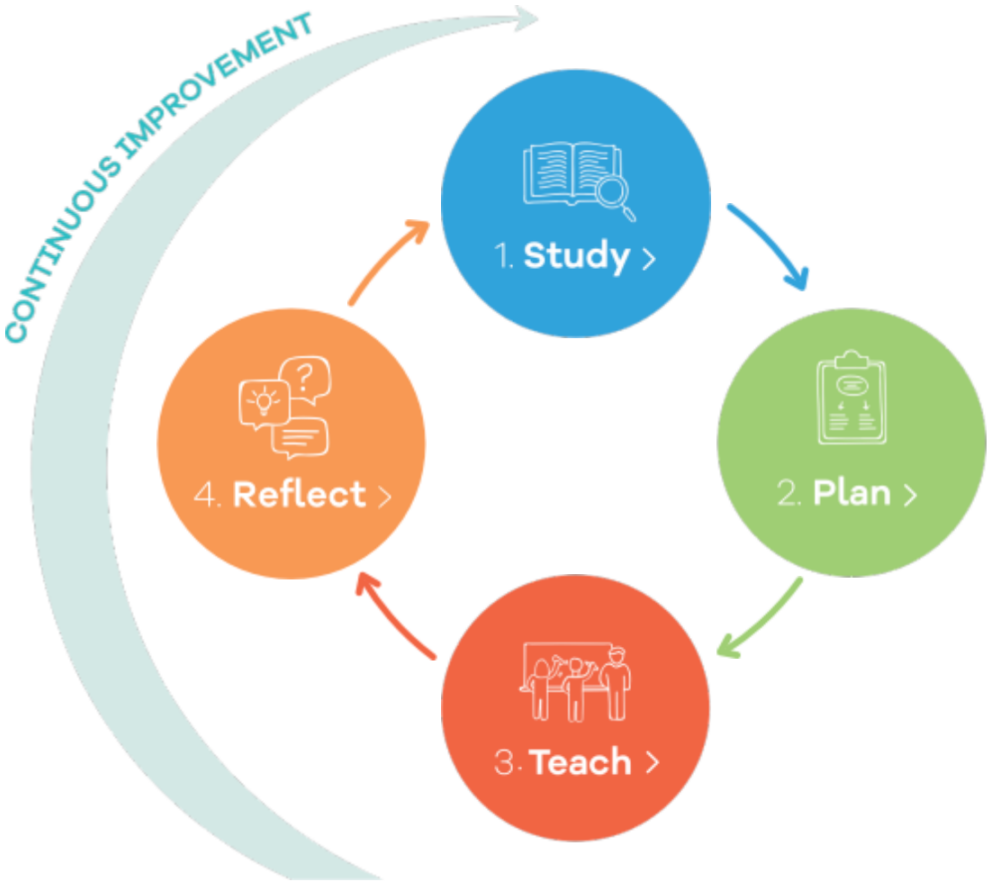
# Lesson Study: Conduct a Cycle




THE LESSON STUDY GROUP AT MILLS COLLEGE

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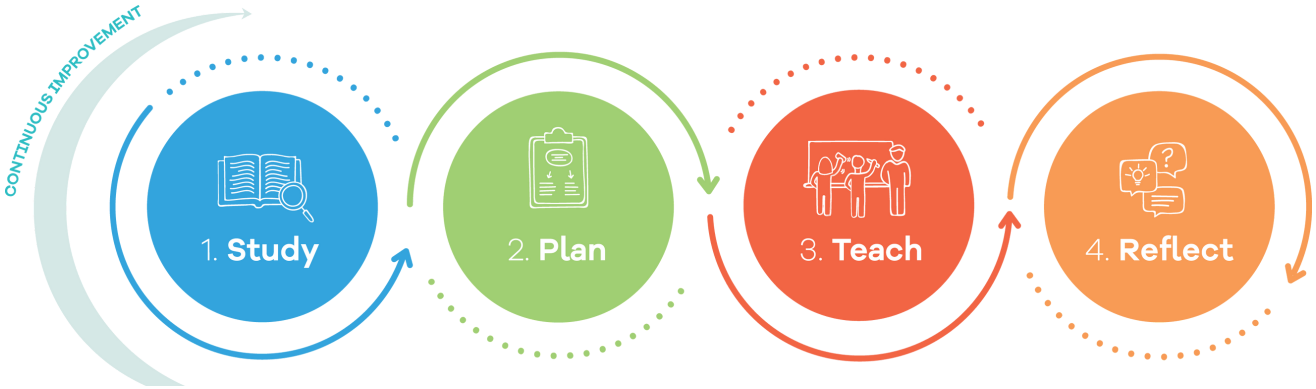
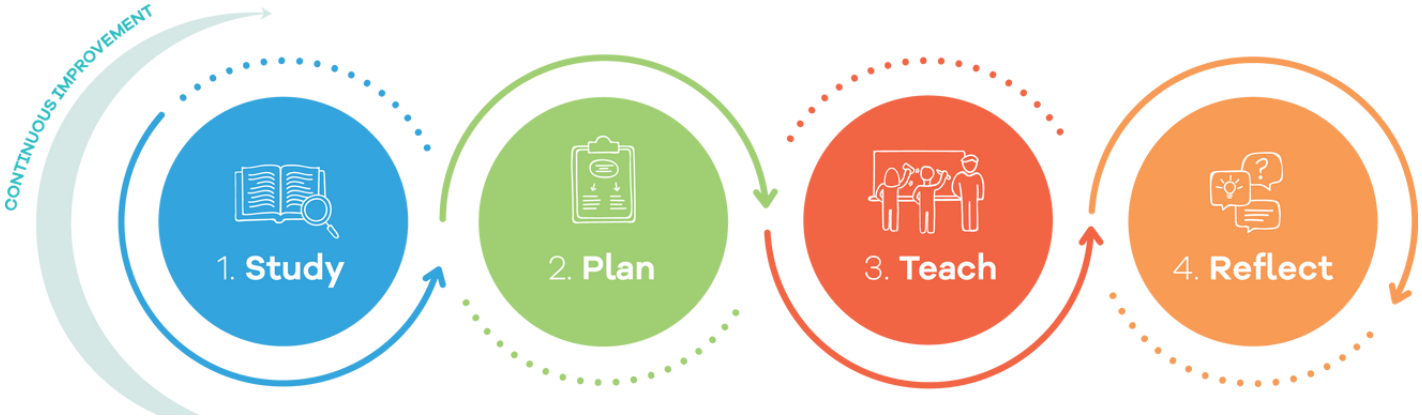
**Appendix**


CONTINUOUS IMPROVEMENT
1. Study
2. Plan
3. Teach
4. Reflect

# What is Lesson Study

Lesson Study is a simple idea: If you want to improve instruction, what could be more obvious than collaborating with fellow teachers to plan instruction and examine its impact on students? In Lesson Study, teachers bring their own questions to the table and seek answers from one another, from outside specialists and research, and from careful study of students.

## How It Works




A team of teachers collaborates to:

- Identify long-term goals for students
- Choose the subject and unit to investigate
- Study standards, research, and curricula

Using insights from the Study phase, the team:

- Examines the unit and chooses one lesson to plan in depth
- Articulates the lesson goals
- Tries the lesson task and anticipates student thinking
- Identifies data to be collected during the lesson

The team puts that lesson into action:

- One team member teaches the lesson
- Other team members observe and record student thinking and learning

The team then reflects on their work by:

- Meeting after the lesson to discuss data on student thinking and learning
- Having an outside specialist provide further commentary
- Reflecting on what they learned during the cycle as a whole

The real "product" of a Lesson Study cycle is much more than just one polished lesson. As a team collaborates to improve instruction, they deepen their knowledge of content and student thinking and their commitment to working together to improve instruction.

# Why Lesson Study?

*One of the things that I really love about [Lesson Study] is that it puts a professional part back in teaching that we have to battle for all the time.... Being able to say "This is like a science, and we can figure these things out and get better at them."*

– Jacqueline Heard, Elementary Teacher

The most brilliant educational visions are just splotches of ink on paper until a teacher somewhere brings them to life in a classroom. Lesson study recognizes the central importance and difficulty of teaching—of actually bringing to life standards, frameworks, and "best practices" in the classroom. Lesson study is classroom research. Teachers build and refine ideas about "best practice" through careful, collaborative study of actual instruction. As teachers work together, they build a habit of learning from each other. A Florida middle school teacher said of Lesson Study "It's changed how we approach our daily lives. We're more confident sharing-previously I wouldn't have admitted that I did a lesson that was a flop. There used to be a barrier or feeling like you're stealing if you share lessons. That barrier is gone now."

Lynn Liptak and her colleagues at Paterson School #2 in New Jersey summed up the differences:

| Traditional Professional Development | Lesson Study |
|---|---|
| Begins with answer | Begins with question |
| Content driven by outside trainer | Content driven by participant inquiry |
| Relationships are hierarchical | Relationships are reciprocal |
| Research informs practice | Practice is research |

One-size-fits-all professional development rarely meets the needs of all teachers within a school or district. Lesson Study differs from more traditional teacher professional development in three main ways:

1. **A Learning Stance**. Lesson Study differs from mentoring or coaching in its emphasis on inquiry conducted by equals. Even experts are expected to pose genuine questions about student learning.

2. **Shared Ownership and Responsibility**. When a Lesson Study group works together, group members come to feel that lessons are "our" lessons, not "your" or "my" lessons. Members see the contributions of all team members, and become invested in colleagues' professional growth.

3. **Emphasis on Students, Not the Teacher**. Lesson Study focuses on student learning and development. It provides a rare and valuable chance for teachers to be in a classroom solely to investigate student learning, unencumbered by the need to manage students or provide instruction.

Lesson Study allows a school to build coherent instruction, bringing to life its vision of student learning across grade levels. It allows teachers to enjoy the satisfactions of classroom research and to influence education broadly through their research lessons, while keeping their feet firmly planted in the realities of classroom life.

# Are You Ready to Begin

To begin the Lesson Study cycle, you will need:

## 1 PEOPLE

You need a team of 3-6 teachers. Team members don't need to teach the same grade level. They do need to share an interest in improving instruction in a specific subject, like mathematics, or in a specific cross-disciplinary area, like academic writing across disciplines.

## 2 TIME

For a Lesson Study cycle, plan on about 12 hours of work. A typical schedule would be 8 weekly meetings of 1 hour each, 3 hours for the research lesson and post-lesson discussion, and 1 hour for a final reflection on the whole cycle. Plan on two cycles per year.

## 3 RESOURCES

This book provides you with the step-by-step resources you need to complete a cycle. You will also need your curriculum and any other resources you want to use in your learning. You can also visit www.lessonresearch.net to download resources, find content-specific materials and courses.

# Lesson Study Steps at a Glance


Teachers agree on a schedule, norms and work processes.

- ☐ Form a Team
- ☐ Decide on Facilitation
- ☐ Agree on a Schedule
- ☐ Adopt an Agenda
- ☐ Build and Practice Norms (10 - 15 min.)
- ☐ Agree on Roles and Expectations (10 min.)


A team of teachers studies the area of instruction they want to improve.

- ☐ Access the Teaching-Learning Plan (10 - 20 min.)
- ☐ Develop a Research Theme (10 - 30 min.)
- ☐ Choose a Topic (5 - 15 min.)
- ☐ Study Standards, Research, and Curriculum Materials (90 - 240 min.)

Total: 115 - 305 min.


The team uses insights from the Study phase to plan a research lesson.

- ☐ Research Lesson Logistics (5 - 20 min.)
- ☐ Examine the Unit Plan (20 - 90 min.)
- ☐ Identify and Examine the Research Lesson (30 - 50 min.)
- ☐ Design the Flow of Instruction (40 min.)
- ☐ Focus the Data Collection (10 - 15 min.)
- ☐ Teach a Mock-Up Lesson (60 min.)
- ☐ Confirm Research Lesson Day Responsibilities (20 - 40 min.)

Total: 185 - 315 min.


One teacher teaches the team's lesson in the classroom, with team members carefully observing students.

- ☐ Conduct Pre-Lesson Discussion (45 min.)
- ☐ Teach and Observe the Lesson (90 min.)


Teachers meet after the lesson to share data and observations and deepen their learning.

- ☐ Review Data (15 - 20 min.)
- ☐ Conduct the Post-Lesson Discussion (45 - 60 min.)
- ☐ Final Commentary (15 - 30 min.)
- ☐ Consolidate Your Learning (60 min.)

Total: 135 - 170 min.


0. Prepare

# 0. Prepare Your Team

During this phase, you'll agree on a schedule, norms and work processes. (Experienced Lesson Study teams may be able to skip or skim this section and revisit elements as needed.)

## PREPARE | STEP 1:

## Form a Team

This step addresses team size, composition, and how to involve outside specialists in your Lesson Study work.

### GOALS:

- Learn about optimal team size and composition
- Learn about role of outside content specialists

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## Make Decisions About Your Team

Spending time up front on your team's makeup will help ensure your Lesson Study's success.

### Team Size

Optimal size for a lesson study team is three to six teachers. If your whole department or whole school plans to engage in Lesson Study, we recommend that you break into teams of about three to six, and plan for periodic meetings as a whole department or school.

### Team Composition

At elementary schools, it is typical for teachers from one or two adjacent grades to form a lesson study team, since they share closely related curriculum challenges. However, a cross-grade team working on a shared content strand (e.g., number sense) or problem of practice (e.g., reflective journals) can also be powerful.

### Single-Subject Versus Cross-Subject Teams

Teams typically bring together teachers who teach the same subject (e.g., mathematics, English Language Arts) so that they can deepen their knowledge of the standards, curriculum, recent scholarship, and teaching strategies specific to that subject.

Cross-subject teams can also be effective if team members have a genuine shared question that is important across disciplines. For example, teachers from several subject areas might collaborate to ask how they can improve students' nonfiction comprehension strategies or their presentation and critique of ideas.

### Involving Others at Your School and Outside Specialists

Coaches and outside specialists can make important contributions to a Lesson Study team, even if they are not regular members. Within the steps of the Cycle, we suggest you consult them to:

- Identify good resources on your topic (e.g., content frameworks, research on student thinking) (during the Study phase)
- Provide feedback on your draft lesson plan (during the Plan phase)
- Attend the research lesson and provide final commentary (during the Teach phase)

At the outset of your Lesson Study cycle, it is a good idea to think about who might provide good input to your work at each stage, and to schedule their time.

A school-wide research theme (described in **Study Step 2**) gives additional power to a team's Lesson Study work. Consider having your whole school develop the Research Theme, even if your school has just one Lesson Study team.

## Additional Resources

- **Considerations in Working with Outside Specialists to Support Lesson Study**, see Appendix page 63.
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/03/Choosing-Outside-Specialists-1.pdf

PREPARE | STEP 2:

# Decide on Facilitation

Decide whether your team will have a designated facilitator or rotate the facilitator role among team members.

### GOALS:

- Learn about the benefits of a designated facilitator versus rotating facilitator, and decide which is right for your team now

## Choosing the Role of Facilitator

### Designated Facilitator

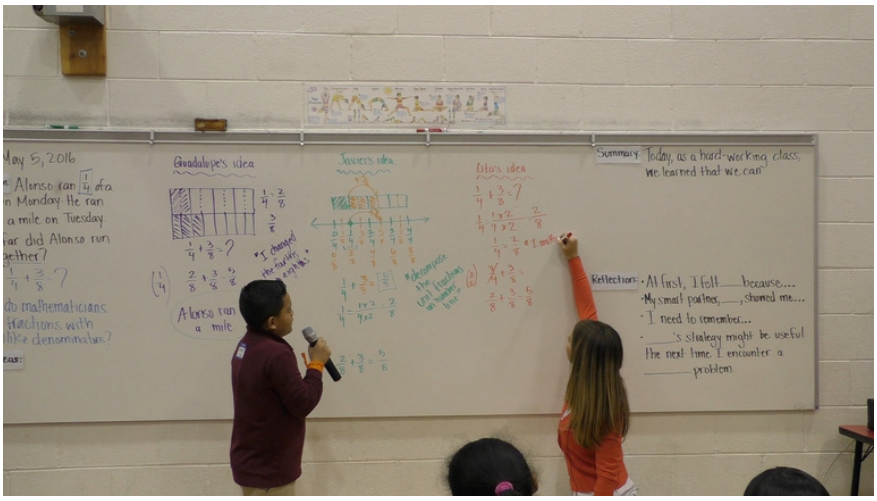
Some Lesson Study teams have a single designated facilitator, often someone who brings particular content expertise, such as a math or literacy coach. A designated facilitator can become a very helpful "go to" person for materials, information, and problem solving, helping the group make steady progress.

### Rotating Facilitators

Some Lesson Study teams rotate facilitation among team members. Teams that do this often report that it strengthens the shared sense of responsibility for the work and builds the leadership skills of all team members.

If your team uses rotating facilitation, make sure you plan in advance how content expertise will be integrated at each phase of the Lesson Study cycle. For example, get recommendations in advance about content documents (such as state frameworks) that will provide a solid overview of the subject area, as well as readings and video specific to the topic you plan to study. Arrange for an outside coach or specialist to provide feedback at key points, such as when you choose the topic, complete a lesson plan draft, and teach the research lesson.

If you have a number of Lesson Study teams at your school and limited access to specialists, you may want to intersperse some school-wide meetings with Lesson Study team meetings. For example, you may want to study content frameworks and research during school-wide meetings, working with a specialist; at Lesson Study team meetings, grade-level groups (with rotating facilitation by team members) can draw out the implications for their own unit and lesson planning.




### Facilitation: The Long-term View

A designated facilitator who is knowledgeable about Lesson Study and content resources can get your work off to a strong start. Likewise, your team can get a strong start by using a Cycle Course with integrated content resources. Over the long term, to sustain Lesson Study and strengthen team members' leadership, it makes sense to build rotating facilitation by team members, and to cultivate relationships with outside specialists who can recommend high-quality content resources.

> *"A good facilitator makes sure everyone feels valued and heard, and lets conversations flow around the key questions and task of the Lesson Study, bringing it back only when it strays too far afield."*
>
> – Rebecca Pittard, Volusia County, Florida

## Additional Resources

- **Tips for Lesson Study Facilitation,** see Appendix page 64.
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/03/Facilitation-Tips-for-Lesson-Study.pdf

PREPARE | STEP 3:

# Agree on a Schedule

Find out how much time lesson study requires and set your meeting schedule.

### GOALS:

- Set the schedule for your team meetings, research lesson, and post-lesson discussion and reflection

## Budgeting and Planning Your Time

Set your meeting schedule in advance so you know exactly what to expect.

### How Much Time Does Lesson Study Require?

Some Lesson Study teams have a single designated facilitator, often someone who brings particular content expertise, such as a math or literacy coach. A designated facilitator can become a very helpful "go to" person for materials, information, and problem solving, helping the group make steady progress.

| Cycle Stage | Number of Sessions (1 to 1.5 hour sessions) | Session Activities |
|---|---|---|
| **PREPARE** | 0 - 2 sessions | Develop norms, roles and schedules.<br>Learn about Lesson Study |
| **STUDY** | 3 - 4 sessions | Study standards, curriculum, and research |
| **PLAN** | 3 - 4 sessions | Plan the unit and research lesson, and conduct a mock-up lesson |
| **TEACH** | 30 minutes<br>1 class period | Pre-lesson discussion<br>Teach and observe the research lesson |
| **REFLECT** | 1 session on ***same day as lesson.***<br>1 session up to 1 week | Post-lesson discussion<br>End-of-cycle reflection meeting |

If possible, schedule Lesson Study meetings for the entire school year in advance so you need not interrupt the work of each meeting to schedule the next meeting. Setting the research lesson date in advance will help you pace your work and allow you to schedule substitutes and outside specialists.

### How Many Cycles Should Your Team Do?

If possible, team members should commit up front to conduct two Lesson Study cycles, since the process usually becomes more comfortable and useful with experience. Two or three Lesson Study cycles during a school year is typical for a Lesson Study team.

## Additional Resources

- **Sample Schedule for a Lesson Study Cycle,** see Appendix page 65.
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/03/Sample-Schedule-for-Cycle-1.pdf

## PREPARE | STEP 4:

# Adopt an Agenda

An agenda will help your team stay focused and on track.

### GOALS:

- Adopt a standard meeting agenda that will help you work efficiently

## Agendas Keep Your Team on Track

Because collaboration is integral to Lesson Study, an agenda helps focuses the team on the same goals.

### Gather Agenda Items

An agenda will help your team stay focused, and a system for keeping notes will help you carry forward your learning. Many groups like to keep their meeting notes at the bottom of their agenda, as our template shows. If you prefer to have notes in a separate document, agree on how you will name and store the notes so they are available to all team members.

The designated facilitator for each meeting should think in advance about the agenda items for that meeting and any needed materials. Many teams like to use the last few minutes of their meeting to build the agenda for the upcoming meeting, since next steps are fresh in mind.

## Additional Resources

- **Meeting Agenda Guidelines and Template,** see Appendix pages xx
  - Download Meeting Agenda Template online at https://lessonresearch.net/wp-content/uploads/2018/03/Meeting-Agenda-Template.docx

## PREPARE | STEP 5:

# Build and Practice Norms

This step suggests a process for building norms that will support your team in the hard work of learning.

### GOALS:

- Individually consider qualities needed in a group that supports your professional learning
- Agree on group norms and a process for reflecting on their success?

## A Vital Step for Working as a Team

Setting norms at the beginning is what allows the group to disrupt and improve existing patterns throughout the process.

### Individual Quiet Reflection

Take 2-3 minutes for individual quiet reflection in which each team member jots down a list of values important to them in a group that supports their learning.

It may be helpful to:

- Consider groups you have been a part of in the past that have that have functioned well—or poorly.
- Consider norms related to the specific content you will study. For example, teams focused on mathematics have adopted norms like being curious, explaining and justifying solutions, challenging each other's thinking, and providing quiet work time.

### Share and Discuss

As a team, take about 5 minutes to share and discuss the ideas generated by each member. Notice any potential contradictions. For example, if one group member asks for the group to be "safe and supportive" and another wants members of the group to "challenge my thinking," discuss how both can be honored.

Norms from effective teams often attend to both practical matters and team values:

- Listen thoughtfully, with an open mind
- Share the air
- Give 100%!
- Stay on task

- Be punctual
- Have a positive outlook toward self and others
- Always be student-focused
- Show respect for other's ideas...yet challenge them!

### Agree and Record

Synthesize members' ideas into a list of about 5 key norms you all support. Keep the list handy in your agenda so you can revisit it at the start of every meeting. Posting a paper copy when you meet may also be useful.

### Practice Norms

At the start of each meeting, choose one norm or more norms to monitor during the meeting. Note moments when you feel the team is or isn't upholding that norm. At the end of the meeting, discuss how you did with upholding your norms and what can be improved in your process for future meetings. As you reflect on your team's norms, don't be afraid to revise or update them to reflect challenges encountered by your team.

## Additional Resources

- **Three Habits of Effective Lesson Study Groups,** see Appendix pages
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/03/Three-Habits-of-Effective-Lesson-Study-Groups.pdf

PREPARE | STEP 6:

# Agree on Roles and Expectations

Consider the roles and responsibilities of team members.

### GOALS:

- Review the team meeting schedule and any additional expectations
- Agree on the roles that will distribute responsibility on your team

## Collaboration Means Shared Accountability

Working as a team means that each person will need live up to their share of the responsibilities for the group to be able to move forward.

### Review Schedule and Expectations

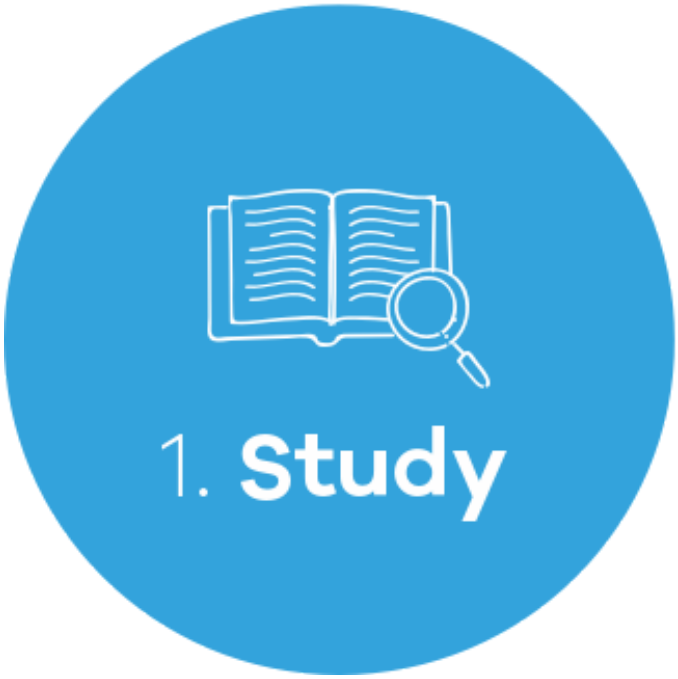
Make sure team members are aware of the meeting schedule and any additional expectations of team members. For example, many teams form with the understanding that no one will be pressured to teach a research lesson and that instead they will be allowed to volunteer as they become familiar with the process. Discuss any expectations up front.

### Define and Assign Roles

Define the work roles needed for your team to function productively. Typical roles might include:

- a facilitator, who leads the group through the agenda, eliciting participation from all group members
- a notetaker, who records and distributes notes that summarize discussion and capture decisions
- a recorder, who publicly records on chart paper to support brainstorming or updates the research lesson plan
- a timekeeper/process checker, who actively monitors the group norms and provides feedback at the end of meetings
- a logistics coordinator, who sends out a reminder for the next meetings, arranges for refreshments, etc.

We recommend that you rotate roles each meeting so that team members develop a full picture of what's needed for teams to function and an appreciation of all roles.


1. Study

# 1. Study

A team of teachers asks: What do we want students to learn? What qualities do we want students to develop? They study standards, curriculum, and research related to their goals.

## STUDY | STEP 1:

## Access the Teacher-Learning Plan

The meeting tools and Teaching-Learning Plan Template will help your team stay organized and carry forward your learning.

### GOALS:

- View the Teaching-Learning Plan template and agree on how team members will access it as you record your planning
- Agree on how you will store and share your team's materials, including schedule, agenda, notes, resources, Teaching-Learning Plan, and other documentation of your work

---

A

## Download the Teaching-Learning Plan Template

The Teaching-Learning Plan is central to Lesson Study. Our template will help you create that plan.

### Accessing the Template

Your team will use the Teaching-Learning Plan to capture what you learn as you study the curriculum and content and as you plan the unit and lesson. Take a quick look at the Teaching-Learning Plan now, so you will be familiar with it for future reference.

You can find a copy in the **Appendix, pages xx- xx**, or you can use the online access url link below to open an electronic template of the Teaching-Learning Plan in google drive. You will be prompted to make a copy.

Online access to Teaching-Learning Plan template
https://docs.google.com/document/d/16zykKFThvsYFUvsjxx7du_gjjxUyDSC4CEn6G2gkBtU/copy?usp=sharing

B

# Gather Meeting Tools

Keeping track of your team's work is an important part of successful Lesson Study.

## Choose a Platform for Materials

We suggest that you agree now on how your team will record, share and store the following information:

- meeting schedule (including updates, reminders, etc.)
- meeting agendas
- meeting notes
- resources (research readings, standards documents, etc.)
- the Teaching-Learning Plan
- documentation of your work, if desired, so you can present it to other educators (some teams like to use the PowerPoint template below)

Some teams like to create a virtual environment (e.g., a Google Docs folder) to store all of the team's documents. Others prefer to print hard copies and create a binder for each team member.

## Additional Resources

- **Lesson Study PowerPoint Template,** see Appendix pages
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/03/Lesson-Study-PowerPoint-Template-1.ppt

# STUDY | STEP 2:

# Develop a Research Theme

The Research Theme expresses the overarching goals of your Lesson Study work, whether within a team or school-wide.

## GOALS:

- Develop or revisit your your long-term goals for student development
- Develop a draft of your "theory of action"—the approaches you will explore to build your long-term goals

## A Identify Your Long-Term Goals

Assess where you want to be and compare it to where you are.

### The Building Blocks of Your Theme

A research theme expresses the long-term goals of your work. If your team or school has already developed a research theme, revisit it now to refresh your memory about your long-term goals and ideas about how to get there.

If your team has not yet developed a research theme, begin by thinking about your long-term goals. To spark your thinking, you may want to have a copy of your school or district vision statement nearby. If you plan to focus on a specific content area (e.g., mathematics, civics), documents that spark your thinking about long-term goals of these disciplines will also be useful.

> Begin by having team members individually jot down qualities in response to the following prompt:
  - Ideally, what qualities do we hope students will have when they graduate from our school? ( If we bumped into our students in 5-10 years, what qualities do we hope they would have?)

After a few minutes of individual think time, share your lists and write all the qualities on a board or poster paper titled "Ideal."

> Now, again working individually, spend a few minutes jotting down a list of qualities in response to a second prompt:
  - What are the current qualities of our students? (For example, what qualities of our students inspire us? Anything that concerns us?)

Again, share your individual lists and write all the qualities on a second list labeled "Current."

Compare the two lists-ideal and current-and notice gaps that really speak to you as educators. Find one or two gaps where you would like to invest your time and energy.

Your research theme positively states the qualities you will work toward. Some examples follow.

- "For students to value friendship, develop their own perspectives and ways of thinking, and enjoy science."
- "Develop social-emotional skills and...a deeper understanding of mathematics"
- "Across both math and language arts, develop our students' abilities to use evidence and reasoning to support and critique arguments."
- "...to take responsibility and initiative as learners."
- "For students to develop strong academic skills that guarantee their advancement and a rich sensibility about human rights."

The last research theme above is drawn from a Japanese elementary school serving students historically subjected to discrimination, and it illustrates how educators use the research theme as a way to focus on the particular students they serve.

The research theme helps a Lesson Study team keep in mind its long-term goals. As U.S. educator Cindy Ann Black says,

> A lot of [U.S.] schools develop mission statements, but we don't do anything with them. The mission statements get put in a drawer and then teachers become cynical... Lesson Study gives guts to a mission statement, makes it real, and brings it to life.

If you already know the subject area focus of your Lesson Study work, it is fine for your research theme to focus on just one subject area (such as mathematics or language arts).

B

## Develop a Theory of Action

Now draft a plan for how you think you might achieve your goals.

### Moving from the What to the How

The second part of your research theme is a "theory of action"—how you will work toward your long-term goals and the specific research questions you will examine. What experiences in school help students move toward a goal such as "students have their own thoughts and can explain them logically?" Teachers addressing this research theme

focused their initial theory of action on two classroom routines: students' presentation of ideas at the board and their use of reflective journals. They actively tested strategies to improve these two classroom routines and posed questions about them. For example, they asked what the features are of effective student presentations and how teachers help students see the power of these strategies (such as using visual models). In order to strengthen the impact of reflective mathematics journals, teachers strategically selected several student journals from the prior day to be read aloud at the beginning of each mathematics lesson, which built students' interest in each other's ideas and helped them see the impact of well-explained ideas.

The first part of your research theme—your overarching goal—is likely to stay the same for several years. The second part of your research theme—your theory of action—is likely to change as you incorporate effective ideas into your practice and go on to experiment with additional changes designed to achieve your long-term goals. For example, the group that experimented with changes to student presentations and reflective journals went on to experiment with routines for discussion and lesson summarization that further built students' capacity "to have their own thoughts and explain them logically."

Take a few minutes to discuss your theory of action-your ideas about how to achieve your research theme. Where do you want to start? Is there a challenging element of classroom practice, such as questioning, discussion, etc., that would benefit from collaborative inquiry and move you toward achieving your long-term vision for students? Is there an element of classroom instruction crucial to your long-term vision for which team members would like to update their knowledge?

> Summarize your research theme in your team notes. Describe why your team/school chose this theme. Include a theory of action (approaches or strategies) you plan to explore to bring your research theme to life. Expect your theory of action to change and grow as you engage in Lesson Study.

## Additional Resources

- **Examples of Research Themes,** see Appendix pages xx-xx
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/03/Examples-of-Research-Themes-1.pdf

- **Developing a Research Theme Presentation,** see Appendix pages xx-xx
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/03/Developing-a-Research-Theme.pptx

# STUDY | STEP 3:

## Choose a Topic

Identify the topic for your Lesson Study cycle.

### GOALS:

- Identify the topic you will work on, and why

### Collectively Decide on Subject Matter

Agree on a topic that you would like to study with your team and bring to life in your research lesson.

### Guiding Questions for Topic Selection

Some teams have already chosen a topic (e.g., fractions, argumentative writing) before beginning their work together. Other teams choose whatever topic will be taught at the time of the research lesson. Both approaches are fine. If your team has not yet settled on a topic, consider the following questions:

- What topics are important and persistently difficult for students?
- What topics do we find difficult to teach?
- Are there new curricula, frameworks, standards or teaching approaches that we want to understand and try out as part of our lesson study cycle?

> Summarize in your team notes the focus of your topic and describe why your team chose this focus. See the Additional Resources section for examples from other lesson study teams.

### Some Cautions

Lesson study is not just about a single lesson. At this point in your lesson study work, you should be thinking about a content area and topic, not just a single lesson. As you study the topic your ideas about a specific lesson may change radically.

Lesson study is a chance to stretch your thinking. So try to choose a topic that is challenging or where there is something new you want to learn-not one where you already feel successful.

## Additional Resources

- **Lesson Study Teams' Topic Focus with Rationale,** see Appendix pages xx-xx
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/03/Topic-Choice-Rationales-1.pdf

## STUDY | STEP 4:

# Study Standards, Research, and Curriculum Materials

The point of the Lesson Study cycle is not simply to produce a lesson, but to study the topic and student thinking in depth.

### GOALS:

- Examine standards related to your topic to find out what key understandings students need to develop over the grades in your school
- Investigate student thinking related to your topic, drawing on research, your teaching experiences, and other data
- Examine your curriculum to understand how it builds the key understandings

## A Consider Your Approach

Your team's investigation of existing research and curriculum materials will build lasting knowledge about your subject, your teaching methods, and how students learn this material.

This step is the heart of the Lesson Study process. It is a chance for your team to explore the resources that exist about teaching your research theme and topic, and then share your learnings with one another.

The process may seem simple, but you'll need at least 3-4 sessions to do it well. It is also important that you take time to consider all of the different kinds of resources that might help you: standards, research on student learning, and existing curricula.

Decide how you want to divide up the research throughout your team, and how you will each share what you've learned with the group. Consider the framing questions in each section below to guide your approach.

## B Examine Standards

Examine your standards (as well as related frameworks, etc.) and consider the following questions.

- What are the key understandings students need to develop about this topic?
- How does student learning of this topic develop over the grades?

Careful comparison of related standards across grade levels often reveals hidden expectations about student learning. For example, if a phrase such as "using objects" disappears from addition-subtraction standards between grade 1 and grade 2, this raises the important question of *how* teachers can support this transition away from object use.

> Discuss your ideas about the bullets above as a team, and summarize the discussion in your team notes.

## C Investigate Research on Student Learning

Now that you have identified key understandings students need to develop, consider the following questions:

- How do students develop these understandings?
- What challenges and misconceptions are typical?
- What distinguishes a learner who deeply understands this topic from one who doesn't? What insights do students have when they have deep understanding?
- What is known about the experiences, models or insights that spark student understanding?

Your own teaching experience is one important source of information to answer these questions. So is research conducted outside your school. We recommend that you draw on both.

Begin by discussing the bulleted questions above. In your teaching, what you have noticed about student understanding and misunderstanding of the topic under study? Supplement your discussion by doing as many of the following as you can:

- As adults, try student tasks related to the topic you want to study; work independently and then share your strategies, so that you learn about different ways of thinking;
- If you wish, try a task designed to be challenging to adults, in order to experience some of the struggles students might experience;
- Examine student work-from prior years, or from a task you give students now, in order to illuminate what students understand and their misconceptions.
- Arrange for a team member to observe and interview a few students as they solve a task related to your topic of inquiry. (You can find examples at Loft.io's Lesson Study project and Math Reasoning Inventory.)

Draw on outside knowledge as well:

- Consult trusted websites, books and professional organizations to find out what is known about your topic. Our library contains some of our favorite resources.
- Ask local coaches, district specialists, or university-based colleagues for recommendations of high-quality written materials and video.

Good resources will illuminate what it means for students to really understand the topic under study, how students develop key understandings, and what gaps or misconceptions are typical. (We recommend starting with trusted sources to save time and increase the quality of resources you locate.)

If team time is short, you can consider assigning some resources as "homework" or having different team members read and summarize different resources.

> Be sure to use your team notes keep track of what you learn as you try tasks and study outside resources. You can also summarize your insights in Background and Research on the Content (Section #3) of the Teaching-Learning Plan.

## D Examine Your Curriculum

How is your own curriculum designed to build the key understandings of your topic of study? Study your own curriculum, especially any materials in the teacher's edition that illuminate the content and its development. If time permits, compare your curriculum's treatment of the topic with another curriculum (ideally, one that is research-based and well-regarded). Consider the following questions:

- How does our curriculum treat this topic? For example: What are the unit goals, and how do they relate to the big understandings we identified? What role does each individual lesson in the unit play in building the key student understandings?; Why are the lessons sequenced as they are?; Why are particular tasks designed as they are?
- What knowledge will students need going into the unit? How will they develop each new understanding that is expected in the grade-level standards?
- How does our curriculum compare with other curricula or with what is known from research? For example, what choices related to task sequence, models, examples, tools, etc. might affect student learning? Why did the writers of our curriculum make the particular choices they did? What are the advantages and disadvantages of various choices?

> Summarize your insights into the design of your curriculum in your team notes or in Background and Research on the Content (Section #3) of the Teaching-Learning Plan.


2. Plan

# 2. Plan

After analyzing what is known and debating the merits of various approaches, the team plans a lesson within a larger unit to bring to life their goals for student learning and development.

## PLAN | STEP 1:

## Research Lesson Logistics

Before diving into moving to the Plan phase, take a moment to take stock of your work in the Study Phase.

### GOALS:

- Make sure you have studied the topic (standards, curriculum, research) before diving into planning the unit and lesson
- Examine the Teaching-Learning Plan and update it to reflect what you have learned
- Take care of research lesson logistics that need advance planning

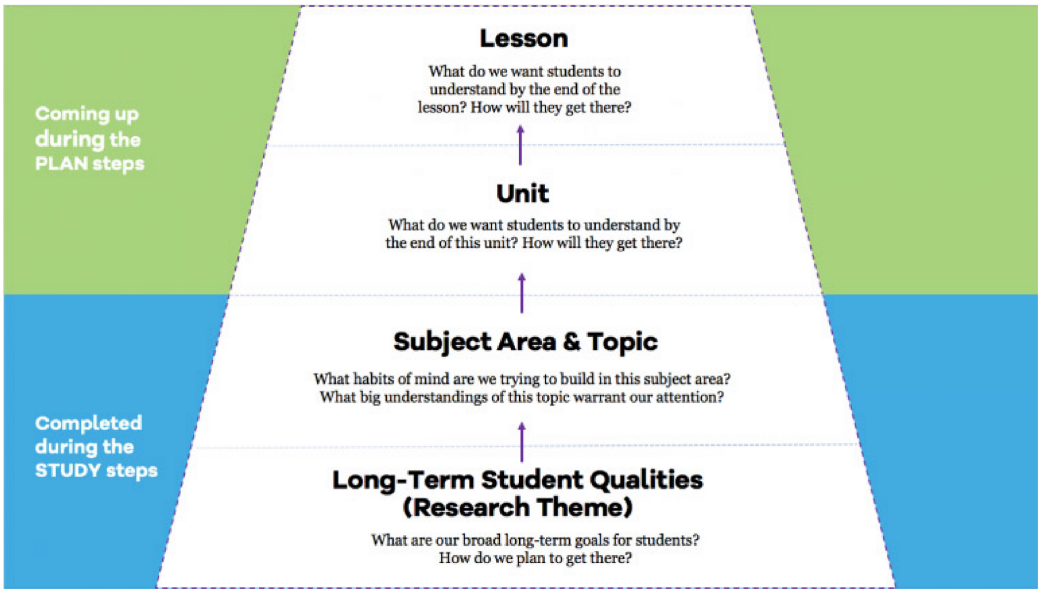
A

## Are You Ready to Plan?

Before moving to the Plan phase, it's important to take stock of your work in the Study Phase.

### Assess Your Work So Far

As shown in the graphic below, your team's work to date-articulating your long-term goals and studying the topic-provides the foundation for the Plan phase. In the graphic below, you are now transitioning from the Study phase (blue) to the Plan phase (green).



Make sure learnings from the Study phase are captured in your Teaching-Learning Plan or team notes, so you can carry them forward into the unit and lesson you plan. If needed, take some time to summarize and consolidate your team's thinking from the Study phase, and identify gaps in your knowledge that you want to continue to work on.

B

## Examine the Teaching-Learning Plan

The Teaching-Learning Plan was introduced in the Study phase. Now it's time to take a deeper look at this important document.

### Overview and Guiding Questions

Your team may already be using the Teaching-Learning Plan to summarize some of your thinking. If you are not familiar with it, now is the time to take a careful look at the Teaching-Learning Plan, which is designed to:

1. Capture your team's study of the topic, so readers can easily see what you learned.
2. Explain and justify the unit and lesson design, including how they relate to your long-term goals.
3. Guide lesson observers to collect data on key elements of the goals and theory of action.

In daily practice, teachers make many quick, solo judgments about what works for their students. Collaborating as a team to write a teaching-learning plan provides a rare opportunity to make the thinking behind teaching visible and available for discussion.

If your team is not familiar with the Teaching-Learning Plan Template, take 5-10 minutes to examine it, and note anything you find interesting or puzzling. The filled-in example of a Teaching-Learning Plan, **see Appendix pages xx-xx,** may shed light on some of the features you find puzzling. Spend another 5-10 minutes to discuss as a team;

- What features of this Teaching-Learning Plan are unfamiliar to us, and what is their purpose?
- What features might help other educators-who observe the lesson or who read the plan- learn from our team's work?

> After your review, write up components that your team has already discussed; for example, the Research Theme (with your Theory of Action) (#2) and the Background and Research on the Content (#3).

## Additional Resources

- **Teaching-Learning Plan Template,** see Appendix pages xx-xx
  - Online access to Teaching-Learning Plan template in google drive https://docs.google.com/document/d/16zykKFThvsYFUvsjxx7du_gjjxUyDSC4CEn6G2gkBtU/edit#heading=h.i5bguiywfxqq. You will be prompted to make a copy.
  - Pre-filled Example of Teaching- Learning Plan (1), see Appendix, pages xx-xxx

C

## Lesson Logistics

Before you delve into planning of the unit and research lesson, it's a good idea to address any outstanding logistics from the list below.

### Decide the Research Lesson Date and Instructor

If you do not yet know which team member will teach the research lesson, you may want to decide soon (or agree when you will decide). Among experienced lesson study practitioners, teachers often commit to teaching a research lesson every year or two, as a way of building their professional learning, so you may already have an identified instructor. Sometimes the research lesson teacher naturally emerges during the Cycle, as one member of the team develops a strong vision for the lesson and interest in seeing the lesson with their own students. If more than one teacher is interested in teaching the research lesson, you can schedule it to be taught twice, preferably with at least a day in between teachings. If the lesson will be taught more than once, we recommend that you conduct the observation and post-lesson discussion on just one of the lessons, so that the focus is on learning deeply from the team's lesson design-not on comparing two classrooms.

### Other Logistics for the Research Lesson

Once you have set the instructor and date, you can:

- Arrange substitutes for the team members
- Collect parent and student consent forms for the research lesson class (if you plan to take video or collect student work)
- Invite a specialist to provide commentary at the end of the post-lesson discussion (see Reflect Step 3)
- Choose a moderator for the post-lesson discussion (see Reflect Step 2)
- Invite other educators to observe the research lesson, if desired.

More information about these logistics for the day of the research lesson is included in Plan Step 7.

## PLAN | STEP 2:

# Examine the Unit Plan

A lesson needs to be considered within the context of the overall unit.

### GOALS:

- Identify the unit goals, record them in your plan, and explain the rationale for any departures from your curriculum
- Outline the unit plan and explain how it relates to your standards

## A Identify the Unit Goals

Can you articulate what you want students to understand by the end of your unit?

In the previous phase, you selected a topic and studied it in the standards, your own curriculum, and research.

> Use what you learned to outline the *Goals of the Unit* (#5) in the Teaching-Learning Plan.

If you decide to modify the unit goals found in your curriculum, explain why. The Unit Goals should answer the question:

- What do we want students to understand by the end of the unit?

> Record your unit goals in your team notes as well as in the *Goals of the Unit* (#5) in the Teaching-Learning Plan. Think of these as the working goals of your unit. You can revise them as you develop your unit plan, but for now they provide a good place to start. Many teams find it challenging, but very valuable, to articulate unit goals.

## B Lay Out the Unit Plan

What progression of tasks is the best one to help your students arrive at the unit's goals?

The unit plan shows the progression of learning experiences that will enable students to reach the unit goals. Discuss and map out with your team:

- What sequence of experiences will allow students reach the unit goals?
- What task(s) will students do in each lesson of the unit, and what will they learn from each lesson?

Revisit the unit plan in your curriculum, and consider it in light of what you learned from reading standards and research. In a perfect world, the unit plan in your curriculum will take students from where they are now to the big new understandings expected in the standards, bringing to life what is known about student learning of the topic. If you're not in that perfect world, figure out how to modify your unit plan so it will best enable students to reach the unit goals you outlined.

- Outline your *Unit Plan* (#6) in the Teaching-Learning Plan. The unit plan is usually a brief list of the lessons in the unit that specifies the main task and goal of each lesson. See the resource tile below for a sample unit plan. Be sure to explain any modifications you make so that readers will be able to understand the reason for your redesign of the unit.

- Finally, consider the *Relationship of the Unit to the Standards* (#7) of the Teaching-Learning Plan. Show how the unit relates to the Standards. What standards does your unit address? What prior standards provide a foundation for the unit, and how does the unit provide the foundation for future standards?

This overview (#7) in the Teaching-Learning Plan allows lesson observers to grasp how your unit fits with the standards and how your team developed the topic for student understanding.

## Additional Resources

- **Example of Unit Goals and Unit Plan,** see Appendix pages xx-xx
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/03/Example-of-Unit-Goals-and-Unit-Plan.docx

## PLAN | STEP 3:

# Identify and Examine the Research Lesson

Now that you have designed the unit flow, decide which lesson will be the research lesson.

### GOALS:

- Choose the lesson and identify lesson goals
- Remind yourself of your long-term goals and theory of action
- Do the lesson task and anticipate student thinking

## A Choose the Research Lesson

Identify one lesson from within your unit to serve as a research lesson.

Choose one lesson within the unit as a research lesson, to be planned in detail by your team and observed by them (and by other educators, if you so choose). Your research lesson choice may be determined by practical concerns such as timing–the date your team members can be freed up to observe. Your team's desire to study a particular element of the unit may also shape your choice of lesson–for example, you may be eager to try out a new unit introduction.

The most valuable research lessons provide ample windows into student thinking, through students' writing, small-group discussion and/or whole-class discussion, and through use of tasks that reveal students' thinking. Once you have chosen the research lesson:

> Add the *Title of the Lesson* (#1) to your Teaching-Learning Plan.

## B Clarify Lesson Goals

Use this opportunity to revise and fine-tune your goal statement.

Your unit plan specifies a goal(s) for the proposed research lesson. Tweak your lesson goal(s) as needed to make sure they capture your thinking about the following questions:

- What is the new learning this lesson expects from students?
- What do we want students to understand or know by the end of the lesson?
- What is important about this lesson?

> Write out your (working) Goals of the Lesson (#8) and add them to the Teaching-Learning Plan. Feel free to revisit and revise the goals as your team's thinking about the lesson evolves.

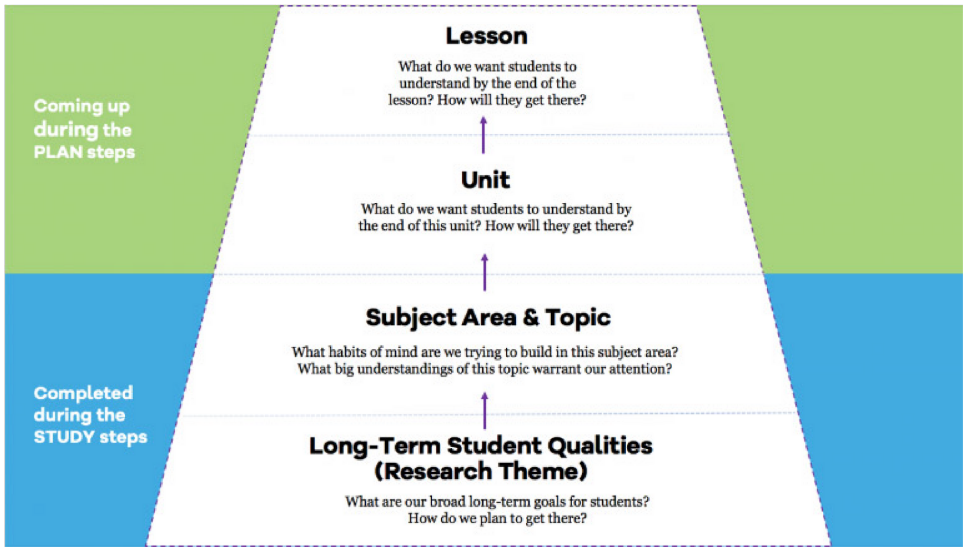
C

## Consider Your Long-Term Goals

Will your lesson bring you and your students closer to the long-term goals you identified in your Research Theme?

Just before you dive into lesson design is a good time to remember the long-term goals represented in your research theme, and your theory of action about how to get there. Some teams create a visual reminder, like the one below, that the research lesson supports nested layers of goals.

**Math: Example of Four Layers of Lesson Study Goals**




## Additional Resources

### Four Levels of Lesson Study Goals Template

If your team would find it useful to have a graphic that shows your own layers of goals, you can create one using the downloadable template available in the **Appendix, page 95.**

Download online at https://lessonresearch.net/wp-content/uploads/2018/03/4-Layers-Template.pdf

## D Do the Task and Anticipate Student Responses

Consider the central task of the lesson. Does it seem well-designed to support the goals of the lesson, unit, and research theme? Will all your students be able to find an entry point, and progress toward the lesson goals? Or do you need to modify the task in some way? Once your team has tentatively arrived at a lesson task, have each member of the team:

- Independently do the task, as if they were a student
- Imagine several students in their class, and anticipate how each one of them would respond to the task

Then share and discuss your responses to the task, using your own and colleagues' experiences to expand your thinking about how students might respond.

### The Value of Anticipating Student Thinking

Anticipating student thinking is a core teaching skill that allows teachers to notice student thinking and build bridges from it to new understandings. Anticipating student thinking and comparing your expectations with the actual student thinking during the lesson will help your team develop this core skill, which is so helpful in the "swiftly flowing river" of daily classroom life.

However, as teacher Heather Crawford notes, anticipating student thinking may initially be hard.

> It is challenging – to try and think about the students' solutions to the problem before they do it, and to try and get all of the answers they might come up with.... Before we did Lesson Study, we really didn't think about what the student responses would be to the questions.... It was, 'Well, we hope they get the right answer and if they don't then we will deal with it.' Now we are really thinking about, 'Well, what if this answer were to come up? How would we deal with it?' We think a lot more about the motivation for the lesson and making sure that the kids have the prior knowledge that they need before we teach each lesson.

> Capture your ideas about anticipated student responses in your team notes. These will be used to design the flow of instruction, so that it builds from anticipated student responses.

## PLAN | STEP 4:

# Design the Flow of Instruction

This step challenges you to design a lesson driven by student thinking.

### GOALS:

- Identify the lesson flow that will take students from where they are now to the new learning of the lesson
- Identify how students' thinking (not the teacher's telling) can drive the lesson—for example, the insight that students need to develop, and the experiences that will build it

A

## Imagine the Student's Experience

The best lessons are driven by student thinking. This section helps you design a learning flow based on your lesson goals, what you know about your students, and what you have learned about the puzzles and insights likely to propel learning.

The Research Lesson Plan (in Section # 9 of the Teaching-Learning Plan) is different from many familiar lesson plans, since it is built around anticipated student responses. What will the students think and do, and how will students develop the desired new understanding(s) over the course of the lesson? What experiences from the task itself, what insights from comparing different ideas, and what specific questions will advance students' movement toward the new understanding expected in the lesson?

Note that focusing on the flow of *student* learning is different from outlining what the *teacher* does. The term "flow" (*nagare* in Japanese) implies a natural force, like that of water flowing. The research lesson plan focuses on the flow of learning-why and how student understanding will change over the course of the lesson. While we can carefully design the lesson landscape and sometime redirect the flow of conversation, we can't really pull learning from students, any more than we can pull water up a stream bed.

What leads to changes in student understanding during a lesson? While simply doing a task or hearing an explanation might sometimes spark students' understanding, learning is usually more complicated than that. A basic learning flow outlined in many Japanese lesson plans is that students bring their own prior knowledge to a new task and, as they grapple with the task and explain their thinking, they encounter a puzzle, tension or contradiction that forces them to extend or refine their thinking in some way. A reader of the research lesson plan can grasp this flow-can understand the prior knowledge students

are expected to bring to the task, the puzzle or tension expected to arise, and the new understandings expected to emerge as students compare ideas and resolve the tension.

For example, students might be faced with a puzzle such as how to compare two fractions with different denominators, or how to reconcile two contradictory accounts of a historical event.

B

## Create the Lesson Flow

Consider the activities, discussions, puzzles, and tensions that will make up the lesson from beginning to end.

> Using the left column of the Research Lesson Plan (# 9 of the Teaching-Learning Plan), capture the learning flow for your research lesson.

This should include the tasks or activities of the lesson, anticipated student ideas, the puzzles or tensions that will arise through discussion and comparison of student ideas and how students will refine or expand their understanding as they confront these tensions. Allocate an amount of time for each lesson element, from introduction through summary. Specifying time helps makes your team's thinking about lesson design visible. The following prompts may be helpful in outlining the learning flow:

- What is the "drama" of the lesson? What is the sequence of experiences that will propel students from their initial understanding to the desired understanding?
- How might the student responses you anticipated, including misconceptions, be highlighted or compared to spark student learning?
- What might students notice that moves their thinking forward? What insights or actions would we expect from students who have a breakthrough in their understanding?

While the left column captures the lesson flow, the middle column of the Teaching-Learning Plan captures Teacher Support. For example, you might note key questions the teacher will ask the class, questions that will be posed to students who do not get started, etc..

### Some Cautions

As you plan the research lesson, group members may be tempted to micromanage each move and comment the lesson instructor will make. Instead, train your focus on the content and how students will interact with it to build the new understandings of the lesson. If a lesson element is likely to affect students' learning in important ways, then it is legitimate territory for group discussion. Problem wording and content, choice of manipulatives, key teacher questions and design of graphic organizers are all examples of lesson elements that may affect student learning.

Other decisions, such as whether to have students at desks or gathered on the rug, may be best left to the instructor, unless you think they will shape student learning-for example, it may be important for students to be at desks so they can update their thinking in their journals as they listen to classmates present.

## PLAN | STEP 5:

# Focus the Data Collection

Well-designed data collection allows a fruitful post-lesson discussion.

### GOALS:

- Identify data to collect during the lesson
- Choose data collection tools and approaches

A

## Identify Data to Collect

Decide on the data that will help you grasp what students learned during the lesson and how they learned it.

What data will illuminate student thinking and learning related to the lesson goals? What data will help you understand the catalysts and barriers to learning as the lesson unfolded? What data will help you understand the theory of action in your research theme? These are the data you want to collect.

Your research lesson plan is a hypothesis about the learning flow that will occur. Your data collection should help you understand each phase of the learning flow. Were students interested in the task presented to them? What prior knowledge did they bring to bear? Did the student thinking you anticipated emerge, and what additional thinking arose? Did the tension or puzzle you expected emerge, and did it drive students to refine their thinking? What helped students to refine their thinking or prevented them? How did students' thinking at the end of the lesson differ from their thinking at the beginning of the lesson?

The specific data you collect depend on your research theme and lesson goals. For example, if you are trying to improve the quality of inferences students make from primary source documents, you might want to trace the changes in those inferences over the course of the lesson, and the catalysts for change. If you think that partner discussions can help students formulate better questions, you might study students' questions before and after the partner discussions.

B

## Choose Data Collection Approaches and Tools

Plan for the different data sources – such as student observations, written work, and lesson documentation – that will enable you to understand how the lesson unfolded and what students learned.

Many lesson study teams choose several focal students to follow over the entire unit, to understand how the learning trajectory of those students relates to the vision in the unit plan. This can be done by examining students' written work over the unit. For example, a team studying a unit on magnets selected three students with different levels of science achievement/interest and examined their reflective science journals for each lesson of the unit. Journal entry summaries from these three students included in the Teaching-Learning Plan allowed observers to understand the ideas these students had developed during each lesson of the unit, and also to examine any new ideas the students developed during the research lesson (the culminating lesson of the unit, in which students built toys to show principles of magnetism).

For the research lesson itself, it is generally most fruitful to have observers follow a selected student(s) from the start to the finish of a lesson in order to understand exactly how the learning progressed for that student(s), and what supported or obstructed learning. Be sure to sure to select for observation students who will enable you to understand how the lesson played out for different learners–for example, second language learners versus native speakers, reluctant versus eager learners, struggling and advanced students. One or more team member can be assigned to collect additional data of interest to the team.

The following data collection tools will typically be needed:

- A seating chart with student names (copies for all observers, so they can more easily grasp and record student actions).
- A prepared data collection form that reminds observers of the lesson goals and particular strategies you want to look for. (It may be useful to give a name and abbreviation to each strategy, to speed up note-taking. RA is repeated addition, M is multiplication, etc.). The form should have a column to note time; the data collection template below provides a customizable example.
- A data source from the end of the lesson, such as a task, reflective journal, or piece of writing that captures individual students' thinking at the end of the lesson.
- A plan to capture the work on the board or other public venues (e.g., photographs of the board, poster paper that can be brought to the post-lesson discussion, or photographic record of other publicly used materials).

Records of students' prior thinking are very valuable. For example, if your unit is designed to help students build conceptual understanding of multiplication, it may be useful to note on the seating chart what strategies (counting by ones, skip counting, repeated addition, etc.) each student used in the prior lesson.

The team should add any data collection elements specific to their goals and theory of action. For example, a team focused on building teacher questioning might note the time and content of each teacher question, or a team interested in English learner development might track speech initiated by English learners.

A modifiable data collection template is found in the Appendix, pages a23-a25.

Assign individual team members or outside observers to cover all the planned data collection elements.

> Design your data collection plan and add to *Points of Evaluation* (# 10 in the Teaching-Learning Plan template)

## Additional Resources

- **Guide to Data Collection and Lesson Observation Log,** see Appendix pages xx-xx
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/01/Lesson-Observation-Log.pdf

## PLAN | STEP 6:

# Teach a Mock-Up Lesson

In a mock-up lesson, the instructor tries out the lesson with other teams members serving as "students."

### GOALS:

- Instructor tries out key lesson elements that may be challenging, such as choosing students to present work, posing questions specific to their work, organizing the board
- Team members notice improvable aspects of the lesson as they experience it from a student's point of view

---

### Try the Lesson Out

Having a "dress rehearsal" of the lesson can reveal fixable problems or gaps in the lesson and help team members experience the lesson from the student point of view.

### The Benefits of a Run-Through

In a "mock-up lesson" just prior to the research lesson, team members take the role of students, and the instructor teaches, focusing especially on challenging elements of the lesson, such as

- Specific teacher questions during each phase of the lesson
- Eliciting and sharing "student" ideas
- Using the board and other public spaces to support students' learning from one another
- The end-of-lesson summary, using actual responses from the "students" (teammates)

The mock-up lesson allows team members to notice how the lesson feels from a student's point of view. Team members can be assigned to produce each anticipated type of student thinking, so that the instructor can rehearse the specific questions that will be asked. Team members can also jot down whatever they noticed as "students"–for example, ambiguous questions, the difficulty of writing legibly while seated on the rug, the need for more partner chats, or the disconnect between their idea and the lesson summary.

Ideally, your team will already have clear lesson goals when you go into the mock-up lesson. The mock-up lesson should help you hone the questions and moves that will help

you reach those goals. Your team may also find the mock-up lesson clarifies lesson goals. Your team may also find the mock-up lesson clarifies lesson goals.

### Plan Your Board Organization

A well-organized board makes key ideas visible throughout a lesson, so that students can:

- Revisit each element of the lesson as needed—the problem or questions being discussed, key concepts or illustration, classmates' analyses or solution strategies, etc.
- See the "story" of the lesson, from the initial problem or question, through the analysis and insights developed by the class, to the summary of what they learned
- Compare different concepts or strategies and consider how their own thinking relates
- Experience an organized model for their own note-taking and reflection
- Become "meta-cognitive" as they see how new ideas are developed in the subject area

> When you conduct your mock-up lesson, take a photo of your board work (if applicable) and add this as your Board Plan (#11 of the Teaching-Learning Plan).

## Additional Resources

### Mock-up Lesson Video

Hear from teachers about why they use the mock-up lesson as part of their lesson study process and see excerpts from mock-up lessons in action.

- Watch video at this link: https://vimeo.com/189574266

## PLAN | STEP 7

# Confirm Research Lesson Day Responsibilities

Finalize your Teaching-Learning Plan and confirm logistics for the research lesson day.

### GOALS:

- Read over the Teaching-Learning Plan and imagine the experience of a colleague reading it for the first time
- Update the Teaching-Learning Plan as needed, based on students' recent learning, mock-up lesson, or other factors
- Divvy up responsibilities for the research lesson day

A

## Finalize the Teaching-Learning Plan

The Teaching-Learning Plan is designed to capture and share your team's thinking and learning. In this step, you'll put the finishing touches on your plan.

### Make Final Adjustments

The Teaching-Learning Plan captures what you have learned so far in the lesson study cycle, for your team's use and to inform other educators.

Read over the Teaching-Learning plan and identify any sections that need to be updated. For example, make sure that the Background and Research section (#3) and the Rationale for the Design of Instruction (#4) capture your team's learning to date, and that the Research Lesson Goals and Plan (#8 and #9 on the Plan template) reflect what you learned from the mock-up lesson. It may also be necessary to adjust the Unit Plan to reflect the actual progress of the learning by the target class. The gaps between what you initially planned and what unfolded can be informative to readers of the Teaching-Learning Plan.

> As needed, update the *Background and Research section* (#3), *Rationale for the Design of Instruction* (#4), *Goals of Unit* (# 5), *Unit Plan* (#6), *Goal of the Research Lesson* (#8) and *Research Lesson Plan* (#9).

### Do a Final Read-through

As you do a final read-through of the Teaching-Learning Plan, try to imagine the experience of a first-time reader of your plan. Can the reader understand what you learned about the topic and its teaching-learning? Can they understand why you designed the unit and lesson as you did, and what data to collect during the lesson?

Teaching-Learning Plans can take on different styles; we have provided some examples of plans created by experienced Lesson Study practitioners.

## Additional Resources

- **Example of Lesson Plan 1 & 2,** see Appendix pages xx-xx
  - Download online Lesson Plan 1 at https://lessonresearch.net/wp-content/uploads/2018/01/Example-complete-lesson-plan.pdf
  - Download online Lesson Plan 2 at https://lessonresearch.net/wp-content/uploads/2018/03/LessonAreaGeoboard_4thgrade-2.pdf

B

# Confirm Lesson Day Responsibilities

Divvy up responsibilities for the research lesson day, so that the research lesson instructor is well-supported, the day flows smoothly, and you have good records of your learning.

### Split Up the Work

Since the teacher teaching the lesson already shoulders considerable responsibility, other group members may want to take charge of the support tasks in the list below. If your research lesson is to be observed by people beyond your immediate planning group, it is beneficial to ask someone outside your team to facilitate the post-lesson discussion, and to add a pre-lesson discussion (about 30 minutes; see Teach, Step 1) to familiarize attendees with the Teaching-Learning Plan and observation process.

### Tasks Related to the Teaching-Learning Plan

Assign a team member responsibility for each of the following tasks:

- Review and finalize the Teaching-Learning Plan.
- Send the Teaching-Learning Plan to the final commentator (at least 3-4 days in advance of the research lesson, or as agreed at the outset).
- Copy the Teaching-Learning Plan and any data collection tools for the team and any additional observers.

### Tasks Related to Teaching the Research Lesson

- Make or obtain lesson materials (e.g., handouts, poster paper, lesson tools)
- Prepare students for extra observers, by letting students know that teachers are focused on improving lessons; they will be closely listening to students, for the purpose of learning from students how to improve lessons.
- Check student consent, if recording video.

### Tasks Related to the Research Lesson Day

- Create an agenda for the day (see the example provided below).
- Designate note-taker for the post-lesson discussion.
- Designate facilitator for the post-lesson discussion (check out Reflect Step 2)
- Inform the school and observers about the logistics of the day

## Additional Resources

- **Sample Agenda for Research Lesson Day,** see Appendix pages xx-xx
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/01/Sample-Template-Research-Lesson-Day-Agenda.docx


3. Teach

# 3. Teach

As one team member teaches the Research Lesson, other team members carefully observe and record individual students' learning, seeking to understand the lesson from students' points of view. The observing teachers get the chance to be researchers in the classroom.

## TEACH | STEP 1:

## Conduct Pre-Lesson Discussion

Observers are key to successful Research Lessons. This section provides guidelines for observers and an agenda for the pre-lesson discussion.

### GOALS:

- Acquaint all lesson observers with the observation guidelines and protocol
- Conduct a pre-lesson discussion for any non-team members who will observe the lesson

---

A

## The Role of Observers

Observers are key to successful Research Lessons. Prepare observers well to maximize your team's opportunity to learn.

### Observation Guidelines and Protocol

The role of observers is to watch and collect data. If observers help students, it's difficult to draw inferences about the lesson's impact. So observers should resist the urge to help students or interact with them. It is important to let students know in advance that the extra teachers in the room will be studying the lesson so they can learn how it can be improved; they will not be helping the students. That way, students won't think they've encountered a roomful of exceptionally unhelpful adults!

All observers, including team members not teaching the lesson, should carefully review the observation protocol below. Many lesson study teams read each item out to observers during the pre-lesson discussion. You may also want to provide it as a handout, especially if you have observers new to lesson study. During the research lesson, pointing to the observation protocol can provide a silent and respectful way to handle any lapses in observer etiquette. Remember that the observers provide extra eyes and ears, not extra mouths and hands.

| OBSERVATION PROTOCOL FOR THE RESEARCH LESSON | |
|---|---|
| 1 | Respect the classroom atmosphere. For example, silence phones, refrain from side conversations, and arrive on time and stay for the entire lesson. |
| 2 | Do not help students or otherwise interfere with the natural flow of the lesson; for example, be careful not to block students' view when they need to see the board or the teacher. |
| 3 | Collect data requested by the lesson planning team. Focus on the "Assessment: Points to notice" laid out in the lesson plan. Prepare by reading the lesson plan thoroughly. |
| 4 | Focus on the same student (or pair of students) over the entire lesson. This is likely to yield the best picture of whether and how the student(s) developed understanding. |
| 5 | If the lesson study team concurs, it is all right to ask clarifying questions of the student after the lesson is concluded. |

B

## Pre-Lesson Discussion

Before teaching and observing the lesson, the team describes context and goals.

Use the following agenda for the pre-lesson discussion:

1. Welcome and Introductions (5 min)
2. Background and Context of the Lesson (5 min)

The planning team briefly describes the lesson and points out the sections of the Teaching-Learning Plan where observers can learn about the lesson and unit goals, long-term goals, and rationale for the lesson design.

3. Silent Reading of Teaching-Learning Plan (15 min)

Participants read the Teaching-Learning Plan. Participants try the lesson task themselves.

4. Clarifying Questions (10 min)

The planning team answers any clarifying questions raised by participants, and clarifies what evidence they are asking participants to collect.

5. Observation Procedures (5 min)

Team reviews protocol for observing a Research Lesson and identifies students to observe.

Refer to this video found at the link below that shows how one Lesson Study team prepared observers for their lesson. In the Appendix, pages xx-xx reference the Example of Teaching-Learning Plan Associated with the Video. It is also available online to download at https://lessonresearch.net/wp-content/uploads/2018/01/Research-Lesson-Proposal-G4-December-2017-1.pdf.

Video access: https://vimeo.com/253092402

## Additional Resources

- **Pre-Lesson Discussion Agenda,** see Appendix pages xx-xx
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/01/pre-lesson-discussion-agenda1.pdf

# TEACH | STEP 2:

## Teach and Observe the Lesson

Team members and observers collect the planned data, while taking care not to interfere with instruction.

### GOALS:

- Support the lesson instructor by making sure observers are "eyes and ears, not mouths and hands"

## The Day of the Lesson

Now it's time for the most interesting part of any research effort: seeing how your ideas fare in practice!

### Points to Keep in Mind

Observers should know their data collection assignment and be well-prepared to serve as "eyes and ears, not mouths and hands."

The lesson instructor should feel support from team members with any last-minute logistics that arise.

Everyone should remember that a lesson is a "swiftly flowing river." However carefully the team has anticipated student thinking and designed the lesson, unexpected things may happen, and the teacher's role is always to exercise professional judgment in the moment about what will best serve the students-not to follow a lesson plan no matter what. The gaps between what we expected and what unfolded can spark powerful insights. The Teaching-Learning Plan was produced through careful study, but should still be regarded as a contingency plan, not a blueprint.

# 4. Reflect >

# 4. Reflect

In a post-lesson discussion, team members share their observations of individual students, building a picture of what worked and didn't. They draw out implications for teaching the particular content, and teaching and learning more broadly. An outside specialist may observe the lesson and provide comments. In a final meeting, the team reflects on what they learned from the cycle and how to share it more broadly.

## REFLECT | STEP 1:

## Review Data

Take a brief pause after the lesson to give team members and observers a chance to review data they've collected.

### GOALS:

- Review lesson notes and student work to identify important data for post-lesson discussion

## Prepare for the Post-Lesson Discussion

Before jumping into the post-lesson discussion, give observers the chance to review their own notes and student work and to collect their thoughts.

### Carefully Review Notes and Student Work

Immediately following the lesson, give observers and planning members at least 10 minutes of quiet time to review their notes before the post-lesson discussion starts. Encourage observers to consider which of their observations to share in the discussion, and to be selective, rather than providing a long list.

Make sure student data from the lesson (such as student journals or tasks) are available for review. Review of the work from all students allows observers to refine and expand the knowledge they gained from observing a particular student(s). Artifacts of the lesson (such as posters capturing the public writing) should also be available.

Provide observers with different-colored sticky notes to flag and categorize key observations in their notes or in student work.

For teams focused on students' writing, you may want to allow substantial time (30 minutes or so) for all participants to read all student writing and attach sticky notes that relate to features of interest.

Organize the post-lesson discussion around a shared set of questions in order to help observers focus their verbal and written comments. Often these shared questions are developed in advance by the lesson study team and included in the Teaching-Learning Plan (# 10), but sometimes interesting new questions emerge during the research lesson, and can be announced at the beginning of the post-lesson discussion.

## REFLECT | STEP 2:

## Conduct Post-Lesson Discussion

The chance to talk, reflect, and think together is the heart of learning from the research lesson.

### GOALS:

- Understand how the post-lesson discussion contributes to a team's learning
- Adopt a discussion agenda suited to the size of your team

A

## Guidelines for Discussion

Creating a good environment for the post-lesson discussion is vital to support learning.

### Design of the Post-Lesson Discussion

Remember that the long-term goal of the post-lesson discussion is to create a professional community that wants to continue to share and improve instruction. This is most likely to occur if the post-lesson discussion surfaces compelling ideas and leaves participants wanting to talk more.

The style of the post-lesson discussion will differ depending on the number of participants. If you are a relatively small group (say 10 or fewer), each participant may be able to have a short time to report on the student(s) they observed, with a focus on the questions and points to notice posed by the team.

For larger groups, it is advisable to have data shared out within small groups, and to have a representative of each group report out in whole-group discussion. Colored sticky notes prepared by each observer and color-coded to the team's questions can also be used to provide feedback to the team.

Whatever the size of your post-lesson discussion, we suggest you observe the following protocols:

- Let the lesson instructor speak first, so that they have the opportunity to explain any unexpected events or challenges before these are characterized by others – for example, places where the lesson flow was not as expected.

- Have the team members speak next, so they have the opportunity to explain the thinking and planning behind the lesson and to take collective ownership over the lesson before hearing from outside observers. It is particularly useful for the team to revisit the lesson rationale when discussing differences between what was planned and what actually happened.

- The whole group discussion should focus on the data that observers were asked to collect, using it to answer the questions posed by the team. Observers should provide specific examples from the student work and conversations they recorded; they should not speak impressionistically about the quality of the lesson. Having outside observers focus on the team's rationale helps them focus on the team's needs while still looking at the lesson with fresh eyes.

- The discussion should not become a ping-pong match. Team members don't need to respond to every comment. Grouping questions and having the team answer a group of questions at once limits grandstanding and digression.

- Limit free discussion time. The best post-lesson discussion will leave participants hungry to keep talking about what they learned.

Sticking to these protocols may strike some as restrictive, but as teachers in Japan have noted, the conclusion of the formal post-lesson discussion is "the beginning, not the end" because teachers can now talk differently with one another based on an instructional experience they have shared.

## Sample Post-Lesson Discussion Agenda

This sample post-lesson discussion agenda is structured with the above protocols in mind:

| Post-Lesson Discussion Protocol | |
|---|---|
| 1 | **The Instructor's Reflections** (5 min) – The instructor restates the aims for today's lesson and comments on what was learned related to the lesson aims and plan–for example, did the lesson flow as expected, or was there anything unexpected? |
| 2 | **Sharing Observational Data** (15 min) – Lesson study team members, followed by other observers, present data from the lesson, focused on the questions laid out by the team and the observation points noted in the Teaching-Learning Plan. Depending on the number of observers, observations may be presented in small groups, each of which share out several key observations. |
| 3 | **General Discussion** (15 min) – A moderator is recommended if outside observers attend. Discussion should focus on the questions laid out by the team, or other questions such as those below. Avoid "point-volley" exchanges and serial disconnected commented. For example, if someone makes a claim, invite others to concur or disagree by sharing supporting or conflicting data.<br>▪ What was learned about the questions posed by the team?<br>▪ What was learned about the students' progress on the lesson, unit and long-term goals?<br>▪ What are the implications for future instruction? For example, what are the implications for the next lesson for these students, or for instruction more broadly? |
| 4 | **Final Commentary** (15 – 20 min) – An invited outside commentator discusses the lesson's relation to key issues in the teaching and learning of this subject matter. |
| 5 | **Appreciations & Close** (5 min) |

## The Power of Disagreement

Educator Deborah Ball notes the value of disagreement:

> Masking disagreements hides individual struggles to practice wisely and so removes a good opportunity for learning. Politely refraining from critique and challenge, teachers have no forum for debating and improving their understandings.

When asked how it feels to have research lessons criticized by colleagues, Japanese teachers often reply that critical feedback is a mark of respect. As one said:

> Colleagues offer criticism because they expect you can improve, and because there is something in your teaching worth improving on. What would really be scary is if they remained silent.

The most important outcome of the post-lesson discussion is whether educators leave with the desire to keep talking, keep sharing practice, and keep improving.

# REFLECT | STEP 3:
# Final Commentary

A knowledgeable outside commentator can model skilled observation and boost team members' learning.

## GOALS:

- Understand the value added by a knowledgeable final commentator
- Understand the characteristics to seek in a final commentator

## The Role of the Final Commentary

> *"When I was a novice teacher, I observed research lessons with experienced teachers. I worked so hard to observe the lessons carefully, but when experienced teachers shared their observations during the post-lesson discussions, I was always shocked. I had been in the same classroom, at the same time, with the same conditions. But how much those educators could see! I had never realized. It's so important to develop one's eye and hone the power of observation."*
>
> – Dr. Akihiko Takahashi, Associate Professor of Elementary Mathematics, DePaul University, Chicago, IL

### Good Final Commentators

Final commentators play an important role in Lesson Study. As Dr. Takahashi notes, they should model how to carefully observe students. They should also grasp the team's goals, listen closely to the post-lesson discussion and build on it or add an important missing dimension. The comments should focus on the subject area, lesson design, student responses and possible next steps.

By the end of a good final commentary, Lesson Study team members and observers find they have much more to discuss and are curious to continue their exploration. Good final commentators:

- Are keen observers of instruction and highly knowledgeable about the subject matter.

- Have a track record of improving their own teaching and supporting the improvement of colleagues.
- Take a learning stance, noting what they have learned from the plan and instruction.
- Grasp what teachers want for students, and help them work toward it.
- Ideally, have firsthand experience as a research lesson instructor.

## Presenting the Commentary

Typically final comments for a research lesson last between 15-40 minutes and follow a sequence:

1. **Thank the instructor and team.** Begin with appreciations to the instructor and team, noting that their willingness to open up their classroom teaching build the education profession.

2. **Start with lesson strengths.** Share one or more strengths of the lesson. Note what you learned from the lesson plan and instruction.

3. **Dive deeper.** After sharing a few positive learnings, dive deeper into the content area, observations of students, the lesson design, or another entry point that is key, given your observations.

4. **Target growth.** Understanding the team's aspirations —and giving a purposeful and reachable next step—is what distinguishes great commentary. What will help this team grow? Ideally, team members should feel they have learned something important from your commentary, and should be eager to act on what they've learned and to continue lesson study.

5. **Thank the instructor, team, and observers again.** Express gratitude for the learning made possible by the instructor and team, who generously opened up their practice.

If you are interested in learning how to become a final commentator, visit the Courses page to learn more.

# REFLECT | STEP 4:
# Consolidate Your Learning

Set the stage for your learning to continue beyond the day of the research lesson.

## GOALS:

- Synthesize what you have learned during the Lesson Study cycle
- Plan for your future learning and for sharing what you have learned

---

1

## The End-of-Cycle Reflection

To set your team up for further success, make sure you end your Lesson Study cycle with an eye on the future.

### What Next?

You've now completed a Lesson Study Cycle, from thinking about your goals to bringing them to life in an actual lesson, to seeing what happened when the rubber met the road.

Take some time to consolidate your learning from the cycle. You can do this immediately following the post-lesson discussion, but many teams prefer to do it a few days or a week later. It may be useful to reflect on the following prompts individually, and then discuss as a team.

What did I learn that I want to carry forward in my daily practice? For example, what did I learn about

- The subject matter
- Student thinking
- Teaching
- Professional learning habits, such as anticipating student thinking, examining student work, or studying outside resources and curriculum materials

What did I learn about working with other adults at my school to improve instruction? For example, what did I learn about

- Making Lesson Study useful and efficient
- Our research theme and how to pursue it at our school—for example, routines we want to encourage or new approaches we want to try
- Welcoming others into our work

Discuss your responses, as desired, with your team. What would you like to learn and do next? Has the Cycle uncovered a gap in student learning or a new question of interest to your team? Is there another strategy to support your theory of action that you want to test? What elements of your work would you like other educators to know about?

> Summarize your team's learning and responses to the questions above in Consolidate Your Learning (#11) section of the Teaching-Learning Plan.

## Additional Resource

- **End-of-Cycle Reflection,** see Appendix page 102.
  - Download online at https://lessonresearch.net/wp-content/uploads/2018/01/End-of-Cycle-Reflection-1.pdf

2

# Share Your Learning

Presenting what your team has learned to other educators deepens your learning and extends insights beyond your team.

### Opportunities to Share

Most school-wide Lesson Study has been built by teachers who find opportunities to share their work with colleagues-who make presentations at faculty meetings, and invite colleagues observe and discuss research lessons.

Lesson Study has spread across the U.S. as teachers have presented their work in public lessons, at conferences, and in educational journals. Your Teaching-Learning Plan and reflections on what the cycle has taught you may constitute the core of a presentation, report, or journal article.

You can find examples of such articles in *Language Arts*, where Jackie Hurd and Lori Ricciardo-Musso shared their learning from a lesson study cycle on comprehension of expository text, and in *History Teacher*, where Alameda County (California) teachers describe a cycle focused on increasing student understanding of the economic and moral dimensions of slavery. More recently, Alex Laughlin-Johansen presented a 4th grade research lesson on fractions at the National Council of Teachers of Mathematics regional conference in Chicago.

Please feel free to reach out to the Lesson Study Group at Mills College to share your experiences and findings. We will connect you with opportunities to share your work more broadly if we can.

## Celebrate Your Learning

It takes courage for teachers in the United States to pioneer lesson study. Your Lesson Study group has taken risks to break down the walls that often isolate American teachers. You have demonstrated your commitment to self-improvement in ways that may ripple through your school and beyond. Whatever else you do, be sure to congratulate and celebrate yourselves and your work! The post-lesson Happy Hour or dinner out is a Japanese tradition that transfers happily to the U.S. (Hint: The lesson instructor gets treated!)

# APPENDIX

# Considerations in Working with Outside Specialists to Support Lesson Study

Lesson Study can be greatly enhanced by collaborating with an outside specialist—such as a teacher or researcher who is highly knowledgeable about the subject matter under study and its teaching-learning. It is most effective to involve an outside specialist early on, so that the specialist has a chance to contribute ideas about the direction of the work, to suggest curricular resources, and/or to schedule time to serve as a commentator on the research lesson.

An outside specialist can greatly ease teachers' work in locating useful materials within the huge variety of purportedly useful internet and print resources. However, keep in mind that a subject matter specialist who routinely meets with the group—particularly one who quickly jumps in to help, and who team members look to as an authority—can also keep teachers from doing certain kinds of learning.

If you choose to use an outside specialist, make sure he or she understands the teacher-led, collaborative, student-focused nature of Lesson Study. Sharing the following table may help the specialist understand the differences between Lesson Study and traditional expert-led professional development.

| Traditional Professional Development | Lesson Study |
|---|---|
| Begins with answer | Begins with question |
| Driven by outside "expert" | Driven by participants |
| Communication flow: Trainer -> teachers | Communication flow: among teachers |
| Hierarchical relations between trainer and learners | Reciprocal relations among learners |
| Research informs practice | Practice is research |
| by Lynn Lipak, Paterson School #2, New Jersey | |

Additional resources in Courses (**https://lessonresearch.net/resources/courses/**) support specialists to serve as final commentators. If you plan to have a subject-matter specialist meet routinely with your team, we recommend you choose a different specialist to serve as final commentator, since a primary function of that role is to bring "outside" eyes to the team's research lesson

# Tips for Lesson Study Facilitation

Because teachers are busy and meeting time is always at a premium, Lesson Study teams benefit from good facilitation. In our experience teachers tend to be good facilitators; it comes with the territory of teaching and learning. Lesson Study also has some specific features that are helpful to hold in mind. The bullets below provide some facilitation tips:

- Prepare a tentative meeting agenda ahead of time based on prior discussions and consensus with your team. A sample agenda is provided on our website.

- Take time to establish group norms and use these to guide your meetings. For example, if the focus norm for a meeting is "share the air," then ask quieter team members to share their thinking at strategic points of the meeting.

- Encourage all team members to raise issues, questions or noticings. You can set the tone for joint ownership of the team's learning at the beginning of each meeting by checking to see if the agenda needs modification.

- Provide access or make copies of agreed-on readings, videos, or other materials in advance.

- Keep the discussion on track and monitor the agenda. Stick to the agenda's agreed-upon items and times or make a joint, explicit decision to modify them if needed.

- Keep student thinking and learning central to your discussions. Avoid jumping into planning instruction before you have discussed the learning of students.

- Notice whether meeting materials and visual aids are supporting team members' learning and adjust in real time. For example, record ideas on chart paper as needed.

- Provide opportunities for individual thinking and reflection as needed during meetings so that all team members can think through their own ideas, task responses, etc.

- Provide opportunities for process checking with the team on how the meeting processes are working.

| The Cycle | Time (1 to 1.5 hour sessions | Date(s) | Activities |
|---|---|---|---|
| **STUDY**<br>student tasks, curriculum, video, standards | 3 - 4 sessions | | Establish group norms and roles; acquaint team members with lesson study, as needed; study research, math tasks, student work, curriculum, video excerpts, and standards. |
| **PLAN**<br>the research lesson | 3 - 4 sessions | | Plan the research lesson, including anticipating student thinking and planning of data to be collected during the lesson. |
| **TEACH**<br>the lesson after a pre-lesson discussion | 30 minutes + 1 class | | Share protocols for the observing a research lesson and prepare observers to collect data. Have one team member teach the research lesson while other team members observe and collect data. |
| **RELECT**<br>on the lesson by conducting a post lesson discussion. Synthesize what you learned from the lesson study cycle | 1.5 hours ***same day as lesson*** + 1 session | | Conduct a post-lesson discussion to share observations and draw out what was learned. Synthesize your learning at the end of the cycle: What did we learn from the lesson cycle? What are the implications for our teaching and learning? What learnings do we want to share with others? What new understanding and questions do we want to carry forward in our work? |

| Time | Agenda Item |
|---|---|
| 1 minute | **Choose Roles** Assign team members to each needed function, e.g. facilitator, note-takers, time-keeper |
| 1 minute | **Review Norms** Choose one or more norms to monitor during the meeting and reflect on at the end. |
| variable | **Review notes from last meeting** |
| variable | **Today's Content** Work on today's topics. Facilitator and team members should place agenda items here in advance of meeting and review and updated as needed. |
| 5-10 minutes | **Meeting Summary** Summarize decisions, any assignments, and build tentative agenda for next meeting. Decide on facilitator if not pre-designated. Summarize major decisions or learnings and make notes to capture them. Build a tentative agenda for next meeting. Reflect on norm(s), how they worked in practice, and whether any changes in norms are needed to ensure the group functions well. |

**Today's Notes:**

**Action Items:** **What** **Who**

# Meeting Agenda Template

| Time | Agenda Item |
|---|---|
| 1 minute | **Choose Roles** |
| 1 minute | **Review Norms** |
| variable | **Review** |
| variable | **Today's Content** |
| 5-10 minutes | **Meeting Summary** |

**Today's Notes:**

**Action Items:** **What** **Who**

## A Learning Stance

Lesson Study rests on the assumption that everyone can learn. Every group member—even ones who are coaches or "experts"—should bring genuine questions (not just answers) to the group's work. Lesson Study differs from mentoring or coaching in its emphasis on inquiry conducted by equals, and it provides an opportunity for even experts to pose and pursue questions about teaching and learning.

## Commitment to Collective Growth

In their work together, team members should come to feel that the research lesson is "our" lesson and that students are "our" students, not "your" students or "my" students. The point of Lesson Study is not to polish the skills of a few star teachers but to help all teachers grow, and to create the interpersonal relationships, school culture, and personal and collective habits of inquiry that support continuing growth every day. Members view every participant as having something valuable to contribute to the group.

## Emphasis on Study of Students, Not Evaluation of Teachers

Lesson Study focuses on student learning and development. It provides a rare and valuable chance for teachers to be in a classroom solely to investigate student learning, unencumbered by the need to manage students or provide instruction. A first-year U.S. teacher from Mills College pointed out that Lesson Study differs from the lesson observation familiar to U.S. teachers: "In the U.S., if you are being observed, it's a critique of you. Lesson Study focuses on student learning, on student "aha's." It takes what we're doing to a more professional level.

***Document Instructions:***

- *All italicized text is instructional and is intended to be deleted upon completion of document.*
- *To replace the logo in the header with your school's logo, right click the logo and select "Replace image."*
- *To add an additional row to any table, right click anywhere in the last row and select "Insert row below."*

## Team Members

*Insert here*

| Lesson Date: | Instructor | Grade Level: |
|---|---|---|
| *mm / dd / yy* | *Insert text here* | *Insert text here* |

## 1.Title of Lesson

***Refer to*** ***Plan | Step 3: Identify and Examine the Lesson***

*Insert text here*

## 2.Research Theme

The long-term goals for our students and how we will get there (theory of action)

***Refer to*** ***Study | Step 2: Develop a Research Theme***

*Insert text here*

## 3.Background and Research on the Content

- Why we chose to focus on this topic - for example, what is difficult for our students, what we noticed about student learning
- What resources we studied, and what we learned about the content and about student thinking

***Refer to*** ***Plan | Step 1: Take Stock***

*Insert text here*

## 4. Rationale for the Design of Instruction

- What we learned from studying our own curriculum and other resources
- Why the unit and lesson are designed as they are - for example, why we chose this particular task, representations, contexts, lesson sequence, etc.
- How the unit and lesson design address the research theme

***Refer to*** ***Plan | Step 7: Finalize the Teaching-Learning Plan***

*Insert text here*

## 5. Goals of the Unit

***Refer to*** ***Plan | Step 2: Examine the Unit Plan***

*Insert text here*

## 6.Unit Plan

The lesson sequence of the unit, with the task and learning goal of each lesson. The asterisk (*) shows the research lesson

| Lesson | Learning goal(s) and tasks |
|---|---|
| 1 | ***Refer to Plan \| Step 2: Examine the Unit Plan***<br><br>***Lesson Goal:*** *Insert text here*<br><br>***Task:*** *Insert text here* |
| 2 | ***Lesson Goal:*** *Insert text here*<br><br>***Task:*** *Insert text here* |
| 3 | ***Lesson Goal:*** *Insert text here*<br><br>***Task:*** *Insert text here* |
| 4 | ***Lesson Goal:*** *Insert text here*<br><br>***Task:*** *Insert text here* |

## 7. Relationship of the Unit to the Standards

- How the learning in the unit relates to the grade-level standards.
- How the learning in the unit relates to prior standards and future standards.

| Prior learning standards that unit builds on | Learning standards for this unit | Later standards for which this unit is a foundation |
|---|---|---|
| ***Refer to*** ***Plan \| Step 2: Examine the Unit Plan***<br><br>*Insert text here* | *Insert text here* | *Insert text here* |

## 8. Goals of the Research Lesson

| |
|---|
| ***Refer to*** ***Plan \| Step 3: Identify and Examine the Lesson***<br><br>*Prompt: Students will understand/know that/appreciate...* |

## 9. Research Lesson Plan

| Learning task and activities, anticipated student responses, key questions or comparisons that will build insights | Teacher Support | Assessment (Points to Notice) |
|---|---|---|
| ***Refer to*** ***Plan \| Step 4: Design the Flow of Instruction***<br><br>***Introduction***<br>*Insert text here* | *Insert text here* | *Insert text here* |

| | | |
|---|---|---|
| ***Posing the Task***<br>*Insert text here* | *Insert text here* | *Insert text here* |
| ***Anticipated Student Responses***<br>*Insert text here* | *Insert text here* | *Insert text here* |
| ***Comparing and Discussing, including Teacher Key Questions***<br>*Insert text here* | *Insert text here* | *Insert text here* |
| ***Summing Up***<br>*Insert text here* | *Insert text here* | *Insert text here* |

## 10. Points of Evaluation (Assessment)

Prompts to focus observation and data collection.

***Refer to Plan | Step 5: Focus the Data Collection***

*Insert text here*

## 11. Board Plan

***Refer to Plan | Step 6: Teach a Mock-up Lesson***

*Insert photograph or diagram (if applicable)*

## 12. End of Cycle Reflection

What Did We Learn? (to be filled out after the post-lesson discussion)

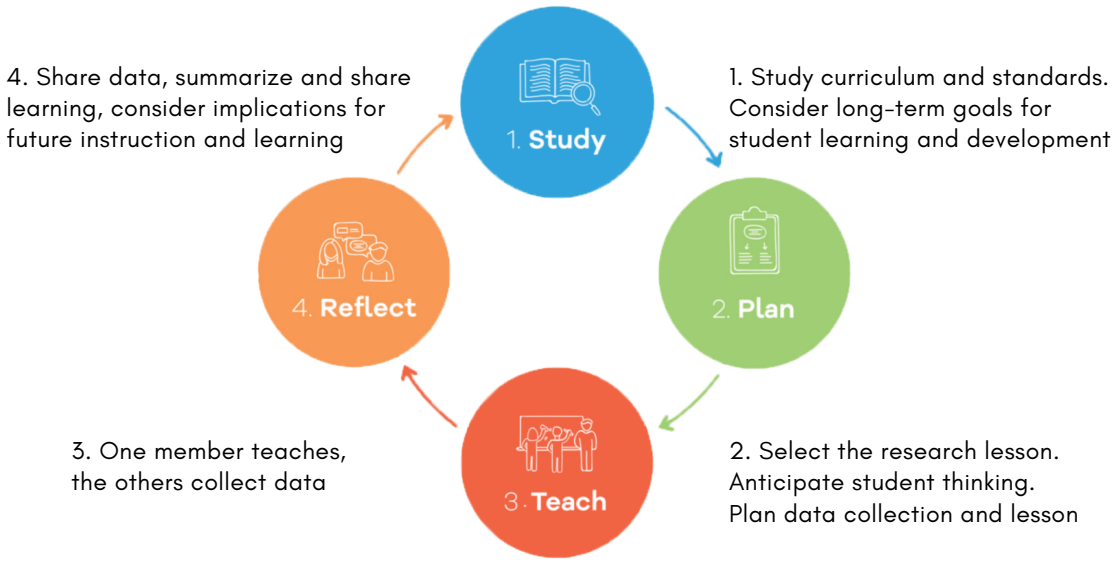
***Refer to Plan | Step 4: Consolidate Your Learning***

*Insert text here*

# Lesson Study at Name of School and Location

Photo, group shot of teachers, students, things that identify the context for your work (2 slides max)

# Lesson Study Cycle



## Our Lesson Study Cycle

- Time frame
- Goals for our work

## Our Study and Planning

- Major "findings" from study and planning phases-e.g., what we learned, what was hard, what was beneficial, what resources we found useful
- Photos from planning phase—e.g., major questions, group norms, "Big Ideas"

(3 slides max)

## Student Work

- Anticipated and actual thinking (from written work or board)
- Information about the process of student learning during the research lesson

(2-4 slides)

## Post-Lesson Discussion

- Photo of group in discussion
- Summary of big ideas or learnings from the research lesson

(2-3 slides)

## What We Learned

- Photos and quotes that bring to life your group's experience (including the good, and yes, the not so good)
- Three things that you would like to remember the next time you teach this content
- What you will do differently in your teaching as a result of this experience
- Any changes in your thinking about student learning, curriculum, teaching

***Highlands School developed a research theme that focused on two initiatives taking place at the school.***

**Research Theme:** How can we improve the use of effective Integrated Thematic Instruction (ITI) and differentiation strategies to help all students, and in particular SED students, access their full potential and improve their performance relative to grade level standards?

***Komae School developed their research theme by considering the qualities they hoped to nurture in all graduates.***

**Research Theme:** For students to value friendship, develop their own perspectives and way of thinking and enjoy learning.

**Theory of Action:** If students are eager to learn and take initiative in their learning, they will be able to deepen their own perspectives and ways of thinking. Student will develop considerate hearts if they work together in ways that enable them to recognize one another's ideas as they engage in observations, experiments and activities.

***Prieto Math & Science Academy focused on mathematics in their research theme, which was revised over 5 years based on the findings from their lesson study work.***

**Research Theme:** Teach scholars to construct viable arguments and critique the reasoning of others through note taking, board work, and student discourse. Teach scholars to make sense of problems and persevere in solving them by teaching mathematics through problem solving.

**Theory of Action:** Through recording their reasoning in their notebooks, students will be able to use their notebooks as a tool to explain their thinking to others. If they also record the reasoning of other scholars in their notebooks, this will lead them to think critically about their fellow scholars' ideas. The careful use of the board by the teacher is instrumental in teaching through problem solving and can support scholars in many ways. The teacher models in their board writing what students should be writing in their notebook. The board also allows the teacher to present multiple solutions simultaneously. This allows students to compare and contrast solutions and facilitate discussion about them. In order to have a substantive discussion, they must have something substantive to discuss. Teaching mathematics through problem solving means presenting students problems that they do not already know how to solve, but have the necessary background understanding to make sense of this new kind of problem. These problems invite different strategies, since there is not yet a consensus on how to solve these types of problems, and these different students derived strategies and ideas provide rich material for students to discuss. Teaching through problem solving encourages perseverance in students. They become accustomed to solving problems they have not yet encountered, and develop positive self-identity as a mathematician.

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

- Imagine you were to bump into them 5-10 years down the road, what would make you happy?
- Jot a list for a few moments individually (quiet time), then let's share and discuss, and make a shared list.

## List your students' qualities now

For example:

- What is wonderful and inspiring about them?...
- What is worrying or frustrating?...
- Write individual lists (quiet time), then share and discuss, and make a shared list.

## Research Theme

Positively state the ideal student qualities we want to work on.

## List your students' qualities now

For example:

- What is wonderful and inspiring about them?...
- What is worrying or frustrating?...
- Write individual lists (quiet time), then share and discuss, and make a shared list.

## Research Theme Examples

"...use evidence and reasoning to support and critique arguments." (Chavez School, Chicago)

"...better problem solvers." (Bret Harte School, OUSD)

"...social emotional skills and...a deeper understanding of mathematics. (Edna Brewer School, OUSD)

"...student perseverance..." (South Shore School, Chicago Public Schools)

"create a positive academic self-identity" (Muir School, SFUSD)

## Add Strategies to Achieve the Research Theme

If you have time, specify some strategies you think will help you achieve your research theme.

For example:

- "Equal access and equitable teaching strategies and routines lead to students' deep understanding of the concept."
- "By supporting students' ability to express and connect ideas in multiple ways, they will become better problem solvers." (BretHarte School, OUSD)
- "Encourage student development...through the relationship between student note-taking, teacher board-writing and mathematical discussion" [so that] students "construct viable arguments and critique the reasoning of others...." (Prieto School, Chicago)

## Revisit the Research Theme

- Your research theme can be modified and updated as you learn
- The research theme is the first step of school-wide Lesson Study (also called "Collaborative Lesson Research"-CLR)

**Topic Focus: Two-digit addition problem with regrouping, applying what they know about place value to make sense of what to do with a new ten (Grade 1)**

We have noticed as a school-site that students struggle in their understanding of place value, meaning they struggle to understand that ten can be counted as a unit. While place value concepts begin to be developed in kindergarten, some students leave first grade without a strong sense of place value and continue to struggle as they move into later grades. Some, even in upper grades, don't see 10 as a friendly number and count numbers individually to add or subtract. We decided to slow down our launch of place value and really break down our lessons into more meaningful pieces to more intentionally build students' development of the place value concepts. (Acorn Woodland School, Oakland)

**Topic Focus: Building a Conceptual Understanding of Multiplication (Grade 3)**

Most students at our school enter 3rd grade already familiar with some of the multiplication facts. This familiarity is limited to understanding multiplication as another way of writing repeated addition sentences. Student may be able to write 5 + 5 + 5+ 5 = 20 as 4 x 5 = 20 and skip count by 5 four times to find the product (e.g., "five… ten… fifteen… twenty"). Indeed, when asked about the nature and purpose of multiplication, most students respond that multiplication is like "times"; in other words, one must skip count certain number of times in order to find the product of two factors. In all, the students' understanding of multiplication is limited to procedural knowledge. Clearly, this is not a deep enough level to claim that the students truly understand the concept of multiplication. (Chavez School, Chicago)

**Topic Focus: Division with Remainders (Grade 4)**

Division has always been a difficult topic for us to teach and for our students to understand. Students at our school learn about multiplication before they are introduced to division, so it makes sense to build upon their existing experience and understanding of multiplication. While we want students to understand the inverse relationship between addition and subtraction, and to use that information when calculating mentally, we also want students to see this relationship with multiplication and division. Many students in this class are not fully comfortable with multiplication yet, which makes introducing division even more difficult.

**Topic: 3rd Grade Conceptual Understanding of Division**

## Unit Goals:

The purpose of this unit is to develop students' conceptual understanding of division. Students come to recognize scenarios involving "equal sharing" as situations that can be represented mathematically with division. Students explore both partitive (when the size of the groups is unknown) and quotative (when the number of groups is unknown) equal sharing situations and recognize that both types of situations can be represented with division.

Students also connect their new learning about division to their prior learning about multiplication. As students see that, as in multiplication, a division equation involves a total, a number of groups, and a size of the groups, they begin to understand the relationship between the two operations. They begin to recognize multiplication as a tool for solving division problems, and in so doing they recognize division as a "missing factor" problem. The inverse relationship between multiplication and division is reinforced through these calculations.

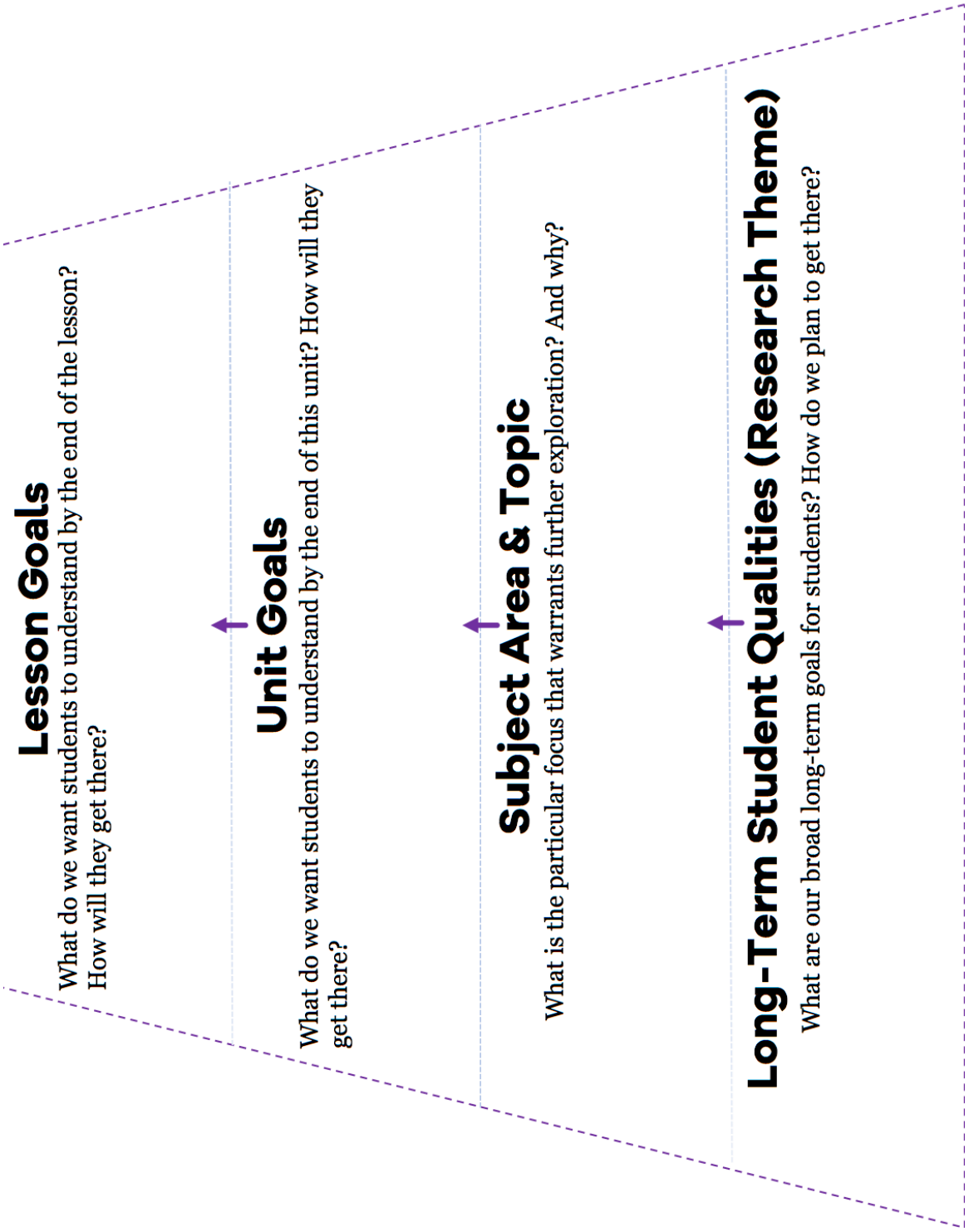
Over the course of the unit, students move from concrete representations of division ("dealing out" counters into equal-sized piles) to more representational (models such as tape diagrams and arrays) and symbolic (equations). Finally, students apply their learning to an assortment of division and multiplication problems, learning to distinguish division and multiplication scenarios in word problems, and to multiply and divide within 100.

| Lesson | | TTP Problem | New Learning | Lesson Summary | Standards Addressed |
|---|---|---|---|---|---|
| 1 | 10/27 | There are 15 stars in all and 3 circles. How many stars are in each circle? | We can use multiplication to find a missing factor. | Sometimes the number you're trying to figure out ISN'T the total. | 3.OA.A.4 – Determine the unknown whole number in a multiplication or division equation relating three whole numbers.<br>3.OA.B.6 Understand division as an unknown-factor problem. |
| 2 | 10/30 | We have 12 cookies. If they are divided equally among 3 children, how many will each child get? | Understand the meaning of partitive division and how to write a division equation. | To share, we need to have equal groups.<br><br>Division is an operation we can use when we want to share something equally. | 3.OA.A.2 Interpret whole-number quotients of whole numbers, e.g. interpret 56 / 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.<br>3.OA.A.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. |
| 3 | 10/31 | There are 20 strawberries. If 5 kids share these strawberries equally, how many will each kid get? | Understand how to find the answer to a partitive division problem | Division is a missing factor problem<br><br>The answer to 20 ÷ 5 is the number that goes in the ☐ in the 5 x ☐ = 20. | 3.OA.A.3 (see above)<br><br>3.OA.B.6 (see above)<br><br>3.OA.B.7 Apply properties of operations as strategies to multiply or divide |
| 5 | 11/1 | RESEARCH LESSON<br><br>There are 12 cookies. If we give 3 cookies to each kid, how many kids can share the cookies? | Understand the meaning of quotative division | If 12 cookies are divided so each kid gets 3 cookies, the cookies can be shared among 4 kids.<br><br>This case can also be written with the following division math sentence: 12 ÷ 3 = 4. | 3.OA.A.2 (see above)<br><br>3.OA.A.3 (see above) |

| Lesson | Date | TTP Problem | New Learning | Lesson Summary | Standards Addressed |
|---|---|---|---|---|---|
| 6 | 11/2 | There are 35 flowers. We are making bouquets with 7 flowers. How many bouquets can we make?<br><br>There are 36 balls. How many baskets do we need if we put 4 balls in each basket? | Students understand that quotitive division situations can be expressed with division math sentences, as well as the meaning of quotative division | We can use division to solve fair sharing problems where we don't know how many groups. | 3.OA.A.2 (see above)<br><br>3.OA.A.3 (see above) |
| 7 | 11/3 | There are 20 stickers. If we give 5 stickers to each person, how many people can we give stickers to? | Students understand how to find the answers to quotitive division problems | The Answer to 20/5 is the number that fits into the ___ in □x5=20 | 3.OA.B.5 (see above)<br><br>3.OA.A.3 (see above) |
| 8 | 11/6 | Victor and Jayla made word problems using the math sentence 6/2. Let's compare the word problems that they made. | Students understand that partitive and quotitive division can be consolidated as "division" and they can find answers to division calculations. | (two different 6/2) Finding 1 person's share and how many people something can be division among are expressed as division math sentences. (BOTH are division) | 3.OA.A.3 (see above) |
| 9 | 11/7 | Some cookies in a box will be shared equally among 4 children. How many cookies does each child get? (when there are 8, 4, and no cookies) | Students are able to solve division problems in which the dividend is 0 or the dividend and divisor have the same numerical value (division with 0 and 1) | We can use division even when the divisor is 0 or when the divisor and the dividend are the same | 3.OE.D.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using the properties of operations. |

| Lesson | Date | TTP Problem | New Learning | Lesson Summary | Standards Addressed |
|---|---|---|---|---|---|
| 10 | 11/8 | ….multiplication problem…. | Students must determine which operation to use based on the word problem situation. | In order to solve a word problem correctly, we need to understand if the problem is a multiplication situation or a division situation. | 3.OA.A.1 Interpret products of whole numbers<br>3.OA.A.3 (see above) |
| 11 | 11/9 | ….division problem with array… | Students must determine which operation to use based on the word problem situation. | When the size of the rows in an array is unknown, we can use division to solve the problem. | 3.OA.A.2 (see above)<br>3.OA.A.3 (see above) |
| 12 | 11/13 | practice: various multiplication and division problems | Students practice determining the appropriate operation to match a word problem situation. | When we don't know the total, we can use multiplication to solve. When we know the total, but we don't know the size of the groups or the number of groups, we can use division. | 3.OA.A.1 (see above)<br>3.OA.A.2 (see above)<br>3.OA.A.3 (see above) |
| 13 | 11/14 | multi-step problem | Students interpret and solve a multi-step word problem | Some word problems require two steps to find the answer. | 3.OA.D.8 Solve two-step word problems using the four operations. |

| Lesson | Date | TTP Problem | New Learning | Lesson Summary | Standards Addressed |
|---|---|---|---|---|---|
| 14 | 11/15 | multi-step problem | Students apply their understanding of division and multiplication scenarios to solve a multi-step word problem. | In word problems with 2 steps, we have to read carefully to know what operations match the situations. | 3.OA.D.8 (see above) |
| 15 | 11/16 | Power Builder | | | |
| 17 | 11/17 | | | | |


Lesson Goals
What do we want students to understand by the end of the lesson?
How will they get there?
Unit Goals
What do we want students to understand by the end of this unit? How will they get there?
Subject Area & Topic
What is the particular focus that warrants further exploration? And why?
Long-Term Student Qualities (Research Theme)
What are our broad long-term goals for students? How do we plan to get there?

The following questions will help you identify the data to be collected by the observers during the lesson:

1. What data will help you understand your students' progress on your lesson goals, board subject matter goals, and long-term goals (research theme)?

2. Would a prepared data collection form facilitate observation? (For example, a form that lists strategies you anticipate or a seating chart to record conversation pathways.)

3. What student work will be collected at the end of the lesson? (For example, an exit slip with a targeted question, a student journal, or a piece of writing.)

4. How will material presented on the blackboard or in other venues be captured (for example, by observers, or by using and retaining chart paper)?

5. What are the individual assignments of the lesson study team? Will one person transcribe the lesson and keep a timeline of lesson events? Will observers be assigned to observe specific students or groups?

# Lesson Observation Log

[Note: Multiple copies of this sheet may help you keep a running record of the lesson as it unfolds over time, as well as note (during the observation or later) significant events to which you want to return or share during the post lesson discussion]

## Title of Lesson:

## Goals of the Lesson:

## Observation Objectives:

| Time | Observation | Significance |
|---|---|---|
| | | |

# Lesson Observation Log

| Time | Observation | Significance |
|---|---|---|
| | | |

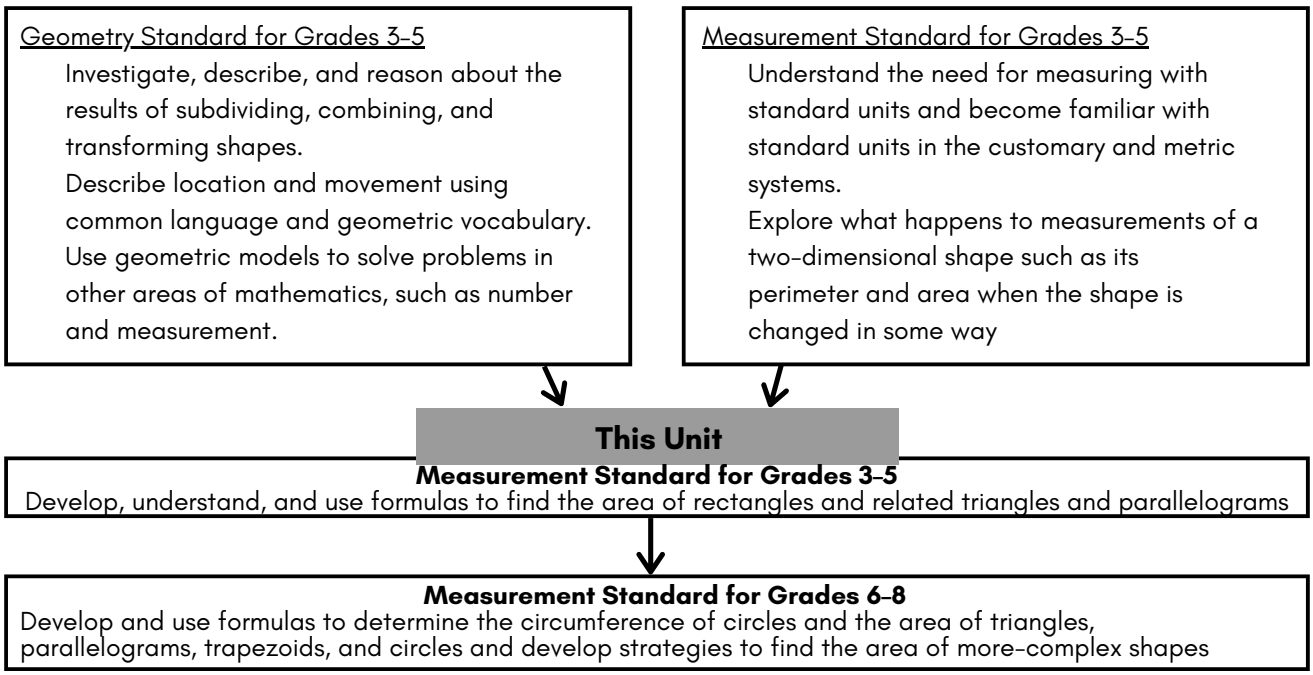
**4th Grade Mathematics Lesson Plan**

April 16-18, 2002
Brewer Island School, San Mateo, CA
Instructor: Akihiko Takahashi

1. Title of Unit: Finding the Area of Shapes

2. Goal:
   a. To deepen students' understanding of the concept of area through problem solving activities.
   b. To develop the concept of equivalent-area transformation to use as the basis for finding the formulas for the area of a parallelogram, a triangle, and a trapezoid.
   c. To recognize that the area of a shape can be found by transforming it into a rectangle or a square.
   d. To help students become good problem solvers by providing a challenging open-ended problem.
      i. To encourage students to use existing knowledge to solve a challenging problem.
      ii. To encourage students to see common properties and relationships among various solutions presented by their peers in order to find a better solution to the problem.
      iii. To encourage students to look at their solutions from a different perspective and develop their ability to use logical reasoning to make conjectures by exposing them to their peer's different solutions.
   e. To provide opportunities for students to recognize the importance of working with their peers in order to deepen their understanding of mathematics.

3. Relationship between this Unit and the Principles and Standards for School Mathematics (NCTM 2000).




*This Lesson Plan is prepared for the Lesson Study Workshop at San Mateo CA. April 15-18, 2002*
*By Akihiko Takahashi*

4. Instructional Plan

Shapes and Area: Three lessons total

i. How to find the area of a shape using previously learned knowledge (1)

ii. How to find the area of a shape using previously learned knowledge (2)

iii. Making shapes that contain an area of eight square units on the geoboard

5. Instruction of the Lessons

A series of lessons consisting of three periods of hands-on problem solving activities was planned to help students extend existing knowledge and develop a foundation for finding the formulas for the area of a parallelogram, a triangle, and a trapezoid.

These lessons were based on the idea of student-centered instruction which the NCTMStandards(2001) supports. This idea is expressed in the objective: "To provide students with an opportunity to develop a formula for the area of parallelogram meaningfully through investigation." According to the Standards, "Students can develop formulas for the area of a parallelogram and a triangle by using what they have learned previously." This prior knowledge includes the formula to find the area of a rectangle and the concepts of decomposing a shape and rearranging its components to make more familiar shapes without changing the area of the original shape. Although the Standards do not provide detailed information on how a teacher can help students to develop formulas for finding the area of parallelograms, triangles, and trapezoids meaningfully, it is important for students to have the opportunity to investigate and experience how those formulas can be developed by incorporating their previously learned knowledge.

One way to help the students to develop these formulas through such investigation is to provide them with a series of problem solving lessons using manipulatives to develop the concept of equivalent-area transformation. Equivalent-area transformation is a key concept necessary to develop the formulas for finding the area of parallelograms, triangles, and trapezoids. This idea is developed by incorporating students' prior knowledge, such as the formula for finding the area of a rectangle and a square. Therefore, it might be a good idea to provide lessons designed to help students develop the concept of equivalent-area transformation prior to lessons designed to investigate the formula for finding the area of parallelograms, triangles, and trapezoids specifically. In order to do so a series of open-ended problem solving activities were developed based on Japanese problem-solving teaching methods/activities that are commonly used in Japan.

The Geoboard was chosen as the main manipulative for this series of problem-solving activities because of the following reasons:

- It is a manipulative that helps students to understand the relationship among various shapes and their areas.
- It has been one of the most commonly used manipulatives in mathematics education and various reform curricula have included it as a tool to provide students with opportunity to explore mathematical ideas.

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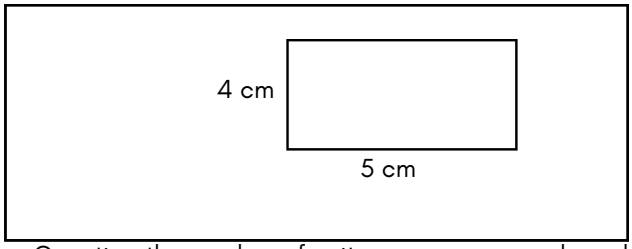
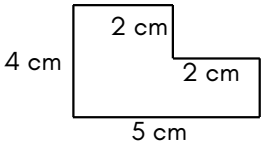
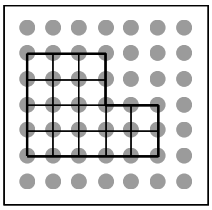
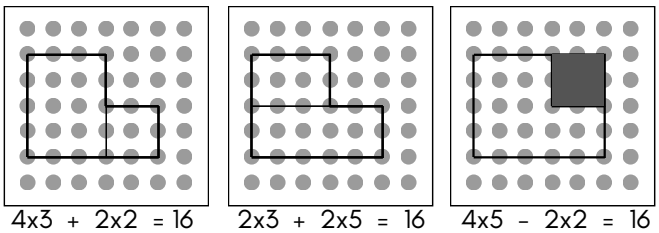
6. Lesson Procedure

(1) How to find the area of a shape by using the knowledge that we have learned (1)

| Learning Activities<br>Teacher's Questions and Expected Students' Reactions | Teacher's Support | Points of Evaluation |
|---|---|---|
| **1.Introduction**<br>  <br><br>Counting the number of unit squares on a geoboard<br>Using the formula for finding the area of rectangle, L x W . | Let students make the rectangle on a geoboard by assuming the distance between two pegs is one inch.<br>Help students recall how to use geoboard.<br>Help students recall the formula for finding the area of a rectangle, L x W, and ask students to explain what this formula means. | Do the students recall how to use a geoboard?<br><br>Do the students recall the formula for finding the area of a rectangle as well as the idea behind the formula? |
| **2. Posing the Problem**<br>Make the following shape on a geoboard and find the area.<br>  <br> | Let students make the shape.<br>Give each student a worksheet with a picture of the shape on a geoboard so that students can record their ideas about finding the area.<br>Let students know that any ideas about finding the area based on their previous knowledge are acceptable. | Do students understand the problem? |
| **3. Individual Problem Solving**<br>a. Determine how to find the area of the shape by:<br>Counting the number of small squares in the shape.<br>  <br>b. Dividing or transforming this shape into the shapes that students already know how to find the area by using a formula.<br>  <br> | Encourage students to find a couple of different ways to find the areas.<br><br>Provide students with worksheets to keep their work for whole class discussion.<br><br>Encourage students to recall what they learned in previous mathematics lessons. | Can each student find at least one way to find the area? |

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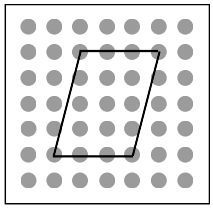
| | | |
|---|---|---|
| **3. Comparing and Discussing Students' Solutions**<br>(1) Ask students to explain their solution methods to the class.<br>(2) Facilitate students' discussion about their solutions in order to understand their ideas behind each solution. | Write each student's solutions and on the blackboard in order to help students understand the discussion. | Can each student understand that there are several ways to find the area? |
| **4. Find a strategy to solve this kind of problem**<br>The area of the shape can be found by dividing the shape into rectangles and squares, or transforming it into a rectangle or a square. | | |
| **5. Summing up and Journal Writing**<br>(1) Using the writing on the blackboard, review what students learned through the lesson.<br>(2) Ask Students to write a journal entry about what they learned through this lesson. | | |

(2) How can we find the area of a parallelogram by using the knowledge that we have learned?

| Learning Activities<br>Teacher's Questions and Expected Students' Reactions | Teacher's Support | Points of Evaluation |
|---|---|---|
| **1.Introduction to the Problem**<br>Review the previous lesson.<br>Ask some students to read their writing from the previous lesson.<br><br>Make the following shape on a geoboard<br>  | By using selected student journal entries, which all the students wrote at the end of the previous class, help students to recall what they have learned.<br><br>Provide each group of students with a picture of the shape on a geoboard, and let students make the shape on their geoboards by looking at the picture. | Can students make the shape on their geoboard? |
| **2. Posing the Problem**<br>Find the area of the shape on the geoboard by assuming that the distance between two pegs is one inch. | | Do students understand the problem? |

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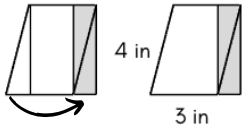
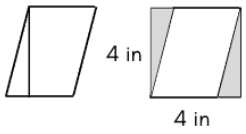
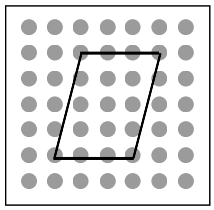
| Learning Activities<br>Teacher's Questions and Expected Students' Reactions | Teacher's Support | Points of Evaluation |
|---|---|---|
| **3. Individual Problem Solving**<br>Find the area of the parallelogram on a geoboard by:<br><br>a. Dividing the shape into a triangle and the other part of the parallelogram and then cutting the triangle from the parallelogram and moving it to the other side of the shape to transform a parallelogram into a rectangle without changing its area<br><br>  <br><br><br>b. Calculating the rectangle that covers the parallelogram and subtracting the area of the two triangles.<br><br>  <br> | Encourage students to use the knowledge that they learned previously to find the areas.<br>Provide students with worksheets that have a picture of the shape on a geoboard so they can record their work for the whole class discussion.<br>Prepare enough worksheets so students are able to have as many worksheets as they want. | Can each pair of students find a way to find the areas? |
| **4. Discussing Students' Solutions**<br>By examining several student's solution methods, students are expected learn that a key idea in finding the area of the parallelogram based on their previous knowledge is equivalent-area transformation.<br><br>a. Ask students to explain their solution methods to the other students in the class.<br><br>b. Facilitate student discussion about their solutions, then lead students to realize that a key idea in finding the area of the parallelogram is equivalent-area transformation. | Write each student's solutions and ideas on the blackboard in order to help students understand the discussion. | Can students visualize the concept? |
| **5. Exercises**<br>Find the area of the following parallelogram on a geoboard.<br><br>  | Ask students if their solution methods can be used to find the area of another parallelogram on a geoboard.<br><br>Help students understand that the area of this parallelogram is the same as the previous parallelogram. | Can students make the shape on their geoboard? |
| **6. Summing up**<br>(1) Using the writing on the blackboard, review what students learned through the lesson.<br><br>(2) Ask students to write a journal entry about what they learned through this lesson. | | |

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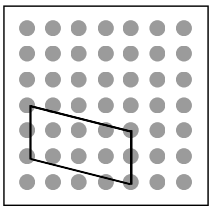
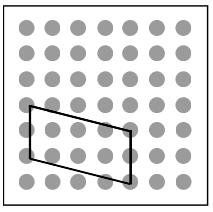
(3) Making shapes with an area of eight square units on the geoboard

| Learning Activities<br>Teacher's Questions and Expected Students' Reactions | Teacher's Support | Points of Evaluation |
|---|---|---|
| **1. Introduction to the Problem**<br>Review the previous lesson.<br>Ask some students to read their writing from the pervious lesson.<br><br>Make the following shape on a geoboard<br>  <br>Find the area of the shape on the geoboard.<br>8 square inches | By using selected student journal entries, which all the students wrote at the end of the previous class, help students to recall what they have learned.<br><br>Provide each group of students with a picture of the shape on a geoboard and let students make the shape on their geoboards by looking at the picture.<br><br>Help students use ideas that they learned previously such as equivalent-area transformation. | Can students make the shape on their geoboard?<br><br>Do students recognize that the shape on the geoboard is the same kind of shape that they worked on previously? |
| **2. Posing the Problem**<br>Make a four-sided shape with the same area as this shape | To help all the students to understand this problem, give them several minutes to come up with some solutions. Then, examine some of those solutions as a whole class to see if any four-sided shape with an area of eight square units can be a solution. Therefore, there might be many different solutions. | Do students understand the problem? |
| **3. Individual Problem Solving**<br>Anticipated student solutions: (See Appendix)<br>  | Provide each group of students several worksheets with a picture of the geoboard.<br><br>Let students keep all the shapes that they make on their geoboards so that they can easily show them to the class during the whole class discussion. | Can students find at least one solution to the problem? |
| **4. Discussing Students' Solutions**<br>(1) Ask students to explain why they think the shape has an area of eight square units.<br><br>(2) After the students bring various shapes as their solutions, sort the shapes by using their previous knowledge. Their previous knowledge includes: | Ask students to bring and put their worksheets on the blackboard in order to help the other students understand what they have made and why the shape can | Do students realize that several different quadrilaterals with an area of eight square units can be made on the geoboard? |

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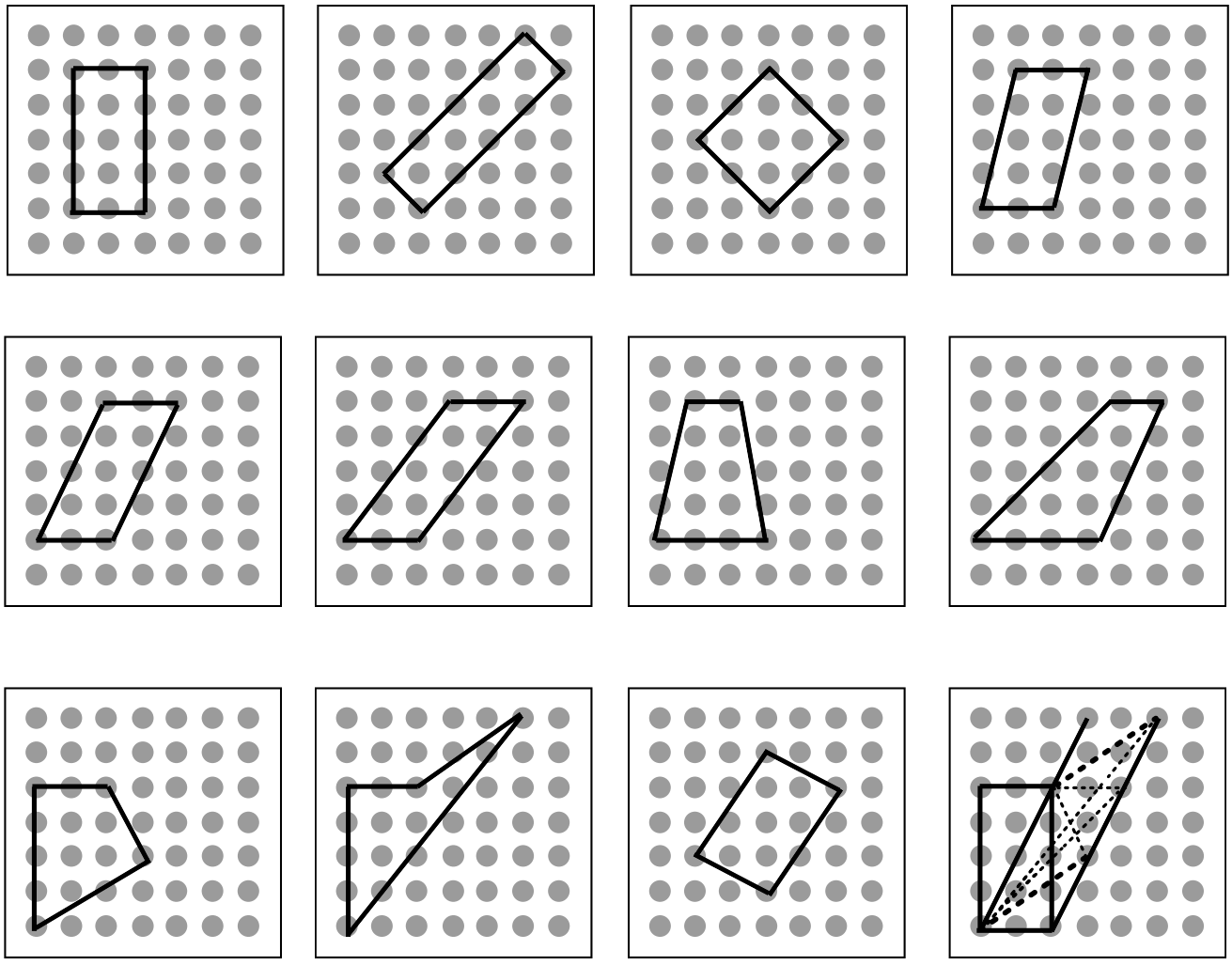
| | | |
|---|---|---|
| Square: a four-sided figure with four right angles and four equal sides<br><br>Rectangle: a four-sided figure with four right angles<br><br>Parallelogram: a four-sided figure with two pairs of parallel sides<br><br>Trapezoid: a four-sided figure with a pair of parallel sides<br><br>Rhombus: a four-sided figure with four equal sides and two pairs of parallel sides | be the solution to the problem.<br><br>Help students realize that many four-sided shapes with an area of eight square units can be made on the geoboard. These shapes include not only a rectangle and parallelograms but also a square, trapezoids, and rectangles with different orientations. | |
| **5. Summing up**<br>(1) Using the writing on the blackboard, review what students learned through the lesson.<br><br>(2) Ask Students to write a journal entry about what they learned through this lesson | | |

(3) Anticipated Student Responses



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## Elementary School Research Lesson Agenda

May 31, 2017 | 12:00 - 4:00 PM

| Time | Activity | Room |
|---|---|---|
| 12:40 | Welcome & Introductions | |
| 12:45 | Pre-Lesson Discussion | |
| 1:10 | Transition to Classroom (break) | |
| 1:20 | Research Lesson | |
| 2:10 | Review Student Data (break) | |
| 2:25 | Post-Lesson Discussion | |
| 3:25 | Final Commentary | |
| 3:50 | Appreciations and Close | |

# Pre-Lesson Discussion Agenda

**1. Welcome and Introductions** (5 min)

**2. Background and Context of the Lesson** (5 min)
The planning team briefly describes the lesson and points out the sections of the Teaching-Learning Plan where observers can learn about the lesson and unit goals, long-term goals, and rationale for the lesson design.

**3. Silent Reading of Teaching-Learning Plan** (15 min)
- Participants read the Teaching-Learning Plan
- Participants try the lesson task themselves

**4. Clarifying Questions** (10 min)
The planning team answers any clarifying questions raised by participants, and clarifies
- What evidence they are asking participants to collect

**5. Observation Procedures** (5 min)
- Review Protocol for Observing a Research Lesson
- Identify students to observe

# End-of-Cycle Reflection

**Describe in some detail two or three things you learned from this Lesson Study cycle that you want to remember, and that you think will affect your future practice.**

These might be things about content, about teaching, about student learning, or about working with colleagues. (If you don't feel you have learned anything from this cycle of Lesson Study, please note that and identify changes that might have made the lesson study work more productive for you.)