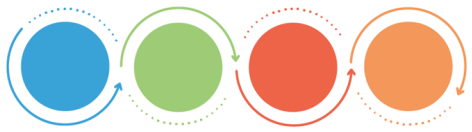
List their qualities now.



Choosing a Lesson Study Theme

What is an opportunity for growth from the actual to the ideal that you would really like to work on as an educator?

The research theme positively expresses the ideal student qualities you hope to build



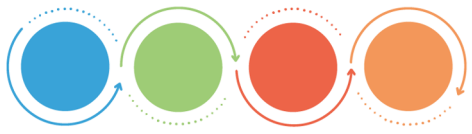
Research Theme Examples

“...social emotional skills and...a deeper understanding of mathematics.” (Edna Brewer Middle School, Oakland USD)

“...student perseverance...” (South Shore K-8 School, Chicago Public Schools)

“For students to value friendship, develop their own perspectives and ways of thinking, and enjoy science.”
(Komae School # 7, Japan)

“For students to have strong basic academic skills and a rich sense of human rights.” (Osaka School # 2, Japan)



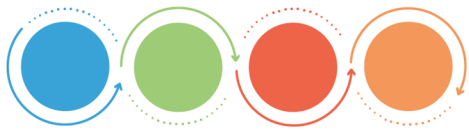
Build Theory of Action Around Research Theme, Identify Strategies to Study and Try

Muir Research Theme :

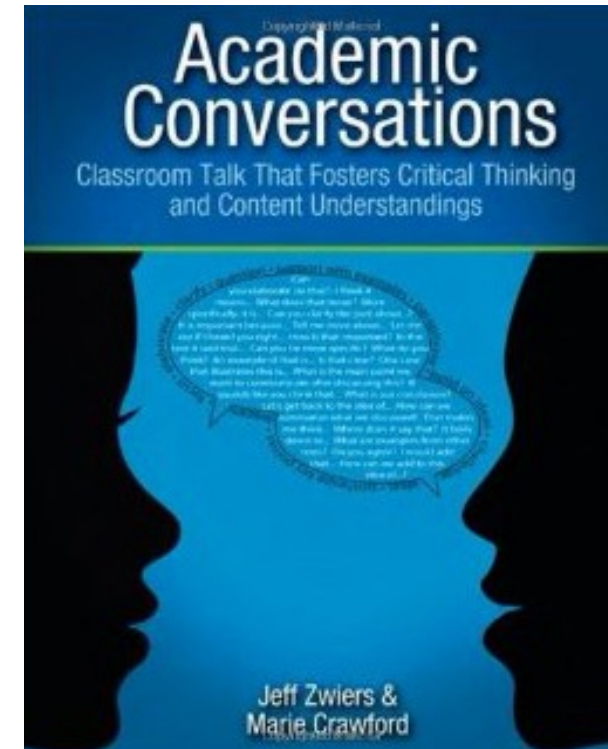
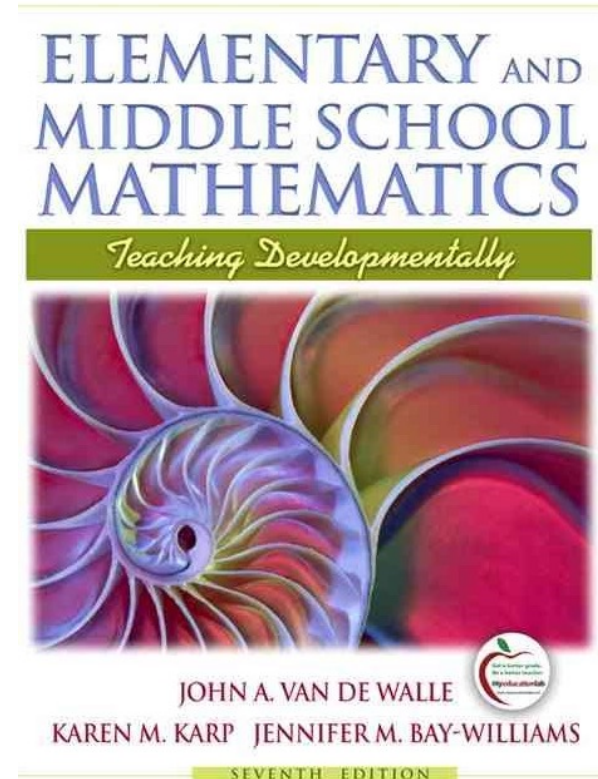
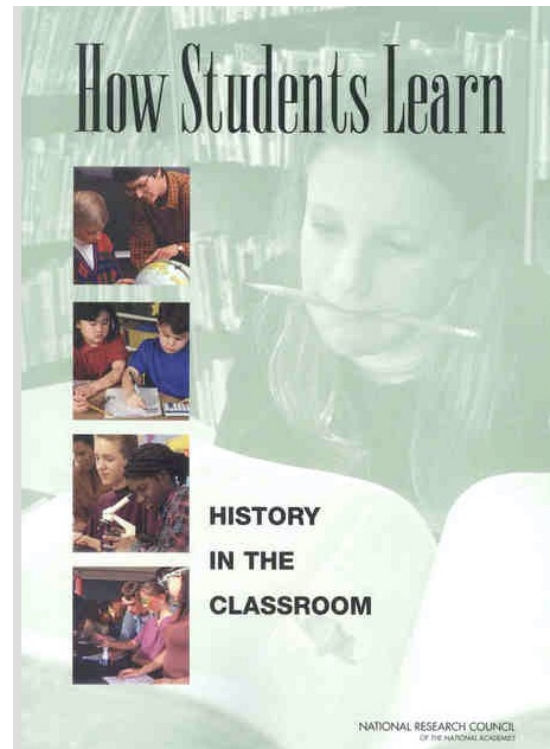
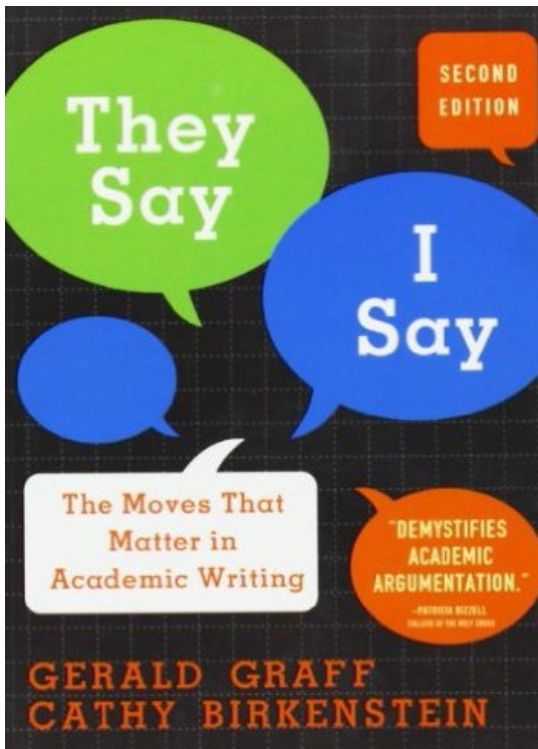
Students will use evidence to **construct**
viable arguments so that they are
confident, independent learners.

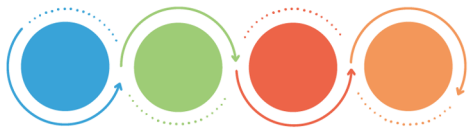
2018-2019 Focus Strategies

- ① Higher-order questioning
- ② Making thinking visible

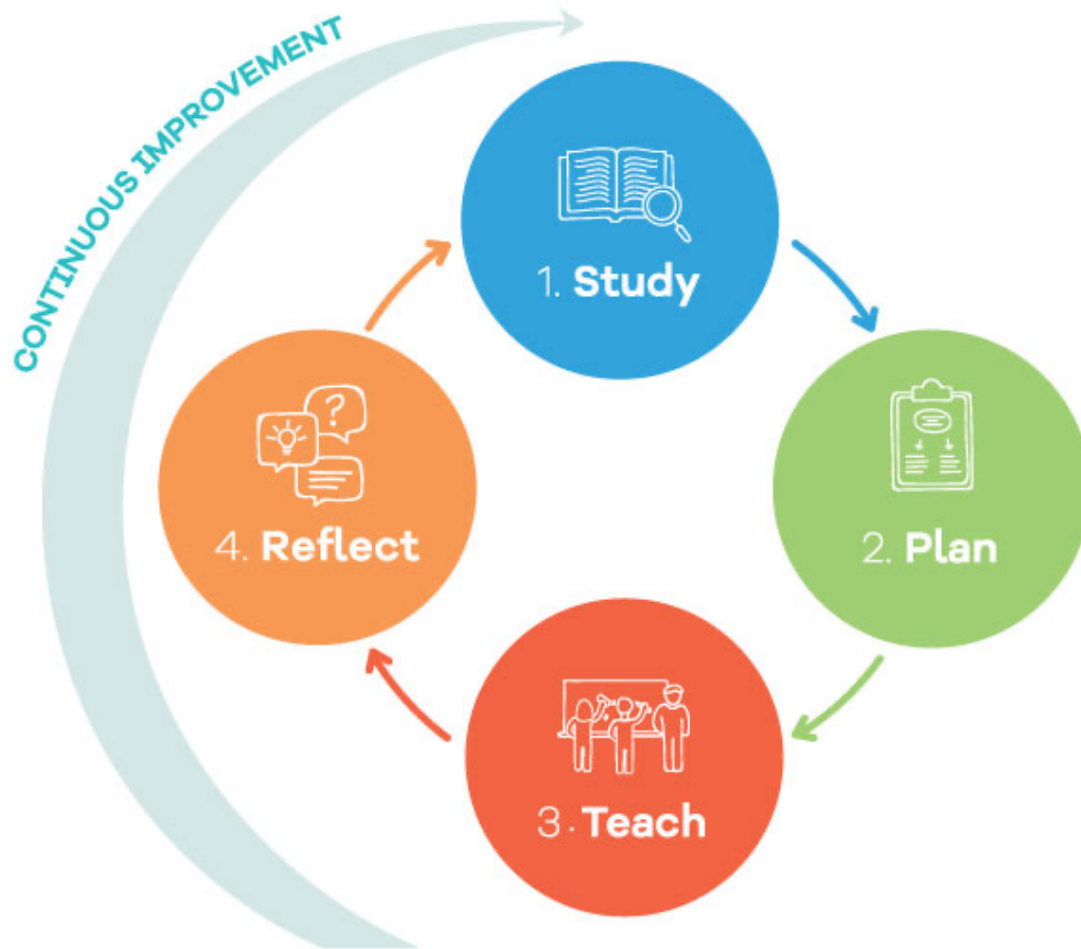


STUDY PHASE: Examples of Resources Teams Have Used (History, Math, Writing)

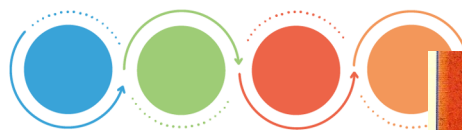




Lesson Study: Plan



- Study curriculum
- Examine the unit goals and flow
- Identify a key lesson to plan in depth, by anticipating student thinking
- Identify data to collect during lesson
- (Conduct a mock-up lesson)



LESSON

3

Estimate and Find Area

Learn

ROW BY ROW Mr. Jones is putting 1-square-foot tiles on the shower wall of his bathroom. Estimate the number of tiles he needs to cover the wall.

Think: How many squares in each row? about 6 squares
How many rows are needed? about 8 rows
 $6 \times 8 = 48$

So, Mr. Jones needs about 48 tiles to cover the area of the shower wall.

Area is the number of square units needed to cover a surface.

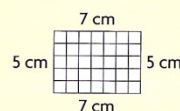
One Way You can count square units to find the area.

STEP 1

Using a centimeter ruler and grid paper, draw a rectangle 7 cm long and 5 cm wide.

STEP 2

Count the number of squares.



STEP 3

Record your answer in square units.

$A = 35 \text{ sq cm}$

Another Way You can also use a formula.

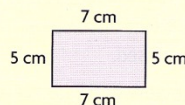
The formula for the area of a rectangle is
 $\text{Area} = \text{length} \times \text{width}$ or $A = l \times w$.
Use the formula to find the area.

$$A = l \times w$$

$$A = 7 \times 5$$

$$A = 35$$

So, the area is 35 sq cm.



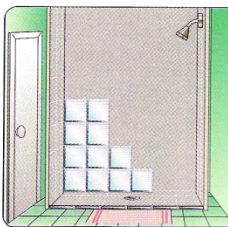
- Use the formula to find the area of a rectangle with a length of 8 cm and a width of 6 cm. **Multiply 8 cm by 6 cm to find the area, 48 sq cm.**

Quick Review

- 4×9
36
- 5×6
30
- 8×7
56
- 7×7
49
- 6×8 48

VOCABULARY

area



STUDY PHASE: Resource Example 2 Introductions to Rectangle Area Harcourt Math Teacher's Edition, grade 4

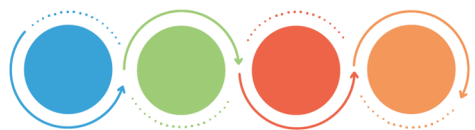
"You can count square units to find the area"

"You can also use a formula."

500



CALIFORNIA STANDARDS **MG 1.1** Measure the area of rectangular shapes by using appropriate units, such as square centimeter (cm^2), square meter (m^2), square kilometer (km^2), square inch (in^2), square yard (yd^2), square mile (mi^2); **MG 1.4** Understand and use formulas to solve problems involving perimeters and areas of rectangles and squares. Use those formulas to find the areas of more complex figures by dividing the figures into basic shapes. *also* **AF 1.0, AF 1.4, MG 1.0, MG 3.0, MR 1.2, MR 2.2, MR 3.2**



Introduction to Rectangle Area

Tokyo Shoseki Grade 3

“Let’s think of a way to compare and express the size of these shapes”

10

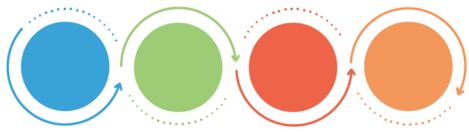
Area

Class newsletters posted on the bulletin board.

Which class newsletter is bigger?

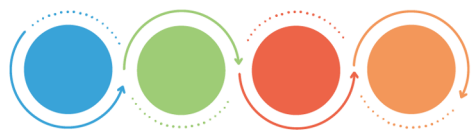
What if we put drawing papers on top of each newsletter.

Let’s think about a way to compare and express the size of these shapes.



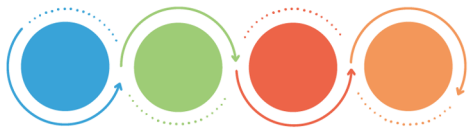
Percent of Sentences in Teacher's Edition on Selected Topics (Chapters on Area of Polygons)

	Japan	US
Reason for Pedagogical Choices	10%	0
Anticipation of Varied Student Thinking	28%	1%
Single Correct Student Answer	3%	13%

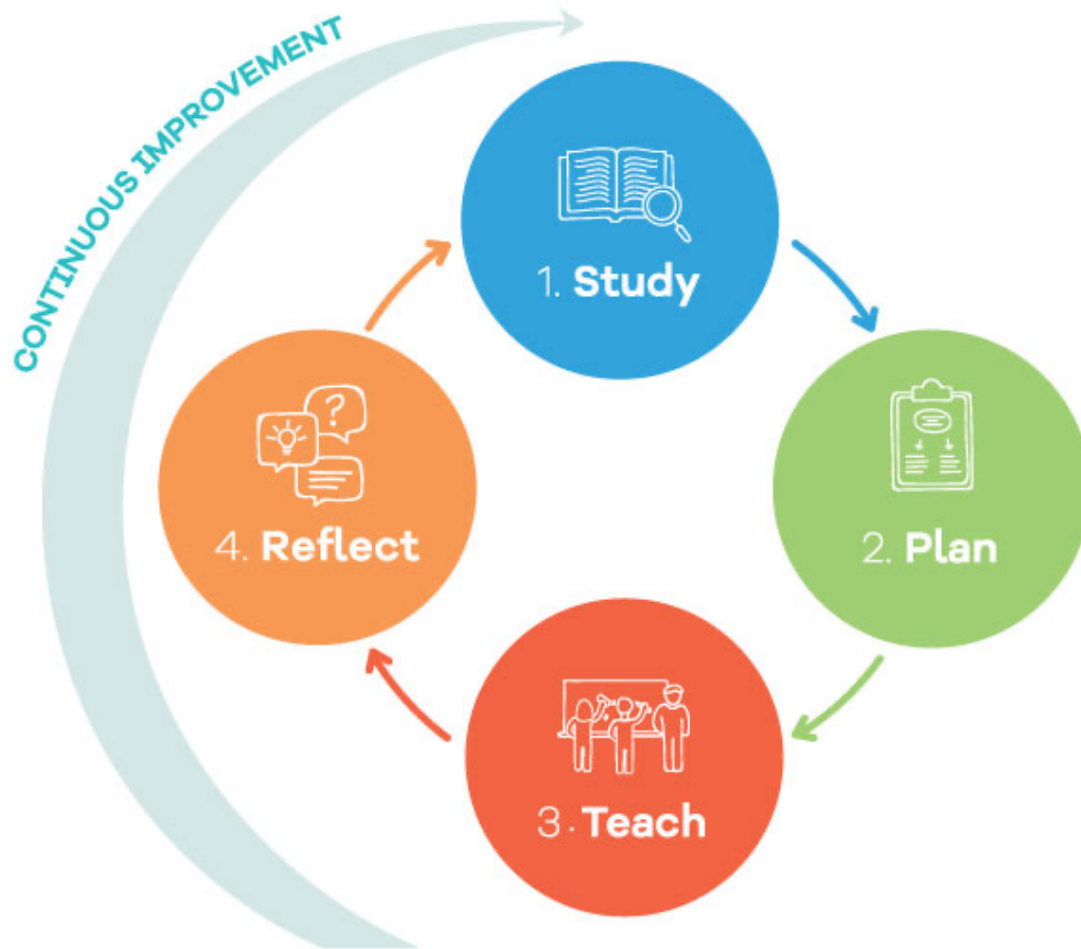


“PLAN” Phase—Teachers Try Task, Anticipate Student Thinking





Lesson Study Phase: Teach



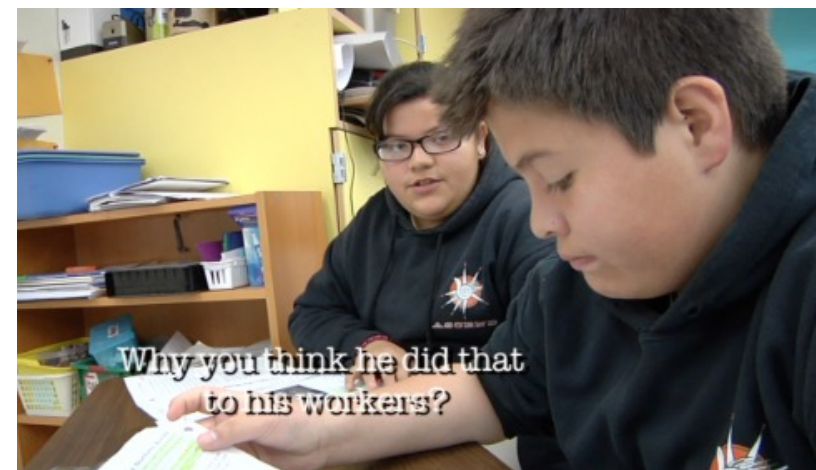
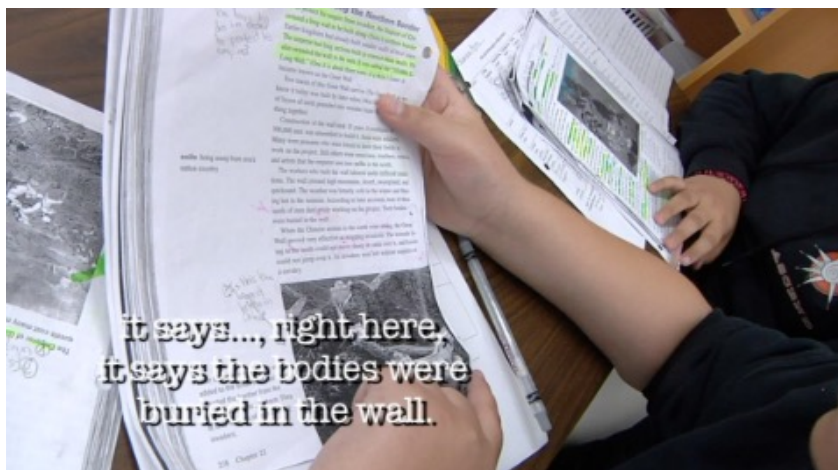
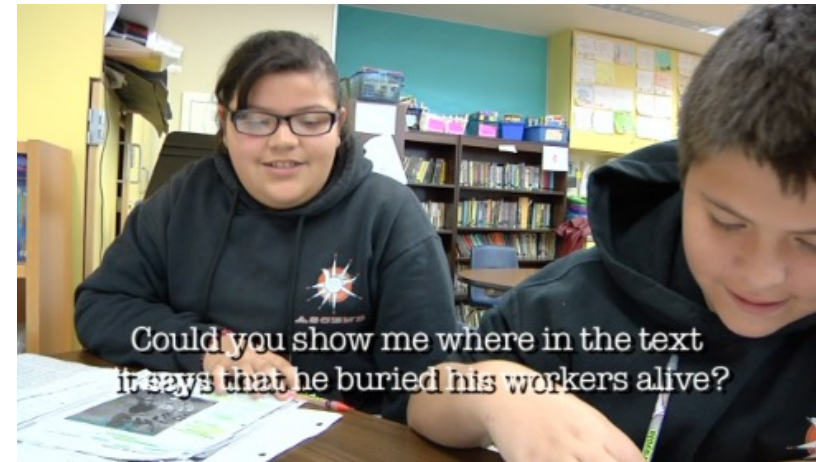
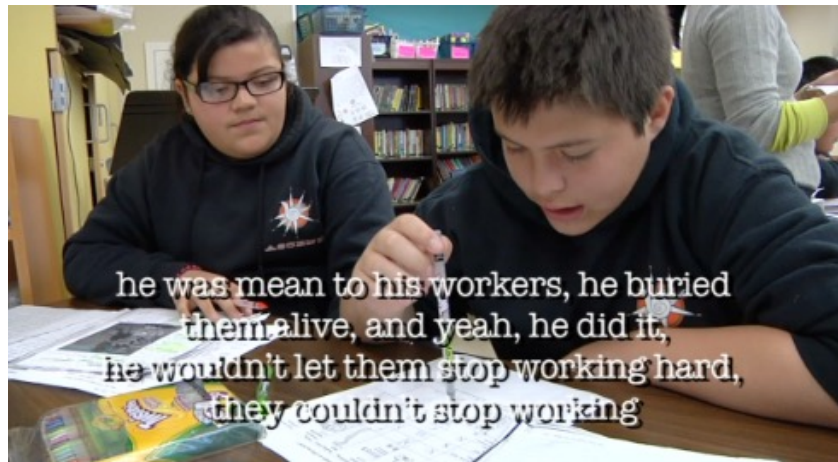
- One team member teaches “research lesson” to students
- Other team members observe and collect data on individual students’ learning
- Sometimes select focal students, interview them during “study” phase and after teach phase

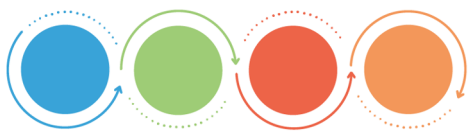
“TEACH” Phase: See Impact of Lesson Elements

History Question: Was Qin Shi Huang an Effective Ruler?

Lesson Study Focus: Elaboration, Citing Evidence, and Writing

Citing Evidence in Text:

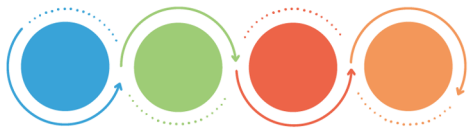




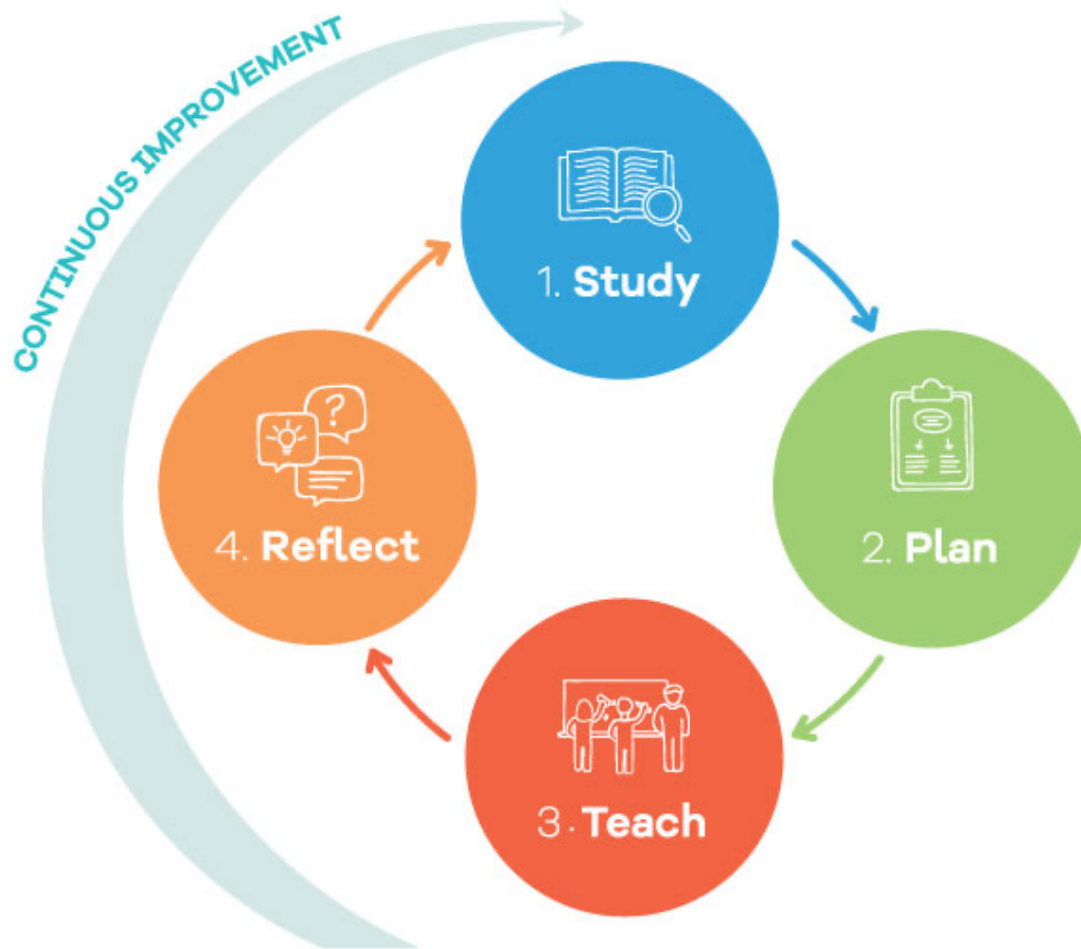
“TEACH” Phase: See Lesson Through Students’ Eyes

We were interested in how our students would react to such a lesson. We felt that the population of students [in the video] was quite different than ours. We weren't sure if our students would be as flexible in their thinking; however, we were very pleasantly surprised!

-Teacher in fractions lesson study randomized trial

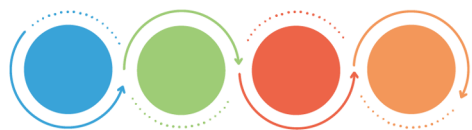


Lesson Study Phase: Reflect



REFLECT

- In post-lesson discussion, share data on student thinking
- Draw out implications for future instruction
- Hear from outside final commentator
- Summarize what you learned from cycle



Evidence of student learning in relation to the lesson/learning goals

- Students had more than 1 strategy
- Students seemed to ~~under~~ understand how to set-up the problem after seeing Abigail's & McKenzie's

Evidence of student learning or experience in relation to the research question and theory of action

- Students were asking "Where did you get stuck?" "What is your thinking?"
- Students were interested in their peers thinking

What are the most critical questions to discuss in the whole-group discussion?

How can we move the discussion from teacher to student to student to student?

How do we use their misconceptions to move students thinking?

K11

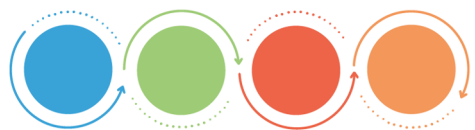
How do students see the reflection of moving their learning forward?

WHAT DID WE LEARN ABOUT OUR RESEARCH THEME?

- PERSEVERANCE FEELS LIKE THE CROX OF WHAT GETS IN STUDENTS' way?
- HOW TO GET STUDENTS ENGAGED IN THEIR OWN LEARNING
- OUR RESEARCH THEME IS A KEY QUESTION FOR US TO HOLD. WE HAVE A MINDSHIFT THAT WE HAVE TO HELP KIDS MAKE
- STUDENT OWNERSHIP IS A KEY WAY TO GET STUDENTS TO PERSEVERE
- WE NEED TO ADD ANOTHER Q FOR STUDENTS:
"IF I DON'T UNDERSTAND _____, WHAT CAN I TRY?"
"I DON'T UNDERSTAND _____, BUT IT MAKES ME THINK ABOUT... / IT REMINDS ME OF..."
- IN SOMEWAYS, OUR THEME FEELS DISCONNECTED FROM MATH LEARNING

WHAT DID WE LEARN ABOUT STUDENTS?

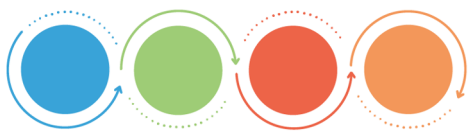
- KIDS NEED MANY, MANY OPPORTUNITIES TO PRACTICE
↳ AS A TEACHER, HOW DO YOU DECIDE WHEN "ENOUGH" STUDENTS GET IT THAT YOU CAN MOVE ON?
- WHEN WILL STUDENTS TRANSITION OFF ALG. TILES?
WHEN SHOULD WE PUSH AS TEACHERS?
- MOVING THE TILES AROUND BUILT UNDERSTANDING OF THE REPRESENTATIONS FOR KIDS
↳ OPPORTUNITY FOR FORM. ASST BASED ON HOW CONFIDENTLY THEY MOVE THE TILES
- STUDENTS WILL JUMP IN IF THERE'S SOMETHING ACTIVE (ALG TILES, DILATIONS)
- AS TEACHERS, WE MAKE SO MANY ASSUMPTIONS AS WHAT WE EXPECT STUDENTS ALREADY KNOW, OR HOW THEY UNDERSTAND TOPICS THEY DO "KNOW"
- HOW DO STUDENTS WHO STRUGGLE TO ARTICULATE THINKING IN WRITING REFLECT? HOW CAN WE GET ~~THE~~ REFLECTIONS FROM THEM THAT ARE ACTIONABLE?



“REFLECT” Phase: Teacher’s Final Reflection on Lesson Study Cycle

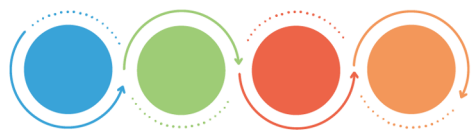
One of the things that stood out the most to me during this process was how well students did on meeting the objective without getting any kind of direct instruction. It makes me think that as a teacher I need to bridge what they already know and are able to figure out on their own to what I am teaching.

-Teacher in fractions lesson study randomized trial



“REFLECT” Phase: Final Commentator

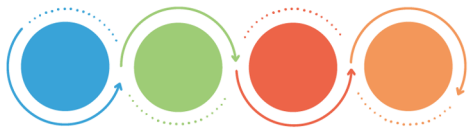
Final Commentator: [describes strengths of lesson including selection of task, mathematical progression of 3 solutions presented on board, etc.....]. “But according to my notes, the 3 student solutions presented on the board did not represent the issue 30% of the class struggled with, understanding area [and how it is used in volume]. How were these students feeling, when they struggled and did not see their struggle represented?”



A Teacher's Final Reflection on Cycle (cont'd)

As I watched the lesson unfold I saw how, with good intentions, we teachers stop the thinking of our students by providing too much scaffoldingI saw students working themselves from an incorrect answer to recognizing the answer was wrong, puzzling over how to correct it, only to have a teacher ask "yes-no" questions that stopped their problem solving and led [the students] to the correct answer. I recognize this trait in myself and have committed myself to allowing the students time to struggle and . . . an opportunity to learn from mistakes. This will impact all of my instruction, not just fraction work.

-Participant in fractions lesson study randomized trial

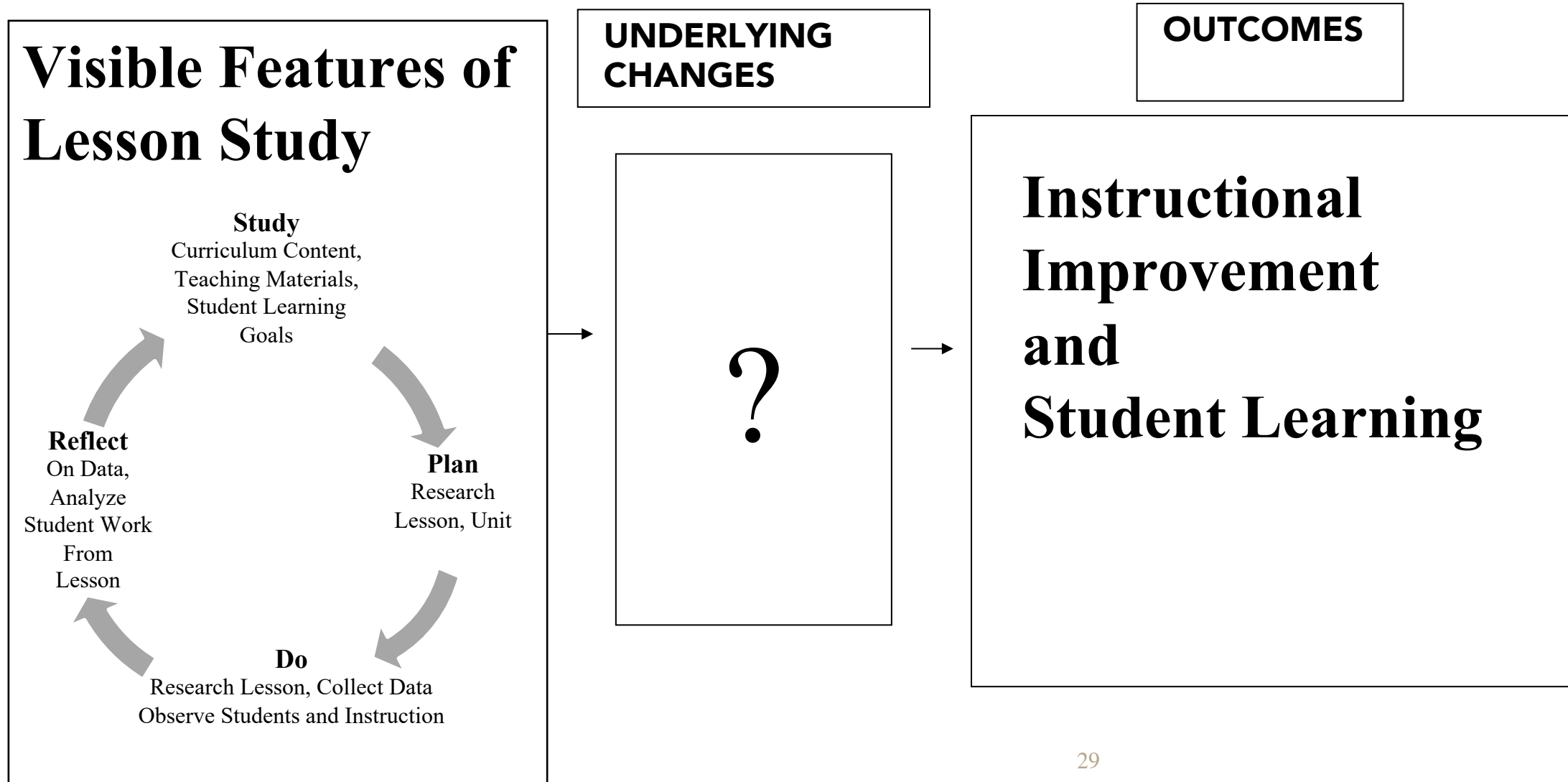


2014 Review of 643 Mathematics Professional Learning Studies

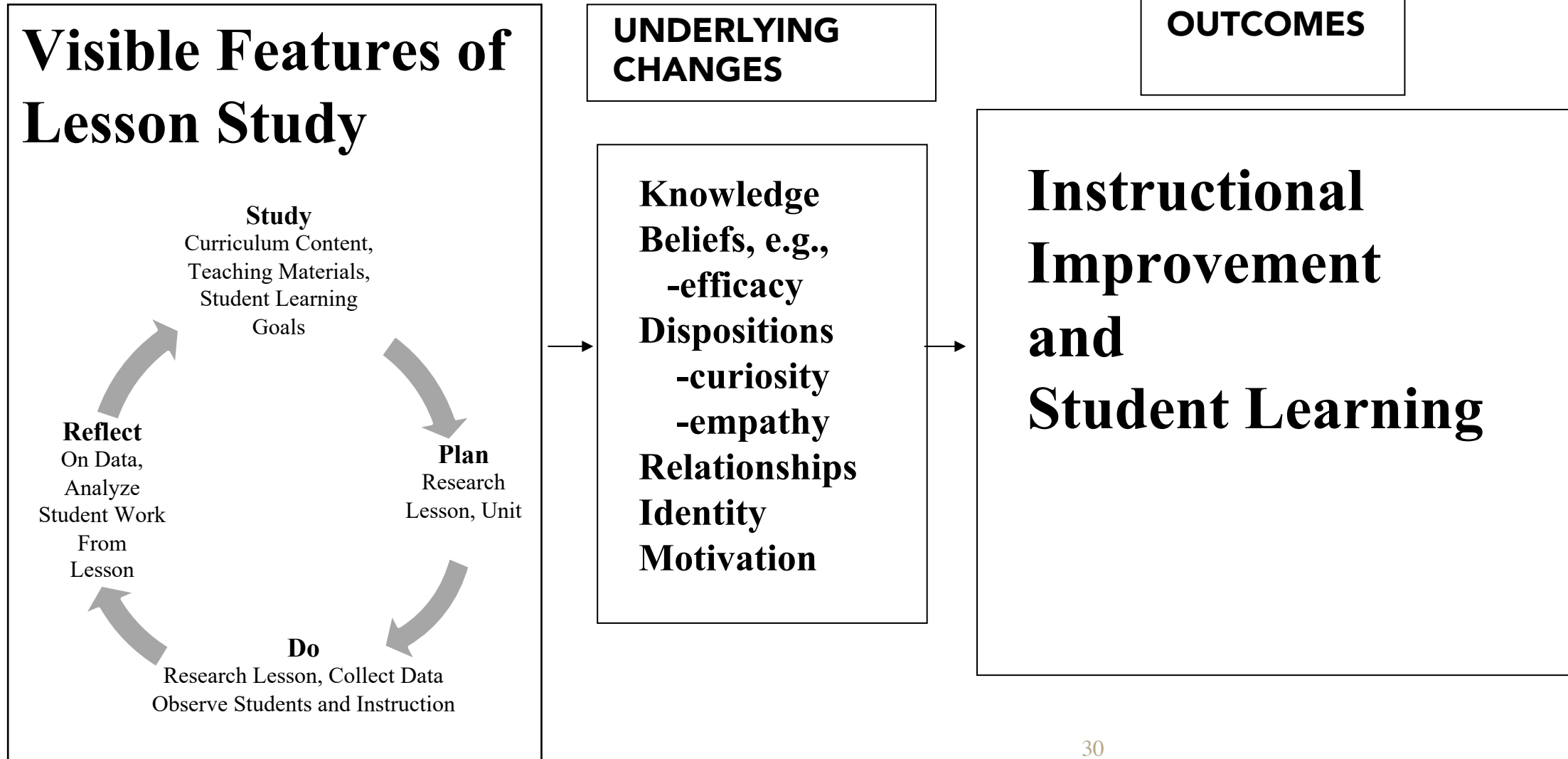
- Only 2 showed impact on student mathematical proficiency (and met WWC scientific criteria)
- One was our RCT of lesson study, *supported by mathematical resource kit* on fractions; impact on
 - Students' fractions knowledge
 - Teachers' fractions knowledge
 - Teachers' expectations for student achievement
 - Teachers' perceptions of collegial learning effectiveness

(Gersten et al., 2014; Lewis & Perry, 2017)

Visible Features vs. Underlying Changes



Underlying Changes....



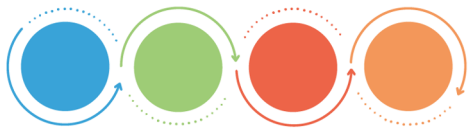
Contrast of Traditional Professional Development and Lesson Study

TRADITIONAL PD

- **Begins with answer**
- **Driven by expert**
- **Communication
trainer → teachers**
- **Relationships hierarchical**
- **Research informs practice**

LESSON STUDY

- **Begins with question**
- **Driven by participants**
- **Communication among
teachers**
- **Relationship reciprocal**
- **Practice is research**



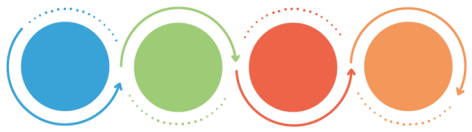
Motivation is Fostered by Organizations that Meet Our Human Needs For:

- Agency (autonomy)
- Belonging
- Competence

Some teachers call these the New “ABC’s”

Such organizations elicit our hard work and desire to work for the common good—essential to the very hard, long-term work of improving instruction

Deci & Ryan, 1985. *Intrinsic motivation and self-determination in human behavior.*



Future Growth Areas for the US: School-wide Lesson Study

Why do you think that?
Why would that strategy work?
What makes you think that?
Can you prove it?
I'm not sure I understand.
Can you explain step by step?
Can you slow down a little?

Questions that help us understand each other's thinking

Room 409 Discussion **Rights & Obligations**

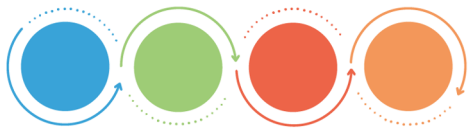
Student Rights <i>Derechos</i>	Student Obligations <i>Deberes</i>
<ul style="list-style-type: none">You have the right to share. <i>My idea is...</i> <i>Mi idea es...</i>You have the right to ask questions. <i>What makes you think that?</i> <i>¿Qué te hace pensar eso?</i>You have the right to be treated kindly. <i>I learned from you!</i> <i>Good idea!</i> <i>¡Buena idea!</i>You have the right to have your ideas discussed, not you. <i>My ideas can change and do not define me.</i> <i>Mis ideas cambian y no me definen.</i>	<ul style="list-style-type: none">You are obligated to be a part of an attentive, responsive audience. <i>Can you speak up?</i> <i>¿Cómo lo escuchas?</i>You are obligated to speak loud enough for others to hear. <i>Can you please speak louder?</i> <i>No to escape, please, participate!</i>You are obligated to listen to understand. <i>I can use Samir's idea.</i> <i>Voy a usar la idea de Samir.</i>You are obligated to treat others kindly. <i>Thank you for teaching me something new.</i> <i>Te escuché me ayudó mucho.</i>You are obligated to consider others' ideas AND to explain why you agree or disagree. <i>I disagreed before, but now I agree because...</i>

Muir Research Theme :

Students will use evidence to **construct** **valid** arguments so that they are **confident, independent** learners.

2018-2019 Focus Strategies

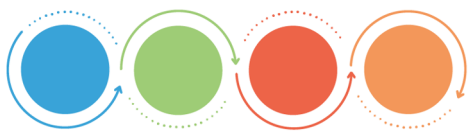
- ① Higher-order questioning
- ② Making thinking visible



John Muir Elementary, San Francisco Unified SD

Student Composition

- 84% Economically disadvantaged
- 16% Homeless
- 25% African-American
- 52% Latinx
- 42% English Language Learners
- 3% White



School-wide Lesson Study: Muir School

- One team invited others; grew from 1 team to school-wide over 3 years
- Mathematics Teaching Through Problem-solving was focus
- Steering Committee formed
- District program supported teacher-fellows who led each team



Carlos from Ms. Alley's class, finding the usefulness of 10 during the public lesson

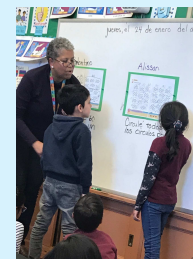
January 2019

Muir Lesson Study News 2nd Edition!

Congrats Second Grade Team!

Our second grade team provided us with quite an opportunity to think about key instructional strategies, teacher moves and the mathematical content we teach at John Muir. Because of their careful planning (thank you team!) we were able to reflect on how to get our scholars engaged in mathematical discourse and ways to make student thinking visible.

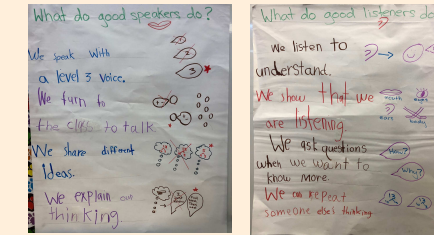
A few key learnings from our post lesson discussion: **First, discussion protocols and expectations** set students up to be leaders of classroom discussions. It was evident that the second grade team has been working hard on setting up discussion protocols and expectations. Ms. Alley's students asked each other questions, showed genuine desire to understand their classmates thinking, and were able to build off each other's ideas. **Second, visible student thinking drives student discussions and learning.** Ms. Alley reflected on how her anticipated board work and the board work she constructed through the careful listening of student ideas changed the expected course of the discussion. Did you notice how Ms. Alley labeled students ideas on the board? **Finally, we are still grappling** with ways to best utilize student misconceptions to build mathematical understanding. We did learn that the more we understand the mathematics and listen to our students ideas, the better we can anticipate student responses and be responsive to our students. However, we aren't quite satisfied with ways in which we are using misconceptions to build tension, excitement, and construct understanding. Remember when Allison forgot to count 110? We are going to continue to think about how to best utilize situations like that!



Valentino helping Allison to see why she counted 246 shells, and he counted 236. Many teachers thought this was one of the most exciting portions of the lesson. Tension grew as students had different answers.

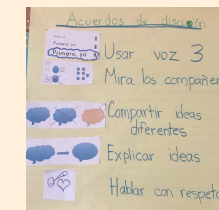
Around Muir

The K/1 Team realized while their students were making real progress orienting their thinking in partners or small group discussion- whole group it was more challenging. The team decided to teach students what good speakers and listeners do. This includes talking loud enough for your classmates to hear you- even in the back! Check out how the first grade team turned lesson on what good speakers and listeners do in math into a shared writing activity!

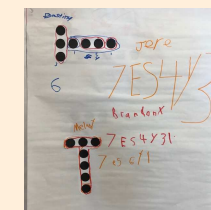


First grade student discussion norms at John Muir

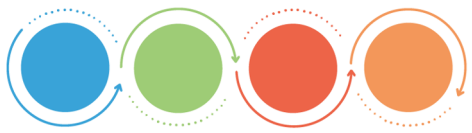
The K/1 team has also been thinking of what it means to make student thinking visible in their classrooms. The kinder team has been focused on ways to make student thinking visible during number talks. They are working on one of the core Kindergarten math standards: decomposing numbers less than 10. They also continue to gamify their math lessons by having students engage in math menu games that reinforce concepts from their Japan Math lessons. If you're interested in seeing some of their games in action- [follow this link!](#)



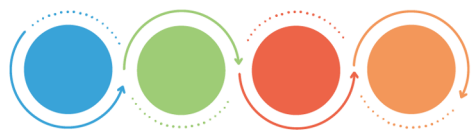
Kindergarten Math Discussions Agreements



A kindergarten number talk in Mr. Delgadillo's Class, they are learning to decompose numbers less than 10.

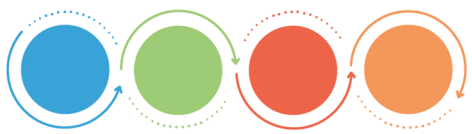


Year	# of Research Lessons (RL)	# of Staff
2015-2016	1 school-based RL (observed by LS team)	5
2016-2017	4 school-based RLs across grade levels (observed by LS team) focused on any math instruction	15
2017-2018	4 school-based RLs focused on either 'Do The Math' curriculum tasks, math talks or Teaching through Problem-solving (observed by LS team), 1 cross-site RL open to district educators	15
2018-2019	4 school-based RLs all focused on Teaching through Problem-solving (observed by all Muir educators), 1 cross-site RL open to district educator	21



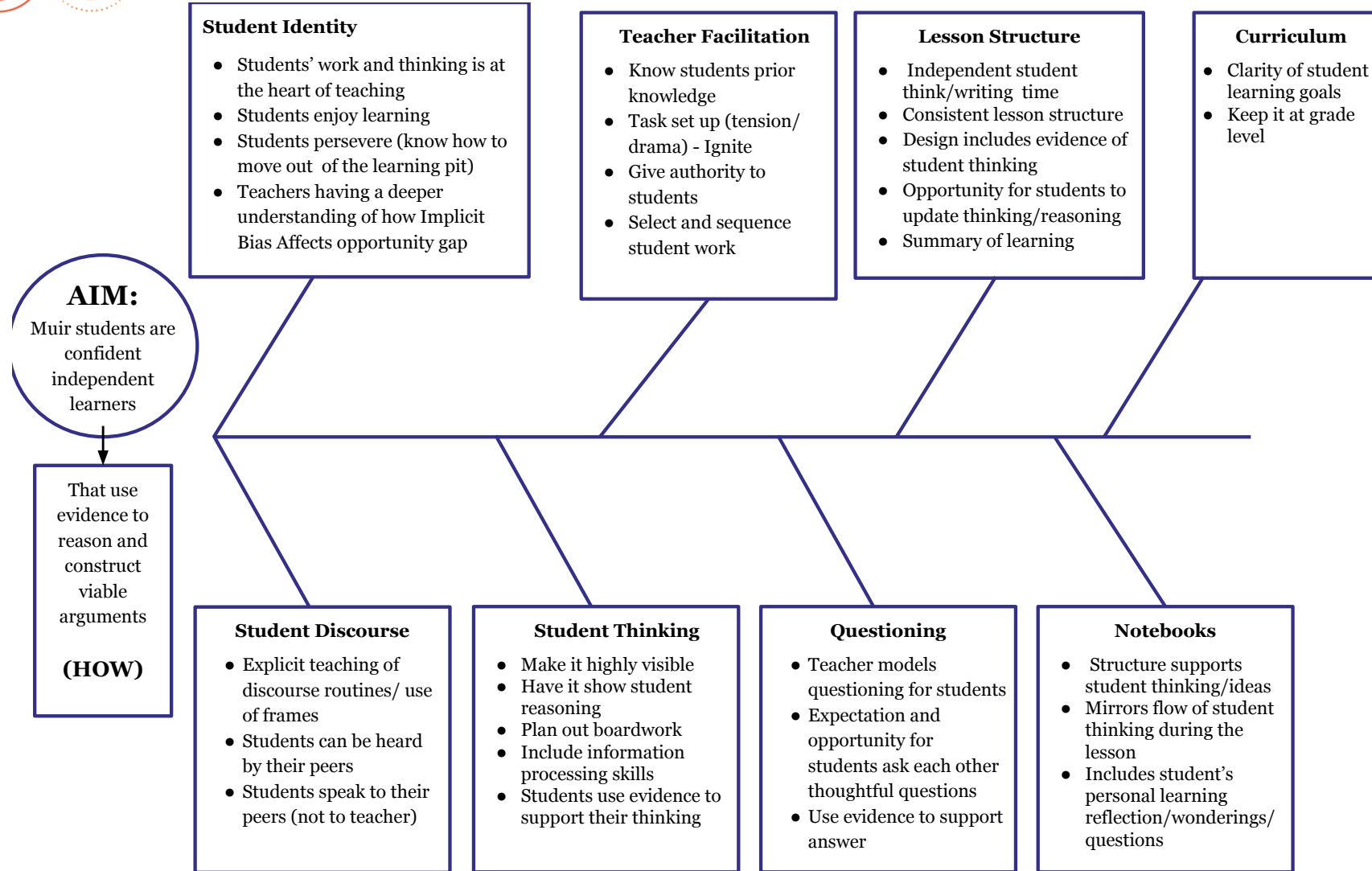
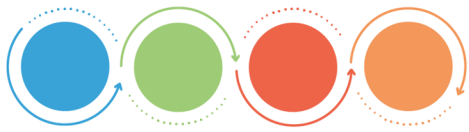
Research Themes at Muir Elementary, 2015-2019

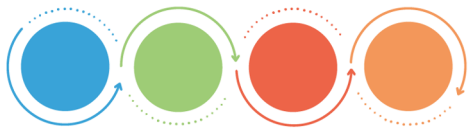
2015-16	...learners are empowered to excel in academic achievement, build character, affirm cultural and linguistic diversity while fostering an interconnected global community
2016-17	Our research lessons will provide opportunities for students to create a positive and confident academic self-identity by building number and place value understanding in order to construct viable arguments and critique the reasoning of others.
2017-18	Nurture students' mathematical agency and identity through the design of lessons that engage students in problem solving and productive talk.
2018-19	Students will use evidence to reason and construct viable arguments so that they are confident, independent learners.



Teaching Through Problem-solving (TTP)

- In TTP, students build each new mathematical concept or procedure in the curriculum by solving a problem that requires it
- Students have NOT previously been taught a solution method
- For example, build the procedure for adding fractions with unlike denominators using a problem such as "Jose ran $\frac{1}{2}$ mile on Monday and $\frac{1}{3}$ mile on Tuesday. How far did he run all together?"

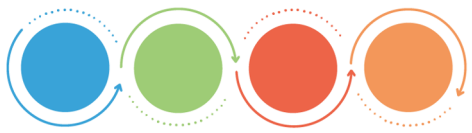




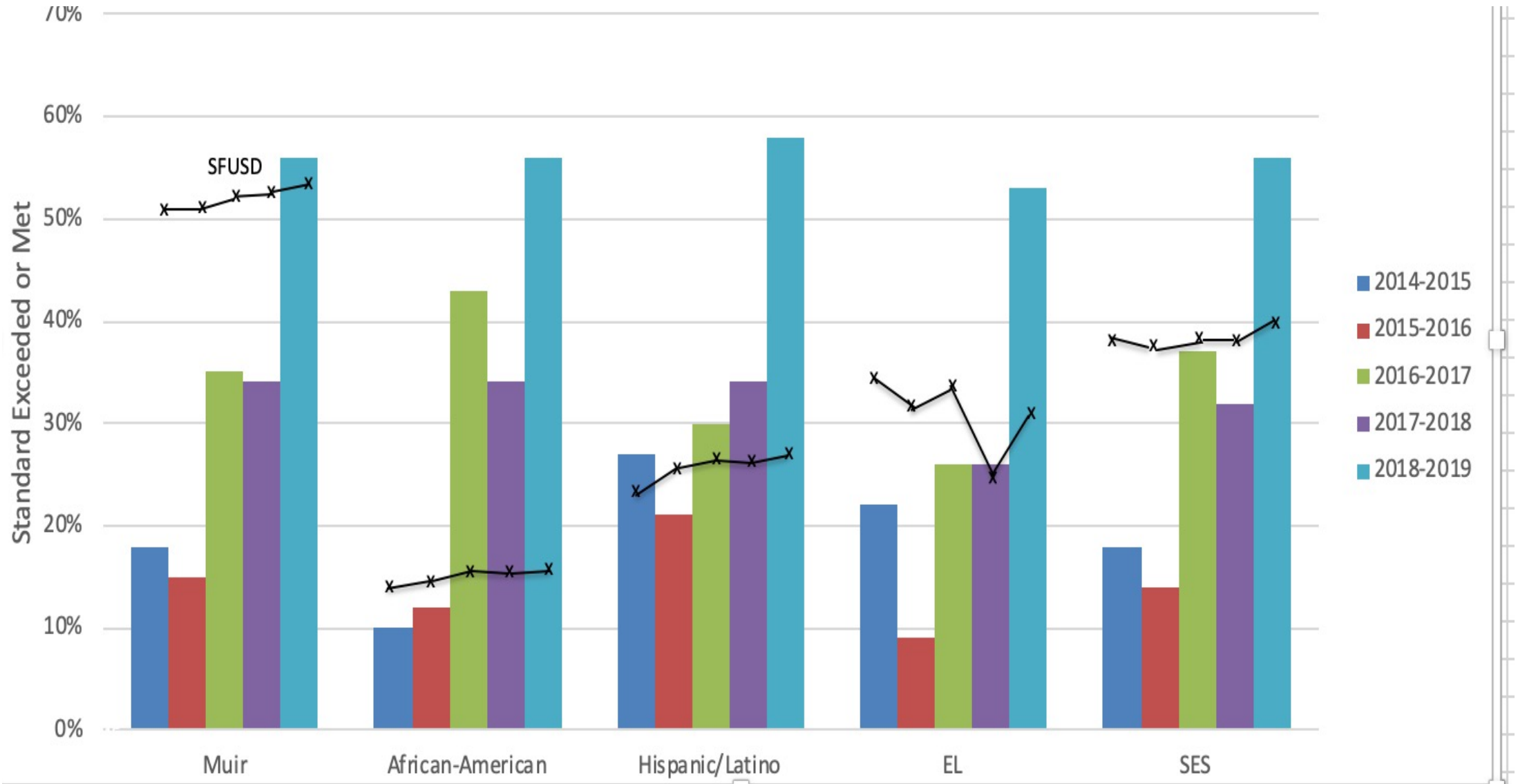
Reflections on Video

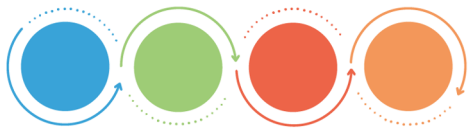
We often underestimate the depth/complexity of planning for instruction (level of abstraction, where they may be gaps in skill and knowledge, etc.) and don't think of planning as professional learning. But in lesson study, learning and planning happen together. Planning informs questions to explore and learning informs planning.

Janice Creneti



Muir Elementary SBAC Mathematics

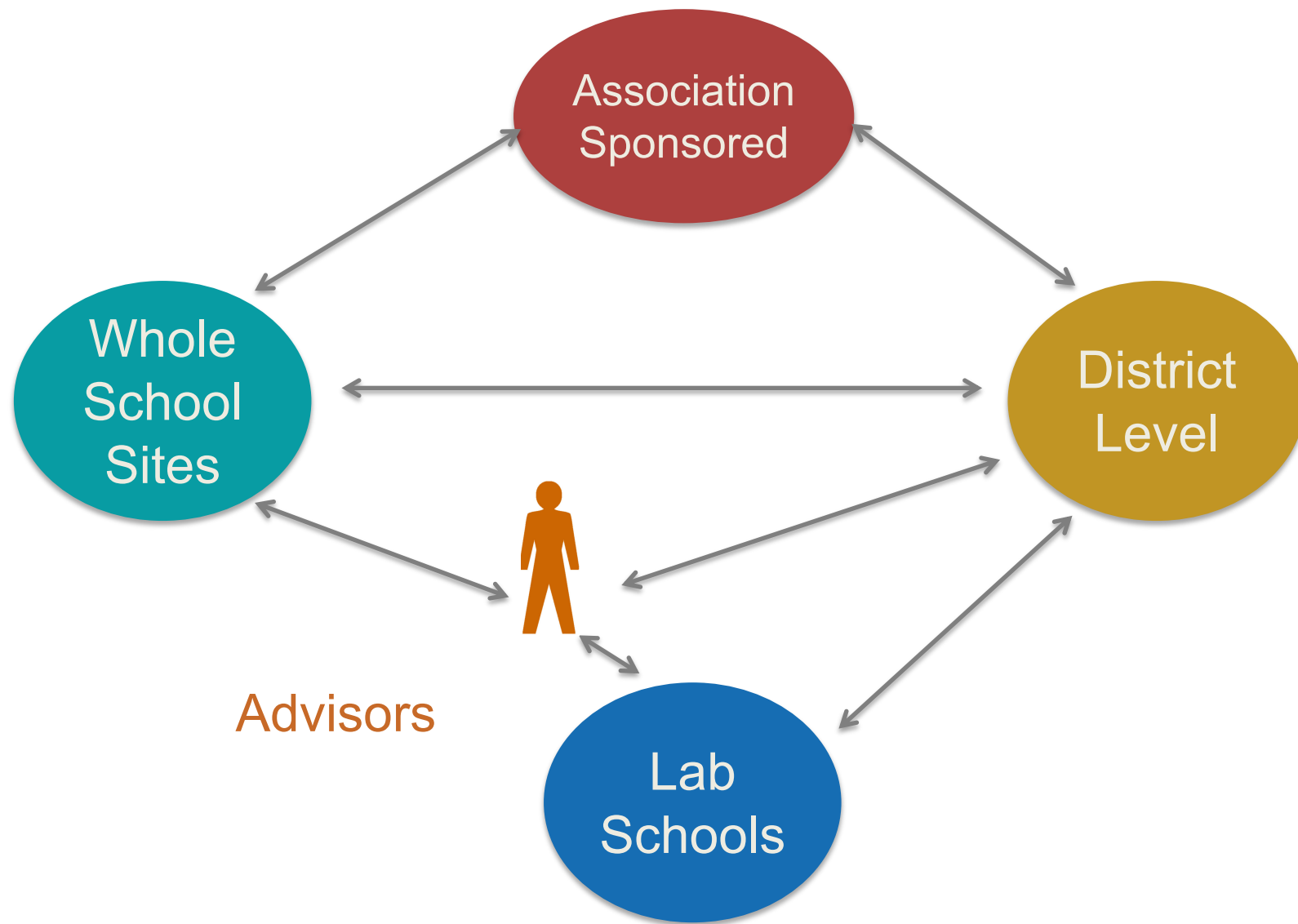


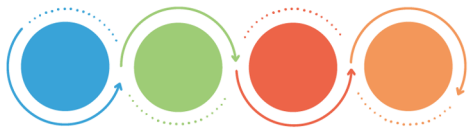


Future Growth Areas for the US: Cross-site Synergy

In Japan, Lesson Study occurs in 4 different venues

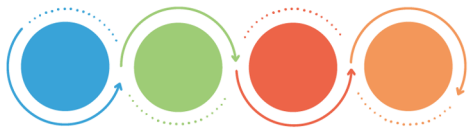
- School-wide
- District-level (Cross-school, by subject)
- Laboratory School-based (Universities)
- Association-sponsored (Subject-matter associations, teacher associations)





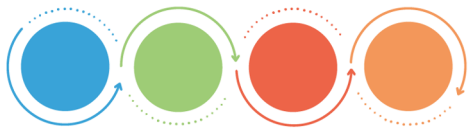
Synergy Among 4 Types

- National schools and associations have access to latest innovations from around the world
- Local teachers know their students and colleagues
- District-level group for local ongoing leadership of subject (math, language, art, physical education, science music, etc.)



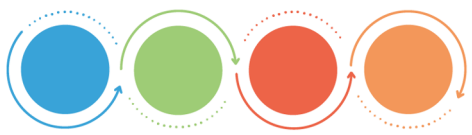
Japanese Teachers Use Lesson Study to Study and Spread

- **New Contents**, e.g., solar energy (Lewis, 2010), 30% increase in math content (Takahashi, 2012)
- **New Instructional Approaches**, e.g., Inquiry, Structured Problem-solving (Stigler & Hiebert, 1999)



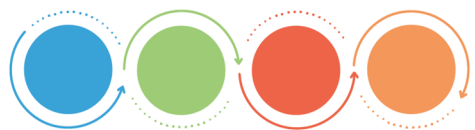
A story about introduction of solar energy in the Japanese elementary science curriculum in the 1990's...

- Hundreds of elementary schools applied for small grants as “designated research schools” on how to teach solar energy
- After about a year of experimentation, often in collaboration with university-based colleagues, schools brought to life their thinking in large public research lessons (hundreds attending)



Solar energy, cont'd

- Thousands of educators saw these research lessons and questioned teachers about why they chose these approaches, what had worked and hadn't
- Knowledge quickly spread about the science content itself, good teaching materials (what toys work and don't to illuminate the principles), and student thinking.

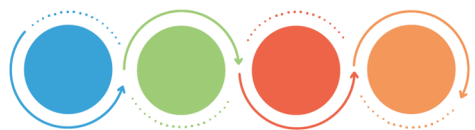


Solar energy, cont'd

A teacher observing a public research lesson asked about three student strategies she saw:

- moving a solar cell closer to a light source
- adding a second light source
- using a magnifying glass to “concentrate” light

“I want to know whether the three conditions the children described – ‘to put the solar cell closer to the light source,’ ‘to make the light stronger’ and to ‘gather the light – would all be considered the same thing by scientists. They don’t seem the same to me. But I want to ask the teachers who know science whether scientists would regard them as the same thing.”

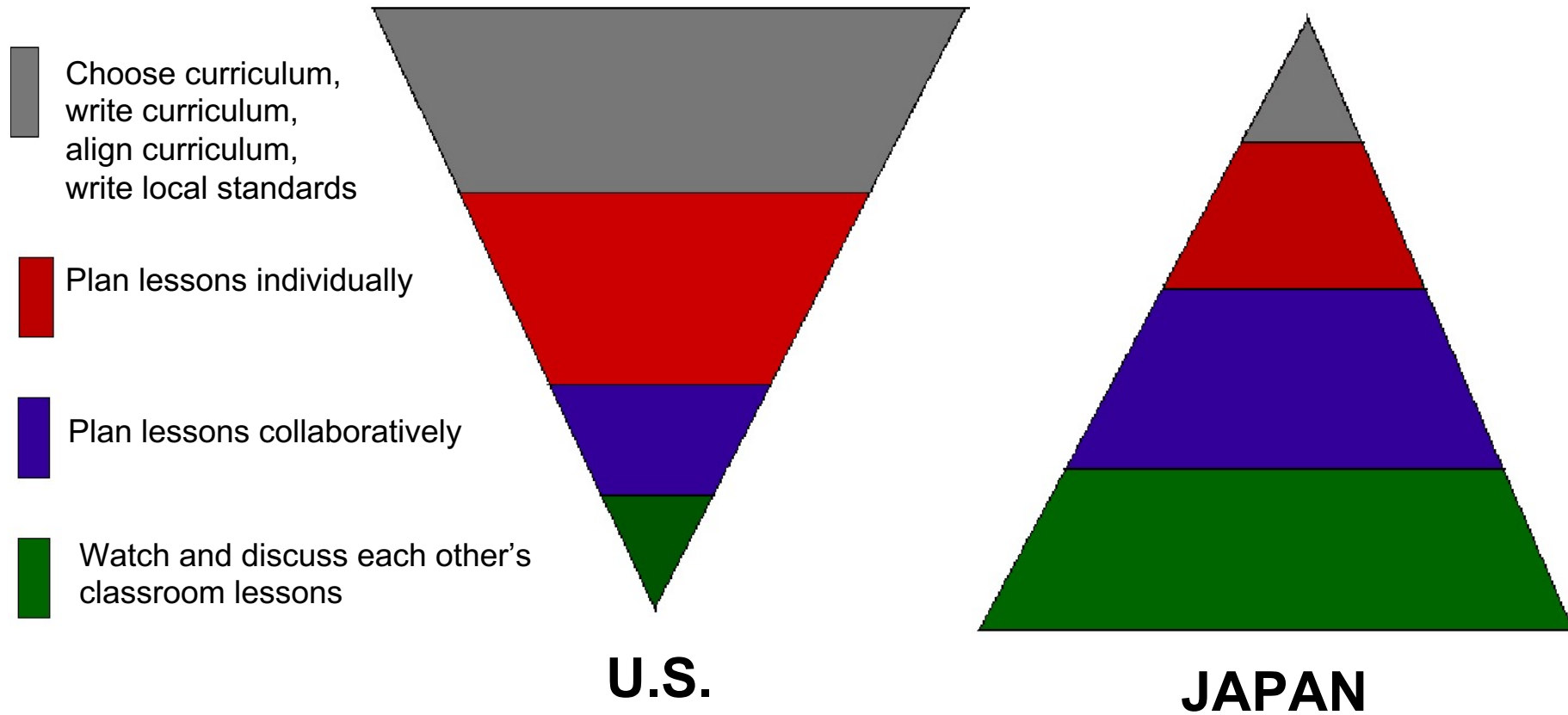


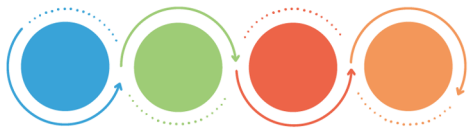
US Teacher's Reflection

We feel there is a great value in a public lesson. It is an opportunity to put our work out for public scrutiny.

High School Teacher, Massachusetts

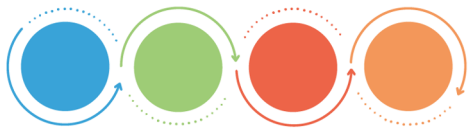
Teachers' Activities to Improve Instruction





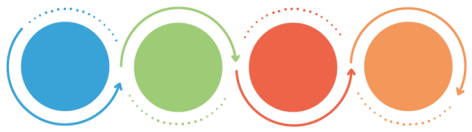
Call to mind a time when you experienced great professional growth

- Does any element of lesson study relate to your experience of lesson study?



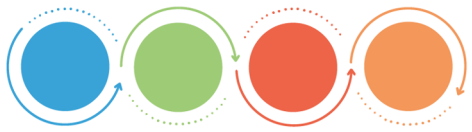
Next steps?

- Check out the resources (end of ppt)
- Is there a problem educators want to solve, where lesson study could help?
- Design work to support **educators' intrinsic motivation** (autonomy, belonging, competence) at **AND** their **knowledge/practice**



Next steps?

- Use Lesson Study to deepen an existing initiative? (around curriculum, PLCs, teacher leadership, anti-racism....)
- Perhaps focus on “studying student thinking together” not on “doing lesson study”
- Start with volunteers; don’t force anyone but keep the welcome mat out
- Be a learner: Coaches/principals/specialists can volunteer to teach the first research lesson if needed

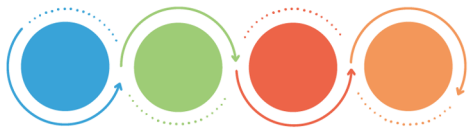


Next steps?

- Build reflection into every meeting
 - Is this a valuable use of our time?
 - Did we value the thinking and learning of all team members?
 - What tweaks to the process would better support our learning?

See phase-specific reflection questions in Lewis et al. 2019 “How Does Lesson Study Work? Toward a Theory of Lesson Study Process and Impact R. Huang et al. (eds.), *Theory and Practice of Lesson Study in Mathematics*, https://doi.org/10.1007/978-3-030-04031-4_2

- Goal is a culture shift, so everyone is a learner; teachers don't outgrow lesson study; it builds “eyes to see students”



Resources

www.lessonresearch.net

- About Lesson Study (overview with videos clips of each phase)
<https://lessonresearch.net/about-lesson-study/what-is-lesson-study/>
- Conduct a cycle provides detailed steps, protocols, examples, tool page
- School-wide Lesson Study (with public lesson video from Muir) under Resources

Lesson Study Step by Step: How Teacher Learning Communities Improve Instruction
(Lewis & Hurd, 2014; Heinemann Publishing). Handbook with DVD

Lesson Study Alliance <https://www.lsalliance.org/>