Lesson Study

FACILITATOR GUIDE

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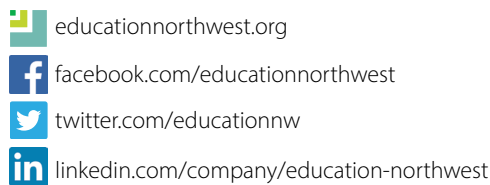
Education Northwest is a nonprofit, nonpartisan organization dedicated to helping all children and youth reach their full potential. We partner with public, private, and community-based organizations to address educational inequities and improve student success. While most of our work centers on the Pacific Northwest, our evaluations, technical assistance, and research studies have national impact and provide timely and actionable results.

Contents

How do I use this guide?

Intended Audience

Lesson study is a high-quality professional learning experience for any educational setting, from prekindergarten to higher education. As such, a lesson study facilitator may be a preschool teacher, K–12 teacher, college instructor, district or school leader, or instructional coach. Regardless of your professional role, this guide will help you lead a team through the 10 steps of a lesson study cycle. Each section is designed to make your lesson study facilitation easier, more enjoyable, and highly productive.

Organization

There are numerous resources available on conducting lesson study, but relatively few that are specifically designed for facilitators. This guide provides:

1. Background information to build understanding of lesson study
2. Guidance and suggestions on preparation, timing, and activities to support facilitation of each step
3. Additional resources and discussion questions

The guide is organized into two initial sections followed by a section for each of the 10 steps to lesson study.

Introduction

The introduction provides an overview of lesson study, including the rationale for using this form of professional development to improve teaching and learning. It describes how lesson study aligns with other effective forms of professional learning and covers three important implementation practices that will help you fully realize the benefits of lesson study.

Routines for Lesson Study

This section describes steps you can take to make your lesson study practice run smoothly. It covers methods for documenting your team's efforts, assigning specific roles for meetings, and developing and sharing a timeline to help the team stay focused and productive.

10 Steps to Lesson Study

The heart of the guide includes a section on each step of the lesson study cycle. Each section includes the following six components. As you prepare to facilitate a lesson study cycle, we suggest that you also review the corresponding sections of the companion participant guide.

Objective	Expected outcomes for each section
Time	Estimated time for each section
Preparation	Suggested steps to prepare for each section
Resources	Additional materials (if available) and/or discussion prompts relevant to each section
Background notes	Context, supporting research, and guidance for each section
Suggested activities	Step-by-step sample activities for each section

Introduction

> **What is lesson study?**
>
> **How does our team realize the benefits of lesson study?**
>
> **Purpose:** In this section, you and your team will explore the phases, steps, and implementation practices in lesson study and consider how lesson study aligns with other effective forms of professional learning.
>
> **Objectives:** In this section participants will:
>
> - Build understanding of the phases, steps, and implementation practices in lesson study
> - Identify how lesson study aligns with other effective forms of professional learning

What is lesson study?

Activity Objective: The team will be able to communicate a shared understanding of the purpose and structure of a lesson study cycle.
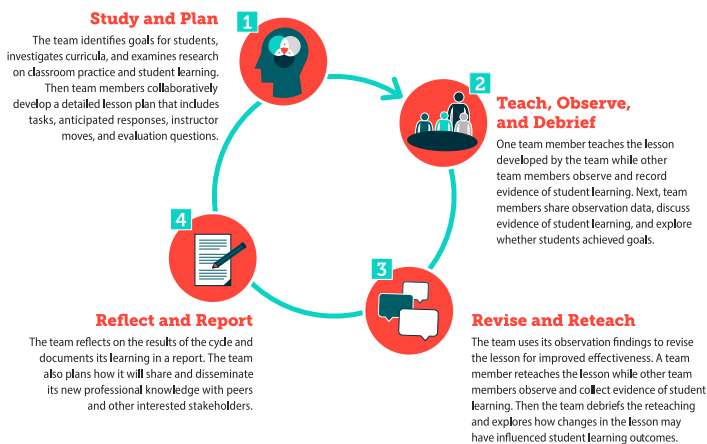
Time: One hour

Preparation: Review background notes.

Resource: Team notebook
Participant guide pp. 2–3

What is lesson study?

Lesson study is an approach to professional development that brings the intricacies of teaching practice and student learning into focus through collaborative and sustained examination of curriculum and instruction. Working in iterative cycles, lesson study gives participants a framework for actively investigating how to improve learning in their classrooms. Team members implement four stages during each lesson study cycle: (1) Study and Plan, (2) Teach, Observe, and Debrief, (3) Revise and Reteach, and (4) Reflect and Report (figure 1).

Figure 1: Lesson Study Cycle

Study and Plan

1 The team identifies goals for students, investigates curricula, and examines research on classroom practice and student learning. Then team members collaboratively develop a detailed lesson plan that includes tasks, anticipated responses, instructor moves, and evaluation questions.

Teach, Observe, and Debrief

2 One team member teaches the lesson developed by the team while other team members observe and record evidence of student learning. Next, team members share observation data, discuss evidence of student learning, and explore whether students achieved goals.

Reflect and Report

4 The team reflects on the results of the cycle and documents its learning in a report. The team also plans how it will share and disseminate its new professional knowledge with peers and other interested stakeholders.

Revise and Reteach

3 The team uses its observation findings to revise the lesson for improved effectiveness. A team member reteaches the lesson while other team members observe and collect evidence of student learning. Then the team debriefs the reteaching and explores how changes in the lesson may have influenced student learning outcomes.

DISCUSS

- Think about professional development experiences in which you have engaged in the past. Which ones were effective? What made them effective?

- In what ways did they affect your instructional practice? Were there any impacts on student learning?

- How is lesson study similar to or different from other professional development experiences in which you have engaged? What resonates with you? What questions do you have about the lesson study cycle?

10 Steps to Lesson Study

During each of the four stages, there are 10 steps that the team will engage in to complete its first lesson study cycle.

STUDY AND PLAN

1. Develop Collaboration Norms*
2. Establish a Research Theme*
3. Identify and Study the Topic
4. Plan the Lesson

TEACH, OBSERVE, AND DEBRIEF

5. Teach and Observe the Lesson
6. Debrief and Discuss Observation Data

REVISE AND RETEACH

7. Revise the Lesson
8. Reteach, Observe, and Debrief

REFLECT AND REPORT

9. Reflect and Report
10. Share and Disseminate Knowledge

This step may not need to be repeated after the first cycle.

Background

Description

Lesson study is a collaborative professional development model designed to increase teacher/faculty member knowledge and contribute to improved instruction. While lesson study has been implemented by elementary and secondary teachers in Japan for more than a century, it has only become prevalent in K–12 schools in the United States in the last 20 years (Makinae, 2019). More recently, colleges and universities have begun using lesson study within and across departments to help faculty members learn about effective instructional practices that can result in increased student learning.

> *Do not get hung up on the word "lesson." In lesson study, the lesson is a meaningful segment of instruction that lasts for all or part of a class meeting. The lesson may cover what you call a unit, class period, or task.*

When using lesson study, teams of instructors work in iterative inquiry cycles to collaboratively design, teach, and reflect upon the effects of a lesson. Instructors collaborate to develop a lesson plan, then teach and observe the lesson to collect data on student learning and use their observations to refine and then reteach the lesson. The team undertakes four stages together: (1) study and plan a lesson; (2) teach, observe, and debrief the lesson; (3) revise and reteach the lesson; and (4) reflect and report on its results (see figure 1 in the participant guide).

Throughout the lesson study cycle, the team examines what students think and how they learn, as well as what they bring to the learning experience. For example, a team may discover that its students are not grasping a mathematical concept because the lesson allows them to jump to a procedural solution. In language arts, they may learn that students need more instruction before they can effectively use a writing rubric to provide feedback on each other's texts. Through lesson study, it becomes clearer what students understand—or misunderstand—and what stimulates their interest and inspires them to persist through a challenging task.

Lesson study provides an opportunity to examine content and instruction on a profound level. Participants deepen their understanding of how different topics fit together and build on each other by taking time to examine and reflect on curricula and other teaching materials. They also work together to translate their own content knowledge into powerful learning experiences for students. Indeed, lesson study provides space for a "redo," during which the team fine-tunes instruction and learns more about what works best to maximize student learning.

Rationale

Evidence from K–12 settings suggests that lesson study has a positive impact on student learning. A 2014 literature review of 643 studies of professional development in mathematics found that lesson study was one of only two approaches with solid evidence of effectiveness in improving student outcomes (Gersten, Taylor, Keys, Rolfhus, & Newman-Gonchar, 2014). Additionally, lesson study has resulted in positive outcomes for teachers. It aligns with at least four well-documented characteristics of high-quality professional development for K–12 teachers: it is structured around groups of teachers who teach common subject areas; it focuses on curriculum, content knowledge, and how students learn specific content; it is a teacher-driven, classroom-based form of professional learning; and it uses active, hands-on approaches to teacher learning. Implementation of lesson study in four-year colleges has been documented but has not yet been rigorously studied (Bickerstaff et al., 2019).

Insights from implementation research suggest that lesson study is well-suited to deep learning in a variety of educational contexts for at least four reasons:

- Lesson study follows a clear structure for systematically examining student learning and strengthening instruction, which means it can be used by instructors who are new to collaborative professional learning.

- Lesson study involves training team members in a process (the four-stage cycle), which means members can continue to conduct lesson study cycles on their own, without the need for an external facilitator. In this way, the initial training investment potentially pays high dividends in terms of faculty learning in the future.

- Lesson study focuses on collecting classroom-level data, which means it can be aligned or incorporated into other existing efforts to strengthen data use to improve instruction.

- Lesson study does not require instructors to revise course goals, curricula, or assessments, unless they choose to. Rather, it can be used strategically to focus on a specific area of instruction. For this reason, lesson study may be perceived as a more practical and feasible approach to professional development than other more global or comprehensive approaches. (Bickerstaff et al., 1999)

Additionally, the process of learning collaboratively through inquiry and discussion helps instructors build their sense of collective efficacy, which is a group's shared belief that they can improve student learning through collective action. In K–12 educational settings, collective teacher efficacy is a strong predictor of gains in student achievement (Eells, 2011; Goddard, 2003; Hattie, 2012). Collective teacher efficacy also contributes to positive teacher outcomes such as increased effort and persistence. When collective efficacy is high, teachers approach challenges as problems they believe they can solve together. Developing collective efficacy requires a disciplined, collaborative approach to inquiry and improvement over time. Lesson study provides the structure for such an approach and can build collective efficacy if implemented well over a sustained period.

For more information on the rationale for lesson study, please see https://educationnorthwest.org/resources/adapting-lesson-study-community-college-math-instruction

Suggested Activity

1. Ask participants to locate "What is lesson study?" in the participant guide. Let participants know that this resource provides a helpful overview of a lesson study cycle.

2. Next, ask participants to think about professional development experiences they have engaged in previously. Which ones were effective? What made then effective?

3. After five minutes, provide participants with the key points below.

Key Points

- Lesson study is a collaborative professional development model that is designed to increase instructor knowledge and contribute to improved instruction through focused observation of how students are responding to the lesson and evidence of thinking.

- Lesson study teams work in iterative inquiry cycles to collaboratively design, teach, and reflect upon the effects of a lesson.

- Instructors collaborate to develop a lesson plan, then teach and observe the lesson to collect data on student learning and use their observations to refine and then reteach the lesson.

- Evidence from K–12 settings suggests that lesson study has a positive impact on student learning. A 2014 literature review of 643 studies of professional development in mathematics found that lesson study was one of only two approaches with solid evidence of effectiveness in improving student outcomes (Gersten et al., 2014).

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4. Next, ask participants to take two to three minutes to review the corresponding section of the participant guide on their own.

5. Facilitate a whole-group discussion on the following questions:

Key Questions

How is lesson study similar to or different from other professional development experiences in which you have engaged?

What resonates with you?

What questions do you have about the lesson study cycle?

How does our team realize the benefits of lesson study?

Activity Objective: Team members will understand the most important implementation practices for fully realizing the benefits of lesson study. By making these practices explicit, the team can observe their implementation and take steps to strengthen it throughout the cycle.

Time: 30 minutes

Preparation: Review background notes.

Resource: Team notebook
Participant guide pp. 4

How does our team realize the benefits of lesson study?

Three implementation practices (figure 2) are critical for teams' ability to realize the purpose and benefits of lesson study. The **first** practice is to develop and sustain a collaborative team by creating a productive learning community. Establishing and sustaining a safe and trusting environment with clear communication will support the team as it engages in inquiry, reflection, and critical examination of its practice. The **second** feature of lesson study is to study research and apply evidence-based practices. Lesson study involves posing questions and problems of practice, researching possible solutions, trying out ideas, collecting data, and analyzing findings. Without this emphasis, lesson study can devolve into a superficial or perfunctory experience in which participants refine lessons in minor ways without new learning. The **third** implementation feature is to generate and share professional knowledge. If the time invested in lesson study is to have long-term benefits, educator learning must be made explicit and shared.

Figure 2: Implementation Practices

DEVELOP AND SUSTAIN A COLLABORATIVE TEAM	STUDY RESEARCH AND APPLY EVIDENCE-BASED PRACTICES	GENERATE AND SHARE PROFESSIONAL KNOWLEDGE
• Establish purpose and long-term goals • Articulate and attend to collaboration norms • Maintain an inquiry focus on student learning	• Explore research literature on learning theory. • Investigate evidence-based instructional approaches and practices	• Synthesize and document lessons learned • Consider broader application for teaching practice • Share knowledge with the field

DISCUSS

- What prior experiences have you had working collaboratively with colleagues? What went well?
- In what ways do you use research on instruction and student learning?
- What opportunities do you have to share professional knowledge among colleagues?

Background

There are three main implementation practices that appear to be especially important for conducting effective lesson study (see figure 2 in the participant guide) (Bickerstaff et al., 2019).

The first implementation practice is to **develop and sustain a collaborative lesson study team.** This involves establishing a clear and significant purpose for lesson study through identification of a research theme, developing and abiding by team collaboration norms, and maintaining an inquiry focus on student learning (rather than faculty evaluation) throughout the process. These can be unfamiliar practices for participants who have not regularly collaborated with peers on instruction or who have not engaged in classroom observation for nonevaluative purposes.

To launch an effective lesson study team, participants must come to believe that gaps in student knowledge, understanding, and performance can be remedied at least in part by instructional improvement and that lesson study is an effective mechanism for collaboratively identifying and making those improvements. This is referred to as collective efficacy. Effective implementation requires establishing the conditions that will promote collective efficacy. For example, setting collaboration norms, using team roles, and creating a timeline are all practices that demonstrate that team members' contributions will be valued and opportunities for learning will be maximized. Another condition that promotes collective efficacy is to sustain lesson study over more than one cycle. Learning to implement lesson study is a developmental process, with a steep learning curve. As team members become more fluent in the process, they begin to experience the benefits of observing students closely, such as a deeper understanding of how students engage with the curriculum. Finally, staying focused on observing students— rather than evaluating the instructor—ensures that lesson study leads to new learning for all involved.

The second implementation practice is to **study research and apply evidence-based practices.** Lesson study participants should design and refine lessons in ways that are aligned to the best available evidence on student learning. With a focus on pedagogical research, instructors can translate empirical evidence into classroom practice and learn what works best with their students, in their context. Given how limited opportunities for professional development are in many educational settings, a job-embedded approach that provides opportunities to investigate teaching and learning and improve the curriculum is a strategic investment.

Identifying relevant research on instruction and applying those findings to teaching practices can be challenging, especially if team members are not well-versed in research. It is well worth the effort, however. When empirical evidence is available for a specific instructional approach, teams are encouraged to try that approach, even if it is unfamiliar. Throughout this guide, we have highlighted places where teams should make the effort to study—and hopefully apply—findings from student learning research.

The third implementation practice is to **generate and share professional knowledge.** Lesson study does involve a significant investment in staffing hours. To make that investment worthwhile, team members should look for opportunities to document and share what they have learned and to scale up the effort by including more instructors at their institution. This will ensure that the initial investment leads to long-term benefits.

By thinking creatively about how to share and generate professional knowledge as part of their lesson study practice, participants can broaden the influence of any single lesson study effort, essentially inviting nonparticipants to improve their instruction based on the experiences of the lesson study team. Options for sharing may include disseminating refined lesson plans or promising instructional strategies uncovered during

lesson study to colleagues or inviting outside observers, including fellow instructors, to join the debrief sessions in the lesson study process. A more elaborate and potentially transformative approach is to teach a public lesson, in which individuals who are not on the lesson study team are allowed to join for a portion of the cycle. Public lessons allow a broader audience to share in the powerful experience of examining student learning in response to a specific instructional design. Used frequently in Japan and in some U.S. educational settings, public lessons can also have the advantage of building buy-in and support for an institution's investment in lesson study.

Suggested Activity

1. Ask participants to think about both a collaborative working experience that went well and one that did not.

2. Invite participants to find a partner and share what factors made these collaborative working experiences successful or unsuccessful.

3. Have each pair write down the factors that come to mind.

4. After a few minutes, invite pairs to share their experiences with the whole group. Chart their responses in a way that is accessible to all participants.

5. Provide an overview of the key points below for realizing the full benefits of lesson study.

6. Wrap up by asking participants to take two to three minutes to review the corresponding section in the participant guide on their own.

Key Points

- Establishing and sustaining a safe and trusting environment with clear communication will support the team as it engages in inquiry, reflection, and critical examination of its practice.
- Lesson study involves posing questions and problems of practice, researching possible solutions, trying out ideas, collecting data, and analyzing findings.
- Generating and sharing professional knowledge is key to the lesson study team success.

Routines for Lesson Study

Define and assign roles for each meeting

Create and communicate a timeline

Purpose: In this section, you and your team will learn about several steps you can take to ensure that your lesson study cycle goes smoothly. Documenting team thinking and learning, identifying responsibilities and assigning roles for meetings, and creating and communicating timelines will help the team stay organized and maximize the learning experience for all.

Objectives: In this section participants will:

- Define and assign roles
- Create a timeline

Define and assign roles for each meeting

Activity Objective: No matter how much experience the team has working together, your lesson study sessions will be more productive if team members are assigned specific roles and responsibilities during meetings.

Time: 30 minutes

Preparation: Review background notes.

Resources: Team notebook Participant guide pp. 6

Define and assign roles for each meeting

Assigning group roles will help meetings go smoothly, keep the team focused, and support documentation of key ideas and decisions. After establishing and assigning roles, the team may wish to maintain those roles throughout a full lesson study cycle. Afterwards, members can revisit to see if they wish to add or delete roles, or rotate team members who take them on, to divide up the work of lesson study equitably.

DISCUSS

- What roles should we have during our sessions to ensure that we stay focused and work effectively as a team?

EXAMPLE ROLES

- *Facilitator:* ensures that the team stays focused and works efficiently to meet its objectives. The facilitator may develop agendas and identify objectives for each meeting.
- *Researcher:* gathers relevant research and best practice literature to be used by the team. The researcher may find articles related to their instructional goals and develop discussion questions for the team.
- *Recorder:* documents key ideas and decisions made by the team in the team notebook or lesson plan and makes them accessible throughout the cycle.
- *Timekeeper:* helps the team stick to its schedule by keeping track of time during the meeting.
- *Process watcher:* observes team interactions, including how well collaboration norms are followed, and reports back during and/or at the end of the session.

OUR TEAM'S ROLES

Team Notebook: Roles

Background

To be an effective lesson study team, members must commit to participating as a group in many activities, including conducting research on evidence-based pedagogy; studying curriculum materials; developing the lesson plan; participating in the teaching, observing, and debriefing sessions; and contributing to the final report. Team members need to keep good notes, communicate between meetings, and share their knowledge. Your role as the facilitator includes the following:

The study and application of research literature is an important part of lesson study. It may be very helpful to assign the "researcher" role to someone on the team who is willing and able to identify relevant research. In this facilitator guide, an icon is used to alert you to moments throughout the cycle when it is desirable to find, study, and apply research.

- Ensure all team members are clear on the objectives of the meeting, have received a copy of the agenda, and understand the role they will play during the meeting.

- Guide the group through the agenda activities.

- Manage time and decide whether the agenda needs to be altered to meet the objectives. You can also assign the role of timekeeper to another team member.

- Summarize actions. At the end of the meeting, summarize the decisions that were made, including any action items and the person responsible for each one. If relevant, lead the team through the development of a plan and tentative agenda for the next meeting. After the meeting, provide a written summary to all participants. You can also assign some of these tasks to a team "reporter."

You will begin by leading the team through the assignment of roles and responsibilities, which will most likely remain in place during the entire lesson study cycle. See the suggested activity on the next page. The following discussion prompts may also be helpful:

- Who will schedule the meeting days, times, and locations and communicate this information to the team?
- Who will document the team's learning?
- Who will ensure that we adhere to group norms?
- Who will identify and bring relevant research literature for the team to examine?
- Who will make sure that we are efficient with our time and stay on task?
- Who will keep administrators and other interested stakeholders informed about our work?

In addition to using roles, recording the team's thinking and learning along the way will support the team's effort to generate and share professional knowledge. A team notebook is available to for your use to capture the team's work. Recording the team's thinking and learning along the way will support its effort to generate and share professional knowledge.

Suggested Activity

1. Ask participants to discuss with a partner: "What is the role of a meeting facilitator?"

2. Next, explain that your role as facilitator is to provide consistency throughout the entire lesson study cycle. For the same reason, it is important that some roles and responsibilities remain consistent throughout the cycle.

3. Ask participants to discuss with a NEW partner (or small group), "What roles and responsibilities would support successful collaboration?"

4. After a few minutes, ask a few groups to share and chart responses at the front of the room. (5 minutes)

5. Consider adding the following possible roles if not suggested by group members.

   • *Researcher:* gathers relevant research and best practice literature to be used by the team. The researcher may find articles related to their instructional goals and develop discussion questions for the team.

   • *Recorder:* documents key ideas and decisions made by the team in the team notebook or lesson plan and makes them accessible throughout the cycle.

   • *Timekeeper:* helps the team stick to its schedule by keeping track of time during the meeting.

   • *Process watcher:* observes team interactions, including how well collaboration norms are followed, and reports back during and/or at the end of the session.

6. Ask the group to choose three or four roles that will be included as part of all collaborative meetings and record in the team notebook.

Create and communicate a timeline

Activity Objective: The team creates a timeline of activities for the lesson study cycle.

Time: 30 minutes. Continually revisit.

Preparation:
- Review background notes.

- Gather school/district/college calendar.
- Provide highlighters/color pens.

Resources: Team notebook
Example timeline (appendix pp. 58–60)
Participant guide pp. 7

Create and communicate a timeline

The team will engage in 10 steps to complete a lesson study cycle. It is helpful to create and share a timeline for the work. Below is a sample with estimated times.

Figure 3: Team timeline

STUDY AND PLAN		EST. TIME	DATE AND TIME	LOCATION
Step 1	Develop Collaboration Norms*	30 minutes		
Step 2	Establish a Research Theme*	1 hour		
Step 3	Identify and Study the Topic	2 hours		
Step 4	Plan the Lesson	3–6 hours		
TEACH, OBSERVE, AND DEBRIEF				
Step 5	Teach and Observe the Lesson	1 hour + time for teacher		
Step 6	Debrief and Discuss Observation Data	1–2 hours		
REVISE AND RETEACH				
Step 7	Revise the Lesson	3 hours		
Step 8	Reteach, Observe, and Debrief**	2–4 hours + time for teacher		
REFLECT AND REPORT				
Step 9	Reflect and Report	2 hours		
Step 10	Share and Disseminate Knowledge	1 hour		

* This step may not need to be repeated after the first cycle. ** This step may take place in two different locations.

OUR TEAM'S TIMELINE

Team Notebook: Timeline

SCHEDULING LESSON STUDY IN HIGHER EDUCATION
Postsecondary lesson study teams need flexibility to make decisions about the timing and scheduling of the lesson study cycle that fit their institutional context. Many teams typically conduct one cycle in an academic term. Each team must have at least two sections of the focal course in which to conduct the cycle. The first and second teachings typically occur within one week of each other, with each happening in a different course section. For example, a team member may teach the lesson in Section A on a Thursday. The team may meet to revise the lesson on a Friday, and the reteaching would happen in Section B on the following Monday. Scheduling lesson study activities presents challenges, but teams have been able to work creatively so that all members, including full- and part-time faculty, can participate in each stage of the cycle.

Background

To conduct productive lesson study cycles that include multiple team members and outside stakeholders requires coordination. A timeline that is updated and shared with all members ensures the team has sufficient time to prepare for each step in the cycle.

Suggested Activity

1. Provide copies of the school/district/institution calendar to all members.

2. Refer participants to "Create and Communicate a Timeline" in the team notebook. Review the Quick Reference Planning Guide in the appendix for guidance on items that need to be planned or prepared in advance of each step of lesson study.

3. Ask members to work in pairs to highlight key dates (e.g., professional development, testing) that the team should consider as they create a lesson study timeline.

4. Have each pair share key dates. Record on large poster paper for the group to reference.

5. Using the timeline template in the team notebook (or another template), identify and record the intended completion dates for each step in the lesson study cycle.

6. *Optional:* Consider working backwards by identifying ideal dates to "Reteach, Reflect, and Report."

SCHEDULING LESSON STUDY IN HIGHER EDUCATION

Postsecondary lesson study teams need flexibility to make decisions about the timing and scheduling of the lesson study cycle that fit their institutional context. Many teams typically conduct one cycle in an academic term. Each team must have at least two sections of the focal course in which to conduct the cycle. The first and second teachings typically occur within one week of each other, with each happening in a different course section. For example, a team member may teach the lesson in Section A on a Thursday. The team may meet to revise the lesson on a Friday, and the reteaching would happen in Section B on the following Monday. Scheduling lesson study activities presents challenges, but teams have been able to work creatively so that all members, including full- and part-time faculty, can participate in each stage of the cycle.

10 Steps to Lesson Study

Purpose: In this section, the team will engage in the 10 steps of a lesson study cycle.

Objectives: In this section participants will:

- Study evidence-based practices and plan a lesson
- Teach, observe, and debrief a lesson
- Revise and reteach a lesson
- Reflect and report on what is learned

(1) Develop collaboration norms

Activity Objective: In this section, the team will craft a set of collaboration norms that reflect its common understanding of how you will work together to enhance collegial learning. The norms foster a safe and supportive learning environment, help build trusting relationships among team members, and provide opportunities to build collective efficacy.

Time: 30 minutes. Continually revisit.

Preparation:
- Review background notes.
- Gather copies of existing collaboration norms that instructors may already be using in their classrooms.

Resources: Team notebook
Example collaboration norms
Example connecting activities
Participant guide pp. 9

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(1) Develop collaboration norms

The lesson study team establishes collaboration norms or agreements on what group members need from each other to feel supported, productive, and trusting. These agreements can help a team do its best work. Effective groups generally have norms that govern individual behavior, facilitate the work of the group, and enable the group to accomplish its task. Typically, some norms focus on procedures and structures, such as "We will start and end our meetings on time" and "We will communicate and post materials on our group listserv." Others support effective collaboration and relationships, such as "We will make space for everyone's ideas" and "We will practice good humor." Establishing five to eight collaboration norms works well. These should be revisited at the start of each new cycle.

DISCUSS

- What relational conditions – how we relate to each other and create/maintain a sense of belonging and support— will contribute to our learning?
- What operational conditions – procedures and structures guiding our work – will contribute to our learning?
- What needs do we have related to listening, confidentiality, decision making, participation, and expectations?
- How will we resolve differences and/or disagreements?

OUR TEAM'S COLLABORATION NORMS

Team Notebook: Collaboration Norms

Note: The first set of collaboration norms should be established at the beginning of the first cycle. During additional cycles, the team may spend a few minutes revisiting and reflecting on their relevance and potentially making changes. For example, when a norm has become routine practice, some teams may wish to replace it with a new one that reflects the team's need to grow.

Background

To learn from the lesson study process, team members must be willing to collectively examine their practice, acknowledge challenges, and seek out areas for improvement. Lesson study invites detailed discussion about instructional decision making—an experience that may be new or unfamiliar to some team members. As a collaborative group, you will be working to reach consensus on teaching strategies, even though individual team members may have different perspectives on instruction. You will also be observing individual team members teach a lesson, which may cause the person teaching to feel vulnerable or uncomfortable. Creating a supportive and productive environment for the team, including supportive relationships among team members, helps build a foundation for open and trusting dialogue, analysis, and critique.

Group norms provide a set of shared expectations for how the team members will interact and support each other's learning. Group norms are also important because they enable teachers to learn together, adopt a research stance toward their practice, and build a sense of collective efficacy. As team members build their relationships and become accustomed to working together, they will be able to reflect on and deepen their sense of community and strengthen their belief in their capacity to improve student learning (Stepanek, Appel, Leong, Mangan, & Mitchell, 2007).

It may be helpful to begin with an existing list of collaborative norms that have been proven to be effective. Alternately, the team can create its own list then check it against an existing list. There may be characteristics that do not come up in the initial discussion but that the group agrees should be included. What follows is a sample list of group norms (Bray, Lee, Smith, & Yorks, 2000; Collay et al., 1998; Dufour & Eaker, 1998; Garmston & Wellman, 2016; Preskill & Torres, 1999).

- *Communication is open and honest; there is a climate of trust.* Team members must feel that they are able to share their ideas and opinions without inspiring defensiveness or reprisals. It will be difficult for members to learn from each other if they cannot be honest. Although the ability to share their views openly and honestly is important, members will be unlikely to do so if they fear their contributions will be ignored or belittled. The balance between honesty and trust may not be easy to establish and maintain at first, but it is crucial to the team's work.

- *Members are encouraged to both challenge and support one another.* Team members do this by asking questions, building on each other's ideas, and respectfully disagreeing. They are expected to ask for clarification, explain their reasoning, and provide evidence to back up their assertions.

- *Methods for resolving conflict are established and agreed upon.* No team should begin its work assuming it will be easy. Members must agree to listen and focus on the problem rather than on the people involved, give the process adequate time, and try to see the issue from another person's perspective.

- *Mistakes are viewed as opportunities.* It is difficult to try new things or take risks if team members fear the consequences. Keep in mind that the purpose of lesson study is not to create the perfect lesson but to learn about what makes effective instruction effective. Mistakes are fruitful sources of learning—in many ways, the more the better.

- *All members are held accountable for their actions.* Engaging in lesson study requires making a commitment to the other team members. All team members must agree to fulfill their specific responsibilities, to share the work as equally as possible, and to support each other and maintain productive and respectful interactions.

Suggested Norm Activity

Materials
- Flip chart
- Pens or markers
- Sticky dots or colored pens/markers
- Sample norms

Grouping: Split members into four small groups/pairs by color (e.g., red, blue, yellow, and green).

1. Distribute copies of the sample norms above and sticky dots or colored pens/markers to each small group/pairs.

2. Briefly discuss the importance of establishing collaboration norms.

3. Ask all team members to silently review sample norms.

4. Ask each group to brainstorm its own list of collaborative norms and record those norms on a flip chart.

5. Explain and conduct a dot-voting process. Each group will receive four sticky dots (or colored pens) that correspond with their group's color. Groups will have five minutes to review all flip charts and place a dot (or make a mark) next to the four agreements/norms they feel are most important. Alternately, each individual team member can receive four dots (still in their group's color) and vote on their own.

6. Bring the whole group together, tally up the votes, and lead a discussion about the five to eight norms that received the most votes. Leave room for more discussion before coming to a consensus—the dot voting does not have to be the final say. Record in the team notebook.

7. The final list of collaboration norms should be included on all meeting agendas and referred to at the beginning of each collaborative meeting.

Suggested Connecting Activities

Many professional development experiences begin with an icebreaker or connecting activity. Connecting activities can help teams develop trust as they also develop their collaborative norms. When team members will be working together on short-term projects, an informal, "getting-to-know-you" process is appropriate. For the long-term effort that lesson study requires, a deeper process is essential. Even when the team members know each other well, they will ultimately benefit from laying the groundwork for their collaboration. You may decide that it is worthwhile to have a short connecting activity at the beginning of each meeting.

1. One example of a connecting activity is to ask participants to share associations they have with an interesting or evocative image that you supply. For this activity, you will need to bring a collection of images, which can be on postcards or drawn from the internet.

2. Arrange the images so that at the start of the activity, each participant can select one image from the set.

3. Ask each participant to share a personal (and professional, if you like) connection they have with the image.

4. This activity encourages participants to share new information about themselves with the team, which sets a model for seeing lesson study as a space where new connections and relationships can be made.

5. You may also use a content-related connecting activity. There are many ideas for content-related icebreaker activities available on the internet.

② Establish a research theme

Activity Objective: Together, the lesson study team will identify a research theme that reflects the broad, long-term goals you have for your students. Typically, teams use the same research theme for multiple cycles of lesson study.

Time: One hour

Preparation:
- Review background notes.

- Gather documents that articulate long-term goals for students, such as standards, course syllabi, and mission or vision statements.
- Gather data that provide information on students' current understanding related to long-term goals.

Resources: Team notebook
Sample research themes
Participant guide pp. 10

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② Establish a research theme

The lesson study team discusses ideal and actual student qualities and traits, then uses this discussion to establish a research theme: a broad, long-term goal that is focused on improving student learning. The research theme provides a common focus across multiple cycles of lesson study and other related professional development experiences. Teams that are keeping the same research theme they used previously can skip this step.

💬 DISCUSS
- Ideally, what affective qualities and traits do we hope our students will have when they complete our course?
- What are students' current qualities? What characteristics inspire us? Is there anything that concerns us?
- What are the gaps between the ideal and the actual? What ideal student qualities do we want to develop?

🧩 EXAMPLES
- How can we develop students' capacity to ask for clarification, communicate their thinking process, and justify their solutions?
- How do students develop and recognize their willingness to engage with the content? Their curiosity? Their persistence? Their confidence?
- How do we build students' confidence in their reasoning and willingness to persevere in problem solving? Promote a productive disposition? Support a growth mindset? Embrace and learn from confusion?

📄 OUR TEAM'S RESEARCH THEME
✏️ *Team Notebook: Research Theme*

Note: Teams typically keep the same research theme for several cycles of lesson study. Therefore, once a research theme is established teams can skip this step for subsequent cycles until they are ready to revise it or come up with a new theme.

Background

Lesson study teams are guided by a research theme—a broad, long-term goal selected by the team, often for one or more years of lesson study work together. Typically, the research theme defines a core purpose of instruction or a problem of practice about which participants care deeply. Often, the research theme is affective, such as "How do we build students' confidence in their mathematical reasoning and willingness to persevere in problem solving?" To address the research theme, lesson study teams will often consult the research literature to better understand the relevant theory and practice, opening doors for their professional growth.

> *As team members discuss the two questions, be aware of the potential for a deficit perspective on students' knowledge and skills. The purpose of addressing these questions is to identify ways to improve instruction to better meet students' needs, not to focus on perceived student deficits.*

One benefit of the research theme is that it helps teams stay focused on their instructional goals. It encourages them to step back and reflect on the "why" of their teaching rather than getting overwhelmed by the details of "how." Articulating collective responsibility for common goals through a research theme also contributes to collegiality (Datnow, 2011).

Lesson study teams can draw on several sources to inform the selection of their research theme: academic standards, school/district/college goals, curriculum outlines or syllabi, and mission and vision statements.

After reviewing these sources as a group, you may want to use the following suggested activity to generate the research theme.

Suggested Activity

1. Using flip chart paper, create a poster for each of the following questions:

    Q1: Think about the aspirations that you have for your students. What qualities do you want your students to have by the time they leave your class?

    > *Possible Responses:*
    > *Independent thinkers*
    > *Work effectively with others*
    > *Self-motivated learners*
    > *Positive self-concept*
    > *Problem solvers*
    > *Clear and confident communicators*
    > *Confident and perseverant*

    Q2: What qualities best describe where students are currently?

    > *Possible Responses:*
    > *Reluctant to work with classmates*
    > *Disorganized*

Retreat when faced with unfamiliar problems

Limit their communication to providing "the answer" with no justification

Rely on the teacher to help them when they are unsure about what to do

2. Ask team members to break into two separate groups. Each group then discusses one of the two questions and records its ideas on a poster.

3. After four or five minutes, ask groups to switch and visit the other poster to discuss and record ideas.

4. Bring the whole group back together and ask them to look at the two posters, examine possible gaps between the two, and consider how the team can work on closing those gaps. It may help to ask team members to answer an additional question: "What gaps do you see between these aspirations and how students are actually developing?" Using a third poster paper, record group ideas.

    Possible Responses:

    Students need to be able to communicate their mathematical thinking.

    Students need to learn about and use tools to support planning.

    Students need to know an entry point for a complex, open-ended task.

    Students need confidence in their ability to work toward a solution.

    Students need problem-solving skills.

    Students need a growth mindset.

5. Next, ask the group to vote/come to consensus on the one or two gaps that the team would like to address for the lesson study.

6. Once the group has identified one or two gaps, ask them to craft a question that aligns with the long-term goals you have for students.

7. Record the research theme in the team notebook.

    Sample Research Themes:

    How can we support students to become independent problem solvers and be motivated and able to apply their skills to real-world problems?

    How do students develop and recognize their willingness to engage in mathematics? Curiosity. Persistence. Confidence.

    How can we develop students' capacity to ask for clarification, communicate their thinking process, and justify their solutions?

    How do we build students' confidence in their mathematical reasoning and willingness to persevere in problem-solving? Promote a productive disposition. Support a growth mindset. Embrace and learn from confusion.

(3) Identify and study the topic

Activity Objective: In addition to a research theme, the team needs to pinpoint a content-area topic on which to focus the lesson. To make this decision, the team can analyze student assessment or achievement data, identify challenging concepts, and determine the team's learning needs. The team explores the key ideas and common misconceptions for this topic and reviews the literature on evidence-based instructional practices aligned with the research theme.

Time: Three hours.
This step can be divided across two or more days. For example, the team can take one hour to identify the topic and then meet on another day to gather resources for studying the topic.

Preparation:
- Review background notes.
- Gather student learning data, scope and sequence documents, standards, course objectives, syllabi, and curricular materials.
- Gather literature describing evidence-based instructional practices.

Resources: Some sources for evidence-based instructional practices include: the National Council of Teachers of Mathematics, the National Council of Teachers of English, the National Reading Council, the National Research Council, the American Mathematical Association of Two-Year Colleges

Team notebook
Participant guide pp. 11

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(3) Identify and study the topic

The team reviews course content, student learning challenges, and other data to identify a broad topic for the research lesson. The team examines the identified topic in the curriculum, with attention to the goals, sequence of lessons, and progression of the concepts in the text or materials. The team selects one lesson to be the focus of the lesson study cycle.

DISCUSS AND RECORD AS YOU GO

🖋 *Team Notes*

- In what way does each of the following inform the team's selection of a topic for lesson study?

Student assessment or observational data	
Research on student learning challenges and common misconceptions	
Instructor learning needs	
Curriculum gaps	

- What topics are important and persistently difficult for students to learn and for us to teach? What key concepts should students understand about this topic?

- How does our text treat this topic? How does each lesson or task help build conceptual understanding? Does the sequence of lessons align with the learning progressions?

- What does the research say about the topic? What articles were consulted to learn more about the topic? What articles were consulted to learn more about common student challenges and misconceptions?

- Which lesson addresses a concept that is critical to the topic? Which lesson should serve as the focus for our lesson study? Does this fit with our lesson study schedule?

Background

Before identifying the topic for the lesson it may be helpful to agree on the content area. For lesson study teams whose members specialize in a common subject, the content area for the lesson will be obvious. Other teams— including elementary teachers, instructors who teach more than one subject, and interdisciplinary lesson study teams—will first need to agree on the content area of the research lesson.

When the content area is set, the team will identify a more specific topic for the research lesson. Team members can typically generate several topics or concepts students find challenging. In some settings, selection of a topic will be dictated by the curriculum. The team will look at the lesson study schedule and compare it to the curriculum, selecting the topic based on what will be taught when the observation and debriefing are likely to take place (Stepanek et al., 2007).

Ideally, the team is not strictly constrained by an existing schedule and can consult other sources of information to identify a topic for the research lesson, including student achievement data, research on student learning challenges, teacher/instructor learning needs around content and evidence-based instruction, and new topics or gaps in the curriculum. The topic should also represent fertile ground for exploring the research theme. Below are considerations for selecting a topic based on each source of information.

Student assessment data. Through the disaggregation and analysis of student data, patterns may emerge that indicate weaknesses in student understanding or skills. By using data to select the topic, the team ensures that its work will focus on the areas of greatest need. In addition to gaps in content or skills, the team may investigate disparities by student groups, such as by race/ethnicity, gender, English learner status, or special needs status.

Research on student learning. An extensive literature base on student learning challenges in all subject areas, including literacy and mathematics, can provide a rationale for focusing on a specific topic. Learning challenges may also include specific skills that cut across subject areas, such as reading comprehension, problem solving, writing, and approaches for English learners or special needs students.

Teacher/instructor learning needs. Teacher knowledge of both academic content and effective pedagogical practices is frequently linked to student learning (Heibert et al., 2002; Hill, Rowan, & Ball, 2005). Team members can reflect on the areas in which they feel less prepared to teach or the topics they find most difficult to teach.

> *If a team member has been designated as the researcher, this is where they can be especially helpful. Journal articles, both popular and academic, can be very helpful for identifying common student learning challenges. Other helpful sources include national associations such as the National Council of Teachers of Mathematics (NCTM) and the American Mathematical Association of Two-Year Colleges (AMATYC), including their publications.*

Curriculum. Teams may want to focus on gaps in the curriculum or significant topics that are missing or weak. In addition, the adoption of new curricula may provide ideas for topics, as it usually requires teachers/ instructors to examine how concepts are taught and in what sequence.

Suggested Activity

Choosing a topic for lesson study is an iterative process. Teams may work through several possibilities before they finalize the topic. Support the team by working through the following steps:

1. Refer members to the table in the corresponding section of the participant guide. Indicate that the team will use the table below and record in the team notebook how each of the data sources can inform the team's selection of a topic for lesson study.

2. Share the following example to spur their thinking.

    Research theme: *How do we build students' confidence in their mathematical reasoning and willingness to persevere in problem solving?*

Data Source	Questions	Example Responses
Student assessment or observational data	What patterns do you see in the data? What do these patterns suggest about gaps in student learning?	*Our classroom observations indicate that students get stuck when presented with multi-step problems that don't have an obvious solution strategy. They will sit and wait for our help. They aren't demonstrating the confidence or perseverance to try different approaches. They want us to tell them what to do.*
Research on student learning challenges and common misconceptions	What topics are important and persistently difficult for students to learn? What key concepts do students need to understand about this topic?	*The research says students need to be provided with opportunities to work on more complex problems that help them understand concepts. We have to provide "group-worthy" tasks that support collaboration. We have to provide entry to the problems with manipulatives or visuals and scaffold by asking probing questions.*
Instructor learning needs	What topics are important and persistently difficult for us to teach?	*We have read about student-centered approaches, but we haven't had a chance to implement them. When we ask more complex, multi-stepped problems, they appear paralyzed until we come help them by telling them what to do. The research states that instructors tend to ask low-level questions that support rote-memorization.*

Data Source	Questions	Example Responses
Curriculum gaps	How does our text treat this topic? How does each lesson or task help build conceptual understanding? Does the sequence of lessons align with the learning progressions?	*The timeline of our lesson study cycle coincides with our unit focus on arithmetic means. This topic aligns with our research theme and gaps in our students' learning. Our lessons tend to focus on procedural knowledge, such as how to calculate the "average" by finding the mean, median, and mode. Our lessons don't do a very good job of helping students understand how and when they are used and for what purpose. We'd like to map out a lesson that connects these concepts with a real-world problem and illustrates how these different measures of central tendency reveal different things.*

Selected topic: *Plan a "group-worthy" problem that focuses on measures of central tendency.*

④ Plan the lesson

Activity Objective: Next, the team plans a detailed lesson that includes student learning outcomes, tasks and activities, anticipated student responses, and assessment questions to guide data collection. Remind the team that this planning effort sets the stage for the learning that occurs during the teaching, observing, and debriefing in the next lesson study stage. The plan aligns with the research theme and reflects the team's review and application of its research on student learning and pedagogy.

Time: Three to six hours.
This step can be divided across two or more days. This may provide more time to gather resources that can guide the selection of tasks and instructional approaches.

Preparation:
- Review background notes.
- Gather curricular and instructional materials, syllabi, standards documents, and research articles on student learning and evidence-based instructional practices.

Resources: Team notebook
Facilitator questions
Sample lesson plans
Participant guide pp. 12–13
Team Notebook

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④ Plan the lesson

The team collaborates on planning a lesson to help students meet the learning goals and to ensure instructors gain knowledge about the research theme. The team studies evidence-based instructional practices and considers how they should be incorporated into the lesson. The plan is detailed and represents the team's research and its collective thinking about how best to foster student learning. Be sure to record the team's ideas and decisions in your lesson plan.

DISCUSS AND RECORD AS YOU GO

✏️ *Team Notebook: Lesson Plan 1*

LESSON PLAN 1

Background, Research, and Rationale
- Why did you choose this topic?
  - How is this topic important or persistently difficult for students to learn?
  - What are common student challenges and misconceptions about this topic?
  - What articles were consulted to learn more about the topic? What does the research say about the topic?
- Why did you choose the tasks and activities in the lesson?
  - How do your students' learning needs inform instructional decisions in the lesson?
  - How do evidence-based practices inform your instructional decisions in the lesson?
  - How do the tasks and activities support the team's research theme?

Student Learning Outcomes for the Lesson
- What do we want students to understand and be able to do by the end of the lesson?

LESSON PLAN 1 *(CONTINUED)*

Time	Learning Tasks and Activities, Anticipated Student Responses, Key Questions	Instructor Support	Assessment
	Introduction		
	Student Task What is the student learning task?	How will we support student engagement? How will we support students if they are stuck or frustrated? How will we extend the tasks if students finish early?	What types of data will be informative for us to collect during the lesson? How will we know the extent to which the student learning goals were met?
	Anticipated Student Responses What are all the ways that students may approach and solve the task?		
	Comparing and Discussing How will we orchestrate class discussion so that students can share their thinking?		
	Summing Up How will we summarize the main ideas of the lesson and loop back to the learning goals?		

EXAMPLE

Lesson plan examples can be found at:
http://www.lessonstudygroup.net/lg/lesson_plans_table.php?clsg=1

OUR TEAM'S LESSON

Team Notebook: Lesson Plan 1

Background

The process of developing the lesson plan offers many learning opportunities for team members. The process of developing the lesson plan offers many learning opportunities for team members. Participants adopt the stance of a researcher by creating a lesson that represents an inquiry into the complexities of content, instruction, and student learning. The lesson study team moves beyond the familiar confines of educational practice to think deeply about how lessons interact and support each other. The research lesson helps them explore their ideas about how students learn challenging concepts. The instructors develop their ability to anticipate and plan for student responses as part of their preparation.

Developing a lesson plan for lesson study may not resemble the ways instructors typically prepare their instruction. To produce new learning, lesson study calls for intensive examination of instructional approaches and materials as well as a heightened understanding of the topic being taught. The plan proposes what the team believes will support achievement of the student learning outcomes and goals for the lesson.

The first step in developing the lesson plan is to engage in mapping or unit planning by carefully examining where in the unit or course the lesson will take place. The team will review the entire sequence of lessons that make up the unit or course. That includes all lessons that will precede and follow the research lesson. The team should pay close attention to how concepts develop within the unit or course. Through this process, the team gains a better understanding of how the research lesson fits with other lessons and how students' skills and understanding of concepts are developed.

Looking at the sequence of lessons within the unit can help instructors pinpoint which lesson covers a key topic within the sequence. They may choose an introductory lesson or a lesson at the end of the unit that brings all the important concepts together. For a narrower topic, the team may already have a specific lesson in mind. The process of mapping the unit will help the team situate the research lesson within the broader context. This helps team members understand what students learn in the activities leading up to the research lesson and where they will be going next (Stepanek et al., 2007).

> *For lesson study purposes, the ideal lesson is one that builds students' thinking skills broadly rather than teaching a procedure. Typically, lesson plans include challenging, open-ended tasks during which students may work in small groups and have multiple opportunities to showcase their thinking/learning verbally or publicly.*

The next step is to develop the research lesson plan. Teams that have some experience with lesson study may choose to have a subset of team members take responsibility for drafting the research lesson, based on the whole team's discussions and decisions. This writing team should include the team member who has stepped forward to teach the lesson. For teams that are new to lesson study, it is more effective for the entire team to draft the lesson together. Remember that even if a subset of team members finalizes the lesson plan, the underlying decisions should have been made by the entire team. This attitude reinforces the team's collective ownership of the plan.

Research lesson plans include many elements found in traditional lesson plans, but they are more detailed. Just as the lesson study team has carefully crafted the research theme and the goals, members also take time to plan the instructional sequence, learning activities, key questions for students, and anticipated student responses.

Suggested Activity

1. Refer the group to section 4 of their participant guide: *Plan the lesson.* Review each important component of the lesson plan and answer questions. Let the group know that you will walk them through each of the sections of the team notebook.

2. *Background, research, and rationale.* Begin by leading a discussion about the rationale for the lesson and instructional strategies, including the data, research, and other factors that informed these decisions. Use the following questions to help facilitate group discussion:

   - Why did you choose this topic?
   - How is this topic important or persistently difficult for students to learn?
   - What are common student challenges and misconceptions about this topic?
   - What articles were consulted to learn more about the topic? What does the research say about the topic?

3. *Student learning outcomes.* Next, help the team articulate the goals or intended learning outcomes for students that guide their lesson plan and inform the selection of instructional approaches that are examined during lesson study. Provide the group with two or three examples of strong learning outcomes, then ask the team to discuss as a whole group the following question:

    • What do we want our students to understand and be able to do by the end of the lesson?

4. *Learning tasks and activities.* Provide members with an overview of this section. Make sure the team understands the importance of showing and telling what students will be doing and how the teacher/instructor will set up and facilitate the learning tasks. These activities are often rich, challenging tasks. Guide members through the following questions:

    • Why did you choose the tasks and activities in the lesson?

    • How do your students' learning needs inform instructional decisions in the lesson?

    • What evidence-based instructional strategies will we use to best address the needs of students?

    • How do evidence-based practices inform your instructional decisions in the lesson?

    • How do the tasks and activities support the team's research theme?

> *Make sure the team describes the lesson in sufficient detail so that someone from outside the team could envision what is happening throughout the lesson. The team should also estimate how much time each phase of the lesson will take. The team should also use this section to describe important points for the teacher to remember in setting up the learning activities, such as allowing time for student discussion, recording ideas on chart paper, asking questions, and preparing any visual aids that will be used.*

5. *Anticipated student responses.* Share with the team that many teachers/instructors are not accustomed to considering how students will respond to the tasks of the lesson. This is an important reflection for lesson study. Ask the team to break into pairs and discuss how they expect students to react to the tasks and activities in the lesson. What might these reactions look like? What type of background knowledge do students need to be successful? What are some common misconceptions that students may have? After 10 to 15 minutes, come together for a whole-group discussion. Encourage members to generate possible responses to engage in the activities or problems of the research lesson as learners. Team members may need additional time to try out several different activities before they decide on the one they believe will be most effective.

6. *Comparing and discussing.* Encourage team members to discuss strategies that the teacher/instructor can use to help students understand how their peers approached a learning task. Incorporate methods that support students in discussing different approaches and solutions.

7. *Summing up.* Support team members in identifying how the lesson will be summarized. This can include items to review, questions to stimulate deeper thinking, and other strategies that highlight the key components of the lesson.

8. *Teacher/instructor support.* Guide team members through a detailed description of the additional moves, questions, or statements that the team member teaching the lesson may need to use to help students learn. In the row with anticipated student responses, the team can describe how this individual will handle the various student responses, especially incorrect solutions, or what to do if students get stuck or finish early. Ask the team to work together to craft questions that the teacher/instructor can pose to extend student thinking or to help students reevaluate their misconceptions. Think of this as a contingency plan to enact if students are struggling. The team can also use this section to provide questions that can be posed to students as they are working. They might list things to look for that help identify the strategies students are using or the ideas they are discussing. This will help the teacher/instructor facilitate the closing of the lesson by identifying the students to call on or by anticipating how to bring new ideas into the discussion.

9. *Assessment.* Move members into small groups of two to three, ask each small group to draft questions to help assess student progress throughout the lesson. Examples include: Are students engaged? Do students get lost when examining each other's work in small groups? How do students explain the concept being taught? What types of questions do they ask questions during small-group discussion? After five to 10 minutes, as each group to report out their questions. Document all questions. Remind the team that they should also include questions that can be used to analyze the effectiveness of the lesson and the overall approach to teaching and learning that has guided the lesson.

    > *This is a good opportunity for the team to revisit the research theme and the student learning outcomes for the lesson. The learning activities, instructor questions, and all the details of instruction should contribute in some way to helping students achieve the goals that guide the research lesson.*

10. Use the table on the next page to help guide your team's planning session.

Ask

Time	Learning Tasks and Activities, Anticipated Student Responses, Key Questions	Instructor Support	Assessment
	Introduction		
	Student Task What is the student learning task? What are the main tasks and learning activities? Which tasks will be included in the lesson? How well do the tasks and activities match the research theme and student learning goals? How well does the cognitive demand (i.e., level of challenge) of each task align with the students' current knowledge and skills? What kinds of questions will support students' ability to think more deeply about the key ideas? How does the lesson flow? What is the sequence of experiences that will propel students from their initial understanding to the desired understanding?	How will we support student engagement? How will we support students if they are stuck or frustrated? How will we extend the tasks if students finish early? How will we ensure that students remain engaged? How will we support students if they are stuck or frustrated? How will we assess and advance their thinking? How will we extend the tasks if students finish early?	What types of data will be informative for us to collect during the lesson? How will we know the extent to which the student learning goals were met?
	Anticipated Student Responses What are all the ways that students may approach and solve the task? What student responses do we anticipate? How can their thinking help drive the lesson? What does the research say about this topic? What are common student challenges and misconceptions?		

Time	Learning Tasks and Activities, Anticipated Student Responses, Key Questions	Instructor Support	Assessment
	Comparing and Discussing How will we orchestrate class discussion so that students can share their thinking? How will students share their thinking?	What strategies or solution paths do we want students to present? How will we support students to engage with, make sense of, debate, expand on, and make connections with each other's thinking?	
	Summing Up How will we summarize the main ideas of the lesson and loop back to the learning goals?	What will we do tomorrow that will build on this lesson?	

Sample lesson plans

Sample lesson study plans and other resources are available from:

The Lesson Study Alliance: https://www.lsalliance.org/resources/

The Lesson Study Project (postsecondary): https://www.uwlax.edu/sotl/lsp/tools.htm

⑤ Teach and observe the lesson

Activity Objective: This is where the rubber meets the road! One team member volunteers to teach the lesson while the others observe student reactions and collect learning-response data. As a team, you prepare teaching, observing, and debriefing materials, identify and invite outside observers if desired, and assign roles and responsibilities in advance to ensure the process goes smoothly.

Time: One hour for teaching and observing. Additional time for preparation.

Preparation:
- Refer to Quick Reference Guide (appendix pp. 62–63).
  - Review background notes.
  - Identify roles and responsibilities to prepare for the teaching, including who will teach the lesson.
  - Consider whom to invite (in addition to team members) to the observation and the debriefing.
  - Reserve a room for the debriefing.

Resources: Team notebook
Pre-observation protocol
Participant guide pp. 14–15

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⑤ Teach and observe the lesson

Preparing to teach and observe ahead of time ensures this step will go smoothly. In advance of the first teaching session, the team will create a checklist of items to attend to and will record them in the team notebook. The list might include the following items.

☑ EXAMPLE CHECKLIST

- ☐ Reserve a room* for debriefing
- ☐ Send observation, debriefing times, and locations to observers
- ☐ Make and distribute copies of the lesson plan and any handouts
- ☐ Prepare student names tags
- ☐ If needed, schedule and convene a pre-observation meeting for non-team members

* If possible, schedule the debriefing to take place in the same classroom in which the teaching was held. This enables everyone to refer to the whiteboard, posters, or teaching tools used during the lesson. If this is not possible, the team can take photos of the whiteboard and collect artifacts of student work to reference during the debriefing.

⚲ OBSERVATION PROTOCOL

Establishing and communicating protocols for observers will clarify their role during the teaching of the team's lesson. Observers will be expected to:

- **Collect data requested by the lesson planning team.** Be prepared. Read the lesson plan closely prior to the observation. Focus on the assessment questions outlined by the team. Stay present and record observations on the lesson plan handouts.

- **Respect the classroom atmosphere and natural flow of the lesson.** Refrain from assisting or instructing students and be careful not to block students' view when they need to see the board. Avoid disrupting the teacher, refrain from side conversations, and silence all phones. Arrive on time and stay for the entire lesson.

- **Focus on the same small group of students over the entire lesson.** This is likely to yield the best picture of whether and how the students developed understanding. Consider recording students' mathematical thinking and interactions with peers and the teacher/instructor.

SCHEDULE PRE-OBSERVATION MEETING

If you will have non-team members at the observation, invite your guests to a pre-observation meeting. During this session, the team will distribute copies of the lesson plan, provide time for observers to read the plan, answer questions they may have, bring their attention to the assessment questions to focus their data collection, and review the observation protocol (see observation protocol in the appendix).

DISCUSS

- What will our team need to do to prepare for the teach-and-observe session?
- What is important to remember about the purpose of the observation?
- What questions do we have about the observation protocol?

Teaching the Lesson

- After all the hard work, the team finally gets a chance to see the plan in action. While one team member executes the plan, the others observe and collect evidence that supports or raises questions about the team's ideas and hypotheses. During lesson study observations, it is important to pay attention to the details: What do you see? What do you hear? Most of all, how do these details help you uncover and understand student thinking? The focus of the observation is on the students—not the team member teaching the lesson—and on what the lesson is designed to help students learn.

- Because the lesson plan reflects the collaborative effort and thinking of the team, the teacher/instructor should do their best to follow it. If the team has carefully anticipated the students' possible reactions to the lesson and identified teacher/instructor responses, changing the lesson during the teaching is usually not needed. However, if the teaching situation unfolds in a way that was not predicted, the team member teaching the lesson should feel comfortable deviating from the lesson plan. For example, if student responses suggest that teaching the lesson as written will strengthen student misconceptions that will be difficult to address later, midcourse corrections may be necessary.

- If the lesson plan is changed, you will have a chance to discuss why and whether those changes helped students learn. As Akihiko Takahashi writes, "Planning a lesson for lesson study is not drawing a single path to the goal. It is more like drawing a map around the topic that we teach" (Stepanek et al., 2007, p. 94).

OUR TEAM'S CHECKLIST

Team Notebook: Teach and Observe Checklist

Background

The teaching and observing step in the lesson study cycle creates the occasion for team members to bring their learning together and see how their ideas play out with students. Remember, the research lesson is really a work in progress.

Preparing to teach and observe ahead of time ensures this step will go smoothly. In advance of the first teaching session, the team should create a checklist of items to attend to and record them in the team notebook. Your checklist should include the items below.

Roles and responsibilities:

Lesson study requires a variety of players who serve different functions. Each is described below

Teaching the lesson. Many teachers/instructors are unaccustomed to being observed by others; the idea of teaching the lesson in front of colleagues and guests can be intimidating. For novice teams, determining who will teach the team's lesson is best done late in the process of lesson planning. Prematurely choosing

the individual teacher who will be observed can undermine team members' investment. It becomes all too easy for the team to relinquish shared ownership and to perceive the lesson as the to-be-observed team member's lesson. Building collaborative ownership of the process and the lesson is essential to the success of the team. Keep in mind that the selection of this teacher should happen far enough in advance of the observation to allow the lesson design to reflect the needs of that team member's students. As teams grow more accustomed to the process, decisions about who will teach the lesson can be made earlier in the cycle.

Because the lesson plan reflects the collective wisdom of the team, it should be followed as closely as possible. Altering the lesson plan during the teaching session makes it difficult for the team to evaluate the effectiveness of the lesson plan and the team's ideas. Furthermore, if the team has carefully anticipated students' possible reactions to the lesson and identified teacher/instructor responses, changing the lesson during the teaching should, ideally, be unnecessary. If the teaching situation unfolds in an unpredictable way, however, the teacher/instructor should feel comfortable deviating from the lesson plan. For example, if student responses suggest that teaching the lesson as written will strengthen student misconceptions that will be difficult to address later, it may be necessary to make a midcourse correction.

If the lesson is changed, Makoto Yoshida (2006) recommends including the following questions during the debriefing:

1. What was different from the original lesson plan?
2. Why did the teacher/instructor make the decision?
3. Did the changes that were made help students learn or not?

Several considerations can help your team decision who will be the instructor. First, the lesson that is taught at this stage of lesson study will be revised and should be retaught to a different group of students relatively soon after the first session. The amount of time you have given between the teach and reteach stages of lesson study may influence who serves as the teacher for these stages. Additionally, team role decisions may relate to scheduling of activities in this step. For example, we recommend that the team avoid trying to revising the lesson plan on the same day they have observed and debriefed. Teams can get overloaded with too much activity one one day, and some teams appreciate having more time to reflect on the observation and debrief before rolling up their sleeves to revise the lesson. Having at least a day in between may influence your selection of an instructor.

> *Remind the team and invited observers to stay focused on how their group of students responds to the lesson, not on how the teacher/instructor delivers it. It is natural for educators—who spend their time designing, implementing, and reflecting on instruction—to pay more attention to the teacher/instructor than the learners. The goal of lesson study, however, is to gain valuable knowledge and insight about how students learn and then apply it to future lessons.*

Observing the lesson. Observers can offer new and multiple perspectives that capture evidence of student thinking and understanding. Except for the team member who is presenting the lesson, all the adults in the classroom serve as observers. We recommend that each observer focus on the same small group of students for the entire lesson, as this is likely to yield the best picture of whether and how the students developed understanding. Observers take detailed notes and gather evidence to share at the debriefing. They use the lesson plan as a guide, paying close attention to the questions in the assessment column. It is important for outside observers to understand how lesson study focuses on understanding students' thinking rather than critiquing or evaluating the team member teaching the lesson. Helping everyone to approach lesson study with a spirit of respect and gentle inquiry will support the trust-building process and enhance the team's work.

Invited guests. Other educators, administrators, content specialists, and researchers, among others, can be invited guests. In addition to providing a valuable outside perspective to the team's learning, opening the teaching of the lesson to others can provide many benefits. The observation can foster learning among and across groups, building knowledge around the research questions. The team can also strategically select invited guests to build support for their efforts. For example, by inviting administrators the team may be able to garner more resources to scale up the lesson study effort. Inviting colleagues who have already expressed an interest in learning more about lesson study can also build buy-in.

Final commentator. The final commentator is typically someone from outside the team who is knowledgeable about teaching and learning. This person can be a content specialist, instructional leader from a nearby institution, department chair, or professor from a local college or university. In the absence of an outside commentator, a team member or the moderator can fill this role. Choosing a thoughtful and articulate final commentator can set the tone for the team's subsequent work. The final commentator is responsible for the following:

- Expressing appreciation to the teacher for opening their classroom to the group.
- Extending thanks to the team for all their work.
- Summarizing the key ideas and questions that emerged from the debriefing and contributing any new insights or questions not previously shared in the debriefing.
- Highlighting the areas and issues the team might want to pay attention to as they revise the lesson.

Additional reading:

Takahashi, A. (2014). The role of the knowledgeable other in lesson study: Examining the final comments of experienced lesson study practitioners. *Mathematics Teacher Education and Development, 16***(1), 2-17. https://files.eric.ed.gov/fulltext/EJ1046714.pdf**

Suggested Activity

Preparing for the observation and debriefing:

There are several tasks the team should attend to prior to the teaching of the lesson.

1. *Explaining the lesson study model to students.* Students may not be used to having observers in the classroom. A general explanation of the lesson study process and its purpose—including what will happen in the debriefing following the observation—will help put the observation in context for students. Prior to the lesson, it may be helpful to model this explanation for team members. You might also consider giving members time to practice in pairs or small groups. Share with the team that lesson study can help students see their teachers/instructors as learners, modeling an inquiry approach to their work. This can be a powerful insight for students.

2. *Making a checklist of preparations.* Ask team members to begin making a checklist of preparations. For example, to facilitate data collection by the observers, teachers should prepare a seating chart of the class and/or provide name tags and name tents for the students. If space allows, add chairs to the perimeter of the classroom for observers to use while the teacher/instructor or students are addressing the whole class. List checklist items in the team notebook.

3. *Conducting a pre-observation meeting.* Tell group members that you will help them prepare pre-observation meetings. If the team determines they will have non-team members at the observation, you will need to invite these guests to a pre-observation meeting. Provide members with a list of what they will need to accomplish during the pre-observation meeting, including: copies of the lesson plan, time for observers to read the plan, time to answer questions they may have, highlighted assessment questions to focus the data collection of the observer, and time to review the observation protocol.

4. *Developing a schedule.* The day set aside for teaching, observing, and debriefing the lesson requires considerable advance planning. Ensure that all team members are released from their classrooms during the teaching, observing, and debriefing, as well as a pre-observation meeting, if necessary. Create a schedule and distribute to all team members one or two days prior.

   > ***Sample schedule:***
   >
   > | | |
   > |---|---|
   > | **9:30–10:00 a.m.** | Pre-observation meeting |
   > | **10:00–11:00 a.m.** | Teaching and observing |
   > | **11:00–11:15 a.m.** | Individual observer reflection and break |
   > | **11:15 a.m.–12:15 p.m.** | Debriefing |
   > | **12:15–1:15 p.m.** | Celebration |

⑥ Debrief and discuss observation data

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Activity Objective: The debriefing session gives the team a chance to review and discuss evidence about student thinking and learning collected during the observation. As facilitator, it is your job to keep the discussion focused on the instructional activities and tasks in the lesson and its impact on students.

Time: 30 minutes for break and individual reflection. One hour for whole-group debriefing.

Preparation:
- Review background notes.
- Be sure to attend to preparation items listed in step 5 above.

Resources: Team notebook
Debriefing protocol
Participant guide pp. 16–17

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⑥ Debrief and discuss observation data

Prior to the debriefing, identify a moderator to lead the discussion, a commentator to summarize key ideas, and a recorder to document the discussion. Consider providing a token of appreciation to the team member who taught the lesson, such as snacks, treats, or a tiara or crown to wear during the debrief, as well as something to share with the team to celebrate its progress.

During the debriefing, team members and observers share observation data, discuss evidence of student learning, and explore the extent to which students met the goals and learning outcomes outlined in the plan.

After the debriefing, team members should complete the debrief summary that follows the protocol. Please add to PG as well.

FOLLOW THE DEBRIEFING PROTOCOL

The moderator begins by acknowledging and celebrating the efforts of the team member who taught the lesson. The flow of the discussion is outlined in the debriefing protocol (below and in the appendix). It is important to remember that the discussion should start with concrete observations of student thinking and actions and address the assessment questions and intended learning outcomes before moving to more general topics.

- **Introductions (5 min).** The moderator expresses appreciation to the teacher/instructor for welcoming observers into their classroom and to the team for their work on the lesson. The moderator briefly restates the team's goals, including the lesson goals, learning outcomes, and research theme.

- **Teacher/Instructor Reflections (5 min).** The team member who taught the lesson shares their thoughts about implementing the team's plan, including both successes and challenges in conducting the lesson. This team member leads the way, giving everyone permission to genuinely analyze the lesson and offer feedback based on the evidence. The teacher's/instructor's initial observations will set the stage for others to take an analytic but supportive approach to the discussion.

- **Sharing Observational Data (15 min).** Lesson study team members, followed by other observers, present data from the lesson focusing on evidence of student thinking and the questions and evaluation points noted in the lesson plan. Comments should focus on what was seen and heard and avoid subjective statements. In addition to anticipated student responses, were there any that were unanticipated?

- **General Discussion (15 min).** The moderator invites a more free-flowing discussion among team members and observers. Additional questions can be asked or observations shared; comments already offered can be probed at a deeper level; and ideas for strengthening the lesson can be proposed.

- **Final Discussion (5 min).** If possible, an outside observer should serve as the final commentator. The final commentator contributes any new insights or questions not previously shared in the debriefing,

summarizes key ideas and questions that emerged from the debriefing, highlights areas and issues the team might want to pay attention to as they revise the lesson, expresses appreciation to the teacher/ instructor for opening their classroom to the group, and thanks the team for its work.

OUR TEAM'S DEBRIEF 1 SUMMARY

Team Notebook: Debrief 1

After outside observers leave the debriefing, each team member reflects silently for a moment on the discussion and then shares one success, one challenge, and one question for the team to consider during the revision process.

Background

Lesson study observations are rich experiences, and enormous quantities of data are usually collected. The debriefing provides an opportunity for multiple observers to share the data they collected on student learning and begin to reflect on their own insights about what they observed. We recommend that the debrief be conducted immediately after the observation to more accuratelycapture the team's observations and insights.

Prior to the debriefing, identify a moderator to lead the discussion, a commentator to summarize key ideas, and a recorder to document the discussion. Record who is responsible for each of these roles in the team notebook. Consider providing a token of appreciation to the team member who taught the lesson, such as snacks, treats, or a tiara or crown to wear during the debrief, as well as something to share with the team to celebrate its progress.

At the start of the debrief, it is useful to provide time for all the observers to reflect individually, review their notes, and record any remaining details. Observers should also review the student learning outcomes, assessment questions from the lesson plan, and research theme. Most important, the observers should consider the evidence they want to share and the questions they want to raise during the debriefing. Having observers write down their

personal reflections following the observation helps focus and deepen the debriefing conversation and increases the value for the lesson study team. During individual reflection, the observers should select the comments that will have the most impact on the learning of the entire team. Sharing a few well-chosen observations is more effective than reading from a long list of points.

Suggested Activity

1. Tell team members that it is normal to feel nervous about the debriefing. It is common to worry about criticism or judgment. Remind participants that, in fact, the opposite is often the case: There is much to celebrate when observing students participating in a well-planned lesson.

2. Allow members one or two minutes to share concerns and ask questions.

3. Next, refer team members to the debriefing protocol in the participant guide. If there is time, you could facilitate a "mock debrief" to give members an opportunity to experience the process.

4. Walk through the debrief. Allow members to volunteer when they are ready.

General discussion should focus on the assessment points and key questions such as:

- To what extent were the goals and learning outcomes met?
- Which students met these goals?
- What implications are there for equitable opportunities for learning?

5. After outside observers leave the debriefing, ask each team member to reflect silently on the discussion and then share one success, one challenge, and one question for the team to consider during the revision process. Record responses in the team notebook.

> *During the debriefing, encourage participants to focus on objective observations (including concrete, specific details) before sharing opinions. This may feel unnatural, as most people want to skip straight to commentary. Following the provided protocol will help counter this tendency.*

⑦ Revise the lesson

Activity Objective: The team meets to make edits to the lesson. These changes are informed by the data collected during the first teaching and the evidence-based practices the team researched during the planning phase.

Time: One to three hours.

Preparation:
- Review background notes.
- Gather artifacts from the first teaching: observation notes, student work, photos of the white board or student posters, debriefing summaries, and other relevant data.

Resources: Team notebook
Participant guide pp. 18–19

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⑦ Revise the lesson

The revision phase of the lesson study cycle is an opportunity for team members to use the data they gathered during the observation and debriefing of the first teaching to improve the lesson and prepare for a second implementation. The team revisits the research theme and examines the data for evidence of the extent to which students have met the goals and learning outcomes of the lesson. By relying on on direct observation and feedback to inform this reiteration of the research lesson, the team can stay focused on evidence rather than assumptions or inferences that may not be supported.

💬 DISCUSS AND RECORD AS YOU GO

✏️ *Team Notebook: Lesson Plan 2*

Review Debrief 1 Summary

The recorder shares notes from the debrief summary discussion. Next, each team member individually determines and highlights the parts of the lesson plan that supported student learning and the parts that could be revised to be more effective. The following questions may be helpful:

- What do the student learning data tell us about the impact of our instructional decisions?
- How does what we saw in the classroom reflect findings from the research literature?
- Which aspects of the lesson and/or which instructional decisions may have contributed to student learning?
- Which aspects of the lesson plan should our team reexamine to increase student learning? How can research and evidence-based practices help us address these challenges?

Each team member highlights one or two parts of the lesson that they recommend changing.

Identify needed changes

After team members share their individual recommendations, the facilitator leads the team in identifying common themes across the recommendations and then selecting two or three aspects of the lesson to prioritize for revision. If relevant, team members should identify areas or topics that will be strengthened by consulting the research base.

Revise the lesson plan

Using the priorities identified earlier, the team revises the lesson using the following questions as a guide:

- How can we change the lesson plan to help students more effectively reach the learning goals?
- How can the research base help us predict whether our changes will work as we hope?

Resave the original lesson plan and create a new file for the revised version labeled Lesson Plan 2. Be sure to keep a copy of the original lesson, as it can be beneficial to indicate how the revised lesson is different from the original.

Review full lesson

After addressing the priorities for revision, the team reviews the entire lesson to determine if any other small adjustments should be made. Avoid making additional changes that could shift the focus of the lesson. Teams then make enough copies for all team members and observers to use during the reteaching of the lesson.

OUR TEAM'S REVISED LESSON

Team Notebook: Lesson Plan 2

Resave the original lesson plan and create a new file for the revised version. Label it Lesson Plan 2.

Background

Revising the lesson gives team members an opportunity to reflect on what they have learned and, more importantly, to act on that learning. The team draws on the rich experiences and information already collected, using data gathered during the observation and ideas that arose from the debriefing to further their learning. The revision process focuses on the evidence to examine whether students met the learning outcomes and the team met its research theme goals. The team also revisits the assessment questions for the lesson and analyzes the collected data.

During the initial planning phase, team members relied on their own experiences, their investigation of curriculum materials and best practices, research, and the advice of knowledgeable others. The revision process benefits from more concrete data, including members' own observations and feedback from other observers. This allows the team to revise the lesson based on actual data and then to observe whether the changes they made will lead to the desired changes in student learning.

Sample Activity

The challenges of revising the lesson include knowing where to begin and how to prioritize what to revise. Teams generally follow the process below.

1. *Gather data.* Ask members to gather artifacts from the first teaching, including observation notes, student work, photos of the white board, student posters, debriefing summaries, and any other relevant data.

2. *Review and analyze the data.* Focus the conversation on evidence of student learning. The goal is to identify where students did and did not meet the learning outcomes for the lesson and why. Teams can organize their discussion around the following questions:
   - What are the observations around student learning? Include details of what students said, did, and wrote or produced.
   - Were there any unanticipated student responses? Explain.
   - To what extent were the student learning outcomes of the lesson achieved? Provide supporting evidence.
   - In what ways were the student learning outcomes not met? Provide supporting evidence.

3. *Record the team discussion.* As team members answer these questions, one person can serve as a recorder, using the following template in the team notebook:

Evidence of students meeting learning outcomes	
Evidence of student not meeting learning outcomes	
Unanticipated student responses	

4. *Identify needed changes.* After analyzing the data, ask team members to work in small groups to discuss how to restructure the lesson and make it more effective. Depending on the team, this might work better in pairs.

5. *Ask members to connect student learning with the instructional activities in the lesson.* They should discuss which parts of the lesson support student learning and which parts might be revised to help students meet the learning outcomes more successfully. Teams are often tempted to change significant portions of the lesson. Instead, tell them they should prioritize two or three adjustments. Pose the following questions to guide whole group discussion:
   - Based on our evidence, what aspects of our lesson plan should we change?
   - How might this instructional change affect student understanding?
   - Why do we think this change would improve the lesson?
   - Is there information from our earlier research that may be relevant to these changes? Is there an issue for which we need to consult the research now?

6. *Revise the lesson plan.* After changes are identified, it is time to revise the lesson plan. Provide at least two hours for the team works together to do this revision. Ask the group to identify a note-taker/recorder who will Often, be responsible for inputting the changes and sharing the revised plan with the rest of the team.

As the facilitator, it is very important for you to keep a copy of the original plan, both to refer to and to include in the final report. It may also be helpful to identify the changes in the new plan with highlighting, italics, boxes, or different fonts.

⑧ Reteach, observe, and debrief

Activity Objective: A team member volunteers to teach the revised lesson to another class while observers collect student reactions and document their responses. The team and invited guests debrief the lesson and discuss how the revised lesson changed student outcomes.

Time: Two to four hours.

Preparation:

- Review background notes.
- Identify roles and responsibilities to prepare for the teaching and observing, including a moderator and final commentator.

- Consider who you would like to invite to the observation and debriefing, in addition to team members. Provide sufficient notice of date, time, and location.
- Prepare student name tags and set up the classroom.
- Print copies of the lesson for all team members and observers.

Resources: Pre-observation protocol
Debriefing protocol
Participant guide pp. 20–21

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⑧ Reteach, observe, and debrief

A team member reteaches the lesson to a different group of students while others observe and collect evidence of student learning. The team discusses and reflects on the reteaching results.

☑ PREPARE FOR THE RETEACH

- ☐ Reserve a room for debriefing
- ☐ Send observation and debriefing times and locations to observers
- ☐ Make and distribute copies of the lesson plan and any handouts
- ☐ Prepare student names tags
- ☐ If needed, schedule and convene a pre-observation meeting for non-team members

🔍 OBSERVATION PROTOCOL

- **Collect data requested by the lesson planning team.** Be prepared. Read the lesson plan closely prior to the observation. Focus on the "points of evaluation" and questions outlined by the team. Stay present and record observations on the lesson plan handouts.
- **Respect the classroom atmosphere and natural flow of the lesson.** Refrain from assisting or instructing students and be careful not to block students' view when they need to see the board. Avoid disrupting the teacher, refrain from side conversations, and silence all phones. Arrive on time and stay for the entire lesson.
- **Focus on the same small group of students over the entire lesson.** This is likely to yield the best picture of whether and how the students developed understanding. Consider recording students' thinking and interactions with peers and the teacher/instructor.

🕐 SCHEDULE PRE-OBSERVATION MEETING

If you will have non-team members at the observation, invite your guests to a pre-observation meeting. During this session the team will distribute copies of the lesson plan, provide time for observers to read the plan, answer questions they may have, bring their attention to the assessment questions to focus their data collection, and review the observation protocol (see observation protocol in the appendix).

Prior to the debriefing, select a moderator to lead the discussion, a commentator to summarize key ideas, and a recorder to document the discussion. The moderator begins by acknowledging and celebrating the efforts of the team member who taught the lesson. The flow of the discussion is outlined in the debriefing protocol (below and in the appendix). It is important to remember that the discussion should start with concrete observations of student thinking and actions and address the lesson plan's assessment questions and intended learning outcomes before moving to more general topics.

- **Introductions (5 min).** The facilitator expresses appreciation to the instructor for welcoming observers into their classroom and to the team for their work on the lesson. The facilitator briefly restates the lesson goals, learning outcomes, and research theme.

- **Teacher/Instructor Reflections (5 min).** The team member who taught the lesson shares their thoughts about implementing the team's plan, including both successes and challenges. This team member leads the way, giving everyone permission to genuinely analyze the lesson and offer feedback based on the evidence. The teacher/instructor's initial observations will set the stage for others to take an analytic but supportive approach to the discussion.

- **Sharing Observational Data (15 min).** Lesson study team members, followed by other observers, present data from the lesson focusing on evidence of student thinking and the questions and evaluation points noted in the lesson plan. Comments should focus on what was seen and heard and avoid subjective statements. In addition to anticipated student responses, were there any that were unanticipated?

- **General Discussion (15 min).** The facilitator invites a more free-flowing discussion among team members and observers. Additional questions can be asked or observations shared; comments already offered can be probed at a deeper level; and ideas for strengthening the lesson can be proposed.
  - How were the observations about student understanding different from the first lesson? What may have caused these differences?
  - Did the changes to the lesson bring about desired changes in student learning?
  - Keeping the goals in mind, did the changes to the lesson result in a more effective lesson?

- **Final Commentary (5 min).** If possible, an outside observer should serve as the final commentator. The final commentator contributes any new insights or questions not previously shared in the debriefing, summarizes key ideas and questions that emerged from the debriefing, highlights evidence-based practices for further investigation, expresses appreciation to the teacher/instructor for opening their classroom to the group, and thanks the team for its work.

✏️ *Team Notebook: Teach and Observe Checklist*

✏️ *Team Notebook: Debrief 2*

Background

After the team has finished revising, the lesson is presented again to a different group of students. Usually, a different team member teaches the revised version, but the same person may teach the lesson a second time to a different group of students. Sometimes more observers are invited to the teaching of the revised lesson. The team will explore differences between the evidence of student learning from the two versions of the research lesson. During the debriefing, they may discuss the possible causes of these differences.

If invited guests will be observing the reteaching of the lesson, the lesson study team holds a pre-observation meeting. The team clarifies the underlying concepts being addressed in the lesson and what the team would like the students to know and be able to do by the end of the lesson. When introducing a revised lesson, the team briefly summarizes the evidence that was collected during the first teaching and explains the changes they made to address the evidence. It may be helpful to distribute copies of the original lesson plan, especially if some of the observers were not present during the first round (Stepanek et al., 2007).

Suggested Activity

The debriefing session for the revised lesson follows the same format as described in step 6 (pages 41–43). Use the team notebook to make a checklist of preparations and complete a debrief summary after the observation session.

There are some additional questions that teams should consider.

- How were the observations about student understanding from the first lesson different from those of the revised lesson? What may have caused these differences?

- Did the changes to the lesson bring about the desired changes in student learning?

- Keeping the goals in mind, did the changes to the lesson result in a more effective lesson?

Do not be discouraged if the reteach is less successful than expected. When engaging deeply in issues of teaching and learning, the team may try a new approach that does not entirely work. That is why you conducted your lesson study cycle: to learn! So, focus on building your knowledge of what to do next.

⑨ Reflect and report

The team reflects on the teaching and reteaching results and synthesizes the lessons learned. The team generates a report that can be shared with colleagues or adapted for sharing with a broader audience of educators. In preparation for the final reflection, one member of the team scans relevant research and literature and comes prepared with reflections on how the team's actions and observations align with the research literature.

Discuss and record the team's responses to the following questions in your final report. The second debrief summary, as well as earlier documents and the first lesson plan, may be helpful for this step.

DISCUSS AND RECORD AS YOU GO

✏️ *Team Notebook: Final Report*

Develop and Sustain A Collaborative Team
- How well did you and your colleagues collaborate as a lesson study team? If possible, identify specific factors that contributed to the team's success (e.g., discussion items, collaboration norms, or new approaches to any aspect of lesson study).
- Describe how you overcame specific challenges to collaboration.
- Describe any new insights or questions about student learning that resulted from the work on this research theme.

Study Research and Apply Evidence-Based Practices
- How did the team study the research and apply evidence-based practices? What research did the team use?
- How did the team address and/or strengthen "learning progressions" for this topic (i.e., the sequence of tasks, activities, and lessons that build on prior knowledge)?
- What other research topics would you have liked to explore more deeply during this cycle (and may wish to explore in future cycles)?

Generate and Share Professional Knowledge

- Describe any new insights or questions about student learning that resulted from the work on this research theme.

- What did the team learn that can be generalized and applied more broadly in team members' teaching practice? Describe when it might be most useful to use this learning (e.g., which lessons or topics being taught).

- How will the team share this learning with others? If possible, propose a specific method for disseminating these learnings.

OUR TEAM'S FINAL REPORT

✎ *Team Notebook: Final Report*

Background

Reflection is an essential part of the entire lesson study cycle and provides an opportunity for team members to look back on their collaboration, discuss what they learned and how it may be applicable to their day-to-day teaching practice, and document their work as a means of sharing their professional knowledge.

Reflection is a key component of theories about effective teaching and adult learning (Wlodkowski & Ginsberg, 2017; Regan, Case, & Brubacher, 2000). Reflection enables teachers to extract knowledge from their experiences, frame questions about the assumptions that influence their teaching, and form new hypotheses (Briscoe, 1991; Hiller, 1995). This leads to a sharper and broader perspective, which teachers can use to guide future decisions and actions.

Reflection is especially important at the end of a lesson study cycle. Team members need the opportunity to reflect not only on the lessons taught, but also on the lesson study process itself. If teams do not reflect on their lesson study practice, they are in danger of going through the motions without reaching the potential for deep learning and significant changes in instruction. It is helpful for the team to consider both what went well and what changes need to be made to improve the next cycle (Lewis, 2002).

Each member of the team is responsible for fostering and supporting reflection during the lesson study process. Creating an emotionally safe space with positive verbal reinforcement will provide an environment that supports deep reflection. Modeling self-reflection encourages others to take an active part in this contemplative process (Stepanek et al., 2007).

Suggested Activity

Learning to implement lesson study is a developmental process. In its first cycle, a team is typically focused on implementing the tasks within each step. With experience, teams become more fluent in the process itself and begin focusing on the conditions needed to get the most out of lesson study. Discussing these implementation practices will help the team realize the power of lesson study to transform classrooms, educators, and ultimately students.

Steps:

1. Ask team members to review the final report template in the participant guide.

2. Introduce each section, using the text below. Lead the team through a discussion of the questions in the participant guide.

3. Have a recorder take notes on the discussion and then assign a team member to craft the notes into a draft report.

4. Share the report with the team and ask for feedback.

The following rubric can be used to generate conversation about how to move toward strong implementation of the lesson study process. Use this rubric in a non-evaluative manner, to provide opportunities for continuous improvement, and be realistic about the amount of time and energy participants can devote to lesson study.

Study and plan	Implementation	Strong implementation
Plan a collaborative lesson	Team meets to collaboratively plan the research lesson	Team completes (or almost completes) the lesson plan collaboratively
Develop or revisit collaboration norms	Team develops/revisits norms	Team refers to or explicitly uses norms during the planning process
Develop or revisit the research theme	Team develops/revisits the research team	Team explicitly refers to the research theme during the planning process
Identify and study the topic	Team identifies where the lesson falls in the curriculum	Team identifies a learning progression for the topic and the lesson's place in that progression
Identify learning outcomes for the lesson	Team establishes learning outcomes for the lesson	Team explicitly uses learning outcomes to guide instructional decisions during the planning process

Study and plan	Implementation	Strong implementation
Anticipate student responses and instructor support	Team generates one or more anticipated student responses	Team uses anticipated student responses to develop instructional support strategies
Apply evidence-based instructional approaches	Team refers to evidence-based instructional approaches	Team provides an evidence-based rationale for instructional decisions during the planning process
Establish points of evaluation	Team establishes one or more points of evaluation	Team connects points of evaluation to learning outcomes, anticipated student responses, and/or research theme

Teach, observe & debrief	Implementation	Strong implementation
Observe first teaching of the research lesson	Team members observe during the lesson period	Team members take detailed observational notes focused on students and their learning
Debrief first teaching of the research lesson	Team members meet to debrief the lesson	Team follows the protocol and all members share observational data during the debriefing

Revise & reteach	Implementation	Strong implementation
Revise the lesson	Team meets collaboratively to revise the research lesson	Team completes (or almost completes) the lesson revisions collaboratively
Ground revision decisions in goals for students	Team refers to student learning outcomes and/or research theme during revision	Team explicitly uses learning outcomes and/or the research theme to guide instructional decisions during the revision process
Apply evidence-based instructional approaches	Team refers to evidence-based instructional approaches	Team provides an evidence-based rationale for instructional decisions during the revision process
Observe second teaching of the research lesson	Team members observe during the lesson period	Team members take detailed observational notes focused on students and their learning
Debrief second teaching of the research lesson	Team members meet to debrief the lesson	Team follows the protocol and all members share observational data during the debriefing

Reflect & report	Implementation	Strong implementation
Reflect and report	Team members meet to reflect on the cycle	Team members generate a report documenting their learning during the cycle
Generate knowledge	Team members identify implications for instruction beyond the research lesson	Team articulates something new they learned about instructional practice or student learning
Share knowledge	Team discusses sharing knowledge learned during the cycle with a broader audience	Team identifies a specific venue or format for sharing knowledge with faculty not on the lesson study team

(10) Share and disseminate knowledge

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Activity Objective: It is finally time to share what you have learned. In this step, the team will develop a plan for disseminating its new knowledge to interested stakeholders. The objective is to extend the learning of lesson study and introduce potential participants to future lesson study work.

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Time: One hour for planning and ongoing for additional activities.

Preparation:
- Review background notes.

Resources: Team notebook

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</table>

(10) Share and disseminate knowledge

During this final step, the team develops a strategy for sharing and disseminating its knowledge and lessons learned with the broader community. Please record responses to the questions below in the team notebook.

💬 DISCUSS AND RECORD AS YOU GO

🖊 *Team Notebook*

Audience: *Who would be interested in our work?*	Purpose: *What would we want them to understand? What would we want them to do with this information?*	Method: *What are effective ways of communicating?*	Timeline: *When can we do this?*

Background

A team expends significant time and effort during a lesson study cycle, and an institution devotes significant resources. Developing a strategy for disseminating lessons learned will ensure that the knowledge generated is shared with the broader community and the institution gets the maximum benefit from its investment. During this session, the team will generate a list of possible audiences and venues for sharing findings. Below are questions to help you get started.

Suggested Activity

Every school, organization, or college will have different motivations for disseminating the results of a lesson study cycle, as well as different target audiences. To help the team narrow its focus, follow these steps:

1. Refer members to the table in the corresponding section of the participant guide. Explain that the team will use the table to record how each data source can inform the dissemination process.

2. Use the questions below to help the team discuss and define audiences, purposes, and methods for dissemination. Record responses in the team notebook.

Audience
- Who will be interested in our work? What will they find interesting?
    - Which instructors at our institution? Which instructors from other institutions?

- In what ways does lesson study fit a need or current initiative? Who are the decisionmakers that can provide the resources and support needed to continue lesson study at our institution?

- What is the best method for sharing? Slide show? Handout? Samples of student work? Testimonials?

Purpose
- What is our purpose for disseminating this knowledge?

- What would we want this audience to understand?

- What would we want them to do with this information?

Here are possible purposes:
- To share an instructional approach or implementation of a new curriculum

- To share insight into student learning with other instructors

- To share the lesson study approach with administrators or other decisionmakers to garner support for lesson study

- To share knowledge with the broader community and elevate our work

Method

- What are the most effective ways to share what we have learned? How are they aligned with our purpose and audience?

  Here are some different products that can be used to share the team's learning:

  - Newsletter
  - Slide show or handout describing lesson study and what we learned
  - Samples of student work
  - Video clips of students working
  - Team member testimonials

- What upcoming meetings might offer the right venue for sharing our work? (Possibilities include conferences, staff or department meetings, and school board or administrator meetings.)

- Which publications or websites might be interested in including an article or blog post about our team's work? Who on our team can lead the writing effort?

3. Share the following example to support the team's thinking.

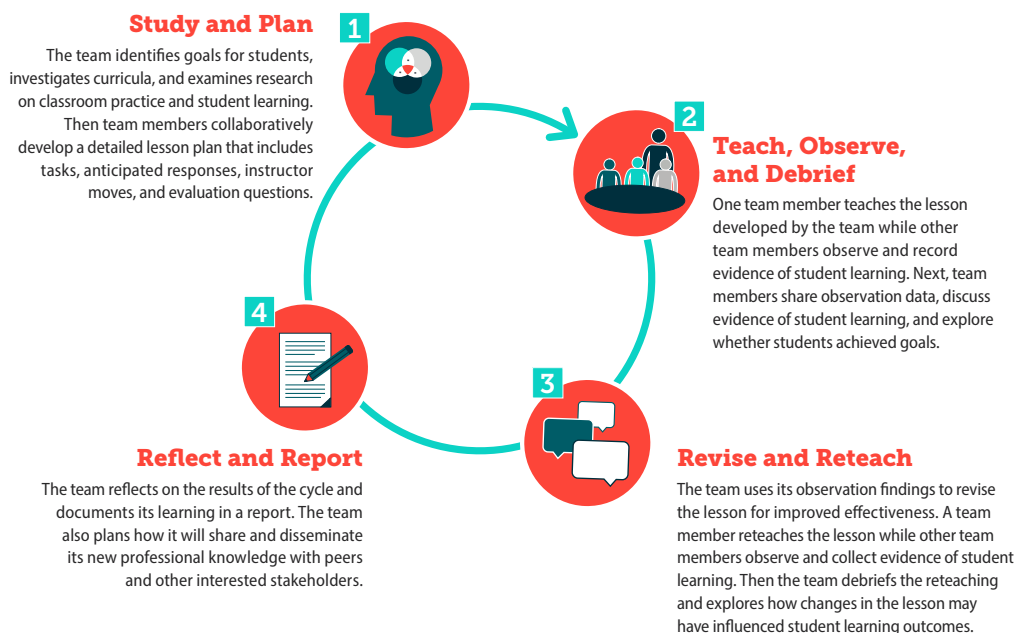| Audience: *Who would be interested in our work?*	Purpose: *What would we want them to understand? What would we want them to do with this information?*	Method: *What are effective ways of communicating?*	Timeline: *When can we do this?*
School board members	We want the school board members to understand how lesson study enabled us to implement instructional practices that had a positive impact on student learning. We want them to provide the resources needed (time in our daily schedules, opportunities for outside observers from other schools, a coach) to continue and grow lesson study.	Handout: Describes the lesson study process; provides a summary of our lesson and samples of student work that highlight what and how students learned	
Instructors	We want our colleagues who weren't involved with our lesson study cycle to see the evidence-based practices we implemented and how they can increase learning opportunities for English language learners.	**Staff meeting:** Slide show presentation that identifies gaps in learning and what the research says about English language learning instruction. **Simulated lesson:** We model the lesson with our staff acting as the students. **Video:** We show a video clip of students grappling with the problem and ask them to discuss what they noticed students doing and saying.	

Appendix

Lesson Study Framework Handout

Lesson Study

Lesson Study is a collaborative professional development approach focused on student learning. The Lesson Study Cycle is comprised of four stages. Typically, teams complete one or two cycles each academic year. Attention to the three Lesson Study Implementation Practices helps teams build capacity to understand student learning and make meaningful changes to their teaching practice.

Lesson Study Cycle

1 Study and Plan

The team identifies goals for students, investigates curricula, and examines research on classroom practice and student learning. Then team members collaboratively develop a detailed lesson plan that includes tasks, anticipated responses, instructor moves, and evaluation questions.

2 Teach, Observe, and Debrief

One team member teaches the lesson developed by the team while other team members observe and record evidence of student learning. Next, team members share observation data, discuss evidence of student learning, and explore whether students achieved goals.

3 Revise and Reteach

The team uses its observation findings to revise the lesson for improved effectiveness. A team member reteaches the lesson while other team members observe and collect evidence of student learning. Then the team debriefs the reteaching and explores how changes in the lesson may have influenced student learning outcomes.

4 Reflect and Report

The team reflects on the results of the cycle and documents its learning in a report. The team also plans how it will share and disseminate its new professional knowledge with peers and other interested stakeholders.

Implementation Practices

DEVELOP AND SUSTAIN A COLLABORATIVE TEAM

- Establish purpose and long-term goals
- Articulate and attend to collaboration norms
- Maintain an inquiry focus on student learning

STUDY RESEARCH AND APPLY EVIDENCE-BASED PRACTICES

- Explore research literature on learning theory.
- Investigate evidence-based instructional approaches and practices

GENERATE AND SHARE PROFESSIONAL KNOWLEDGE

- Synthesize and document lessons learned
- Consider broader application for teaching practice
- Share knowledge with the field

education northwest

Quick Reference Planning Guide

Preparation for each step of the lesson study process:

Stage and Step	Preparation
STUDY AND PLAN	
1 Develop Collaboration Norms*	Gather copies of existing collaboration norms that instructors may already be using in their classrooms.
	Review example collaboration norms and connecting activities.
2 Establish a Research Theme*	Gather documents that articulate long-term goals for students, such as standards, course syllabi, and mission or vision statements.
	Gather data that provides information on students' current understanding related to long-term goals.
3 Identify and Study the Topic	Gather student learning data, scope and sequence documents, standards, course objectives, syllabi, and curricular materials.
	Gather literature describing evidence-based instructional practices.
4 Plan the Lesson	Gather curricular and instructional materials, syllabi, standards documents, and research articles on student learning and evidence-based instructional practices.
TEACH, OBSERVE, AND DEBRIEF	
5 Teach and Observe the Lesson	*Includes preparation for step 6.*
	Identify roles and responsibilities to prepare for the teaching, including who will teach the lesson. For novice teams, this determination is best done late in the lesson planning process. However, the instructor should be selected enough in advance of the observation to allow the lesson design to reflect the particular needs of the instructor's students. As team members become more accustomed to the process, decisions about who will teach the lesson can be made earlier in the cycle.
	Consider whom to invite, in addition to team members, to the observation and the debriefing.
	If needed, schedule, reserve a room for, and convene a pre-observation meeting for non-team members. All team member should attend if possible.
	Reserve a room for the debriefing. If possible, schedule the debriefing to take place in the same classroom in which the teaching was held. If not, have the team take photos of the whiteboard and collect artifacts of student work to reference during the debriefing.
	Identify roles and responsibilities to prepare for the debriefing, including designating a moderator and a final commentator.
	Provide sufficient notice of date, time, and location for all meetings.
	Prepare students, name tags, and the classroom.
	Print enough copies of the lesson plan and any handouts for all observers

Stage and Step	Preparation
6 Debrief and Discuss Observation Data	See above.
REVISE AND RETEACH	
7 Revise the Lesson	Identify roles and responsibilities to prepare for the reteaching, including who will teach the lesson to a different group of students. Usually, a different team member teaches the revised lesson, but the same person may teach the lesson a second time to a different group of students.
	Consider whom to invite, in addition to team members, to the observation and the debriefing.
	If needed, schedule, reserve a room for, and convene a pre-observation meeting for non-team members. All team member should attend if possible.
	Reserve a room for the debriefing.
	Identify roles and responsibilities to prepare for the debriefing, including designating a moderator and a final commentator.
	Provide sufficient notice of date, time, and location for all meetings.
	Prepare students, name tags, and the classroom.
	Print enough copies of the lesson plan and any handouts for all observers
8 Reteach, Observe, and Debrief**	Prepare for teaching, observing, and debriefing as described in 5 above.
REFLECT AND REPORT	
9 Reflect and Report	Gather both lesson plans, notes from both debriefings, student work, and copy of norms.
10 Share and Disseminate Knowledge	None

SCHEDULING LESSON STUDY IN HIGHER EDUCATION

Postsecondary lesson study teams need flexibility to make decisions about the timing and scheduling of the lesson study cycle that fit their institutional context. Many teams typically conduct one cycle in an academic term. Each team must have at least two sections of the focal course in which to conduct the cycle. The first and second teachings typically occur within one week of each other, with each happening in a different course section. For example, a team member may teach the lesson in Section A on a Thursday. The team may meet to revise the lesson on a Friday, and the reteaching would happen in Section B on the following Monday. Scheduling lesson study activities presents challenges, but teams have been able to work creatively so that all members, including full- and part-time faculty, can participate in each stage of the cycle.

Lesson Study: Observation Protocol

Establishing and communicating protocols for observers will clarify their role during the teaching of the team's lesson. Observers will be expected to:

- **Collect data requested by the lesson planning team.** Be prepared by reading the lesson plan closely prior to the observation. Focus on the "points of evaluation" and questions outlined by the team. Stay present and record observations on the lesson plan handouts.

- **Respect the classroom atmosphere and natural flow of the lesson.** Refrain from assisting or instructing students and be careful not to block students' view when they need to see the board. Avoid disrupting the teacher, refrain from side conversations, and silence phones. Arrive on time and stay for the entire lesson.

- **Focus on the same small group of students over the entire lesson.** This is likely to yield the best picture of whether and how the students developed understanding. Consider recording students' mathematical thinking and interactions with peers and the instructor.

Lesson Study: Debriefing Protocol

Prior to the debriefing, select a facilitator to lead the discussion, a commentator to summarize key ideas, and a recorder to document the discussion. Consider providing a token of appreciation to the instructor who taught the lesson, such as snacks, treats, or a tiara to wear during the debrief, and sharing with the team to celebrate its accomplishments to date.

- **Introductions (5 min).** The facilitator expresses appreciation to the instructor for welcoming observers into their classroom and to the team for their work on the lesson. The facilitator briefly restates the team's goals: lesson goals, learning outcomes, and research theme.

- **Teacher/Instructor Reflections (5 min).** The team member who taught the lesson shares their thoughts about implementing the team's plan, including both successes and challenges in conducting the lesson. This team member leads the way, giving everyone permission to genuinely analyze the lesson and to offer feedback based on the evidence. The teacher's/instructor's initial observations will set the stage for others to take an analytic but supportive approach to the discussion.

- **Sharing Observational Data (15 min).** Lesson study team members, followed by other observers, present data from the lesson focusing on evidence of student thinking and the questions and evaluation points noted in the lesson plan. Comments should focus on what was seen and heard and avoid subjective statements. In addition to anticipated responses, were there any that were unanticipated?

- **General Discussion (15 min).** The facilitator invites a more free-flowing discussion among team members and observers. Additional questions can be asked or observations shared; comments already offered can be probed at a deeper level; and ideas for strengthening the lesson can be proposed.

    - To what extent were the goals and learning outcomes met?

    - Which students met these goals?

    - What implications are there for equitable opportunities for learning?

- **Final Commentary (5 min).** The final commentator contributes any new insights or questions not previously shared in the debriefing, summarizes key ideas and questions that emerged from the debriefing, highlights areas and issues the team might want to pay attention to as they revise the lesson, expresses appreciation to the teacher/instructor for opening their classroom to the group, and thanks the team for its work.

Lesson Study: Debriefing Protocol for Reteach

Prior to the debriefing, select a facilitator to lead the discussion, a commentator to summarize key ideas, and a recorder to document the discussion. Consider providing a token of appreciation to the team member who taught the lesson, such as snacks, treats, or a tiara or crown to wear during the debrief. Encourage the whole team to celebrate its accomplishments to date.

During the debriefing, team members and observers share observation data, discuss evidence of student learning, and explore the extent to which students met the goals and learning outcomes outlined in the plan. It is important to remember that the discussion should start with concrete observations of student thinking and actions and should address the lesson plan's assessment questions and intended learning outcomes before moving to more general topics.

- **Introductions (5 min).** he facilitator expresses appreciation to the teacher/instructor for welcoming observers into their classroom and to the team for their work on the lesson. The facilitator briefly restates the team's goals: lesson goals, learning outcomes, and research theme.

- **Teacher/Instructor Reflections (5 min).** The team member who taught the lesson shares their thoughts about implementing the team's plan, including both successes and challenges in conducting the lesson. This team member leads the way, giving everyone permission to genuinely analyze the lesson and to offer feedback based on the evidence. The teacher's/instructor's initial observations will set the stage for others to take an analytic but supportive approach to the discussion.

- **Sharing Observational Data (15 min).** Lesson study team members, followed by other observers, present data from the lesson focusing on evidence of student thinking and the questions and evaluation points noted in the lesson plan. Comments should focus on what was seen and heard and avoid subjective statements. In addition to anticipated responses, were there any unanticipated student responses?

- **General Discussion (15 min).** The facilitator invites a more free-flowing discussion among team members and observers. Additional questions can be asked or observations shared; comments already offered can be probed at a deeper level; and ideas for strengthening the lesson can be proposed.
  - How were the observations about student understanding different from the first lesson? What may have caused these differences?
  - Did the changes to the lesson bring about desired changes in student learning?
  - Keeping the goals in mind, did the changes to the lesson result in a more effective lesson?

- **Final Commentary (5 min).** If possible, an outside observer should serve as the final commentator. The final commentator contributes any new insights or questions not previously shared in the debriefing, summarizes key ideas and questions that emerged from the debriefing, highlights evidence-based practices for further investigation, expresses appreciation to the teacher/instructor
for opening their classroom to the group, and thanks the team for its work.

Resources

Lesson Study Resources

Designing and adapting tasks in lesson planning: a critical process of lesson study
Toshiakira Fujii
ZDM Mathematics Education (2016)
Retrieved from: https://link.springer.com/content/pdf/10.1007%2Fs11858-016-0770-3.pdf

From the abstract: "There is no doubt that a lesson plan is a necessary product of Lesson Study. However, the collaborative work among teachers that goes into creating that lesson plan is largely under-appreciated by non-Japanese adopters of Lesson Study, possibly because the effort involved is invisible to outsiders, with our attention going to its most visible part, the live research lesson. This paper makes visible the process of lesson planning and the role and function of the lesson plan in Lesson Study, based on case studies conducted by Project IMPULS at Tokyo Gakugei University in three Japanese schools. The paper identifies key features of the planning process in Lesson Study, including its focus on task design and the flow of the research lesson, and offers suggestions for educators seeking to improve Lesson Study outside Japan."

Implementing Japanese lesson study in a higher education context
Kadir Demir, Charlene M. Czerniak, and Lynn C. Hart
Journal of Science College Teaching (2013)
Retrieved from: https://s3.amazonaws.com/nstacontent/jcst1304_22.pdf?AWSAccessKeyId=AKIAIMRSQAV7P6X-4QIKQ&Expires=1566481583&Signature=hksHCDejm74NPcLNxnQXAGeYMiQ%3d

From the article: "The purpose of this article is to describe a reform model of instructional collaboration, Japanese lesson study, which has been shown in previous research to enhance reform-based teaching. Japanese lesson study is a method of professional development in which teachers collaborate with peers and other specialists to improve teaching and learning. This paper gives an overview of the need to improve instruction at the college level and a summary of the difficulties of making change in higher education. We discuss how Japanese lesson study can be a practical guide for making improvements in teaching and learning in college settings. We present findings from cases on the basis of our experiences and provide suggestions for implementing high quality lesson study in college science and mathematics courses. Finally, we review the benefits and limitations of the model in the context of higher education."

Learning to lead, leading to learn: How facilitators learn to lead lesson study

Jennifer M. Lewis
ZDM Mathematics Education (2016)
Retrieved from: http://coe.wayne.edu/profiles/zdm_lewis_learning_to_lead.pdf

From the abstract: "This article presents research on how teacher developers in the United States learn to conduct lesson study. Although the practice of lesson study is expanding rapidly in the US, high-quality implementation requires skilled facilitation. In contexts such as the United States where this form of professional development is relatively novel, few teachers have participated in lesson study, so leaders of lesson study groups do not have that prior experience to draw upon for facilitation. To establish lesson study groups, teacher developers are therefore needed in the US context, but we know little about how leaders who are new to lesson study learn to do this work. To investigate this, two novice teacher developers were followed for a period of eighteen months, from their first exposure to the literature on lesson study, through their participation in lesson study conferences, apprenticeship with an experienced lesson study leader, and into their independent conduct of lesson study groups. Data show that the facilitators learned to contend with such issues as teacher resistance, the use of time, and the shifting imperatives of directing teachers' work versus stepping back to give teachers autonomy in determining their collective work. The article concludes by suggesting that lesson study functions as a countercultural bulwark in the field of teacher learning by promoting a participant-driven, time-intensive form of professional development, and that, despite its novelty and complexity, teacher developers with strong mathematical and pedagogical backgrounds become reasonably skillful facilitators in a surprisingly short span of time."

Lesson study as a model for building pedagogical knowledge and improving teaching

William Cerbin and Bryan Kopp
International Journal of Teaching and Learning in Higher Education (2006)
Retrieved from: http://www.isetl.org/ijtlhe/pdf/IJTLHE110.pdf

From the article: "This paper proposes a model for building pedagogical knowledge and improving teaching based on the practice of lesson study. In lesson study a small group of instructors jointly designs, teaches, studies and refines a single class lesson called a research lesson. We describe how college teachers can do lesson study in their classrooms. We explore how the practice of lesson study creates multiple pathways for improving teaching and how the knowledge teachers create can help to advance the practice of teaching in their fields."

Teaching versus teachers as a lever for change: comparing a Japanese and a U.S. perspective on improving instruction

James Hiebert and James W. Stigler

Educational Researcher (2017)

Available for purchase from: https://journals.sagepub.com/doi/pdf/10.3102/0013189X17711899

From the abstract: "We examine the distinction between teaching and teachers as it relates to instructional improvement. Drawing from work outside of education on improvement systems and from analyzing the Japanese system of lesson study, we contend that a focus on teaching can shape a coordinated system for improvement whereas a focus on teachers, common in the United States, leads to elements that are uncoordinated and often work against the continuous, steady improvement of classroom teaching. We propose that the concept of systems for improvement and its instantiation in Japanese K–8 education offer opportunities to reexamine U.S. efforts to improve teaching and shift these efforts toward a more promising direction."

Mathematics and Quantitative Literacy Resources

Helping students become quantitatively literate

Katrina Piatek-Jimenez, Tibor Marcinek, Christine M. Phelps, and Ana Dias

Mathematics Teacher (2012)

Available for purchase from: https://www.nctm.org/Publications/mathematics-teacher/2012/Vol105/Issue9/Helping-Students-Become-Quantitatively-Literate/

From the article: "In recent years, the term quantitative literacy has become a buzzword in the mathematics community. But what does it mean, and is it something that we should incorporate into the high school mathematics classroom? We will define quantitative literacy (QL), discuss how teaching for QL differs from teaching a traditional mathematics course, and provide sources of good QL problems that can be incorporated into the middle school, high school, or college curriculum."

How does lesson study improve mathematics instruction?

Catherine Lewis

ZDM Mathematics Education (2016)

Available for purchase from: https://link.springer.com/article/10.1007%2Fs11858-016-0792-x

From the abstract: "This article presents a theoretical model of lesson study's impact on instruction, through intervening impact on teachers' knowledge, beliefs and dispositions, teachers' learning community, and curriculum. It also describes four different types of lesson study in Japan, pointing out their synergies in producing a system where local teachers "demand" knowledge for their lesson study work and lesson study provides a collaborative, practice-based venue to try out recent innovations in curriculum and instruction. Description of lesson study in Japan provides background for considering the articles of this issue, which highlight four strategies to develop lesson study outside Japan: (1) incorporation of high-quality tasks and materials; (2) attention to processes that illuminate student thinking; (3) attention to system features; and (4) models for scale-up."

Quantitative literacy and civic virtue

William Briggs

Numeracy (2018)

Retrieved from: https://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1285&context=numeracy

From the abstract: "Mathematics educators are occasionally called upon to justify the existence or the offering of quantitative literacy courses. This paper argues that effective quantitative literacy courses have different goals than algebra courses and are legitimate alternatives to algebra courses for non-STEM students. Furthermore, quantitative literacy courses affirm the historic relationship between citizenship and education. In today's world of proliferating news sources, social media, and fake news, quantitative literacy has become an essential component of the long-held ideal of civic virtue."

Teaching the conceptual structure of mathematics

Lindsey E. Richland, James W. Stigler and Keith J. Holyoak

Educational Psychologist (2012)

Retrieved from: http://reasoninglab.psych.ucla.edu/KH%20pdfs/Richland_etal.2012.pdf

From the abstract: "Many students graduate from K–12 mathematics programs without flexible, conceptual mathematics knowledge. This article reviews psychological and educational research to propose that refining K–12 classroom instruction such that students draw connections through relational comparisons may enhance their long-term ability to transfer and engage with mathematics as a meaningful system. We begin by examining the mathematical knowledge of students in one community college, reviewing results that show even after completing a K–12 required mathematics sequence, these students were unlikely to flexibly reason about mathematics. Rather than drawing relationships between presented problems or inferences about the representations, students preferred to attempt previously memorized (often incorrect) procedures (Givvin, Stigler, & Thompson, 2011; Stigler, Givvin, & Thompson, 2010). We next describe the relations between the cognition of flexible, comparative reasoning and experimentally derived strategies for supporting students' ability to make these connections. A cross-cultural study found that U.S. teachers currently use these strategies much less frequently than their international counterparts (Hiebert et al., 2002; Richland, Zur, & Holyoak, 2007), suggesting that these practices may be correlated with high student performance. Finally, we articulate a research agenda for improving and studying pedagogical practices for fostering students' relational thinking about mathematics."

"You've got to learn the rules": A classroom-level look at low pass rates in developmental math

Rebecca D. Cox

From the abstract: "Objective: Given the current concern across the United States with improving community-college student outcomes, particularly in developmental education, understanding what students encounter inside developmental education classrooms is a necessary first step. Method: Drawing on data from a study of teaching practices inside developmental math courses at two large, urban-serving community colleges in the Northeast United States, I open up the "black box" of developmental math teaching at the community college level. Focusing specifically on data gathered through classroom observations, instructor interviews, and curricular artifacts from six sections of developmental math, I explore two distinct curricula as they were enacted in class sessions and through the classroom discourse around solving math problems and analyze the extent to which each approach reflects the recommendations for mathematics instruction advocated by professional mathematics associations. Results: I found that differences in pedagogical goals (and related notions of mathematical proficiency) were integrally linked to differences in the what and how of assessing student learning, and that contrasting approaches to assessment maintain critical implications for accounting for failure inside developmental math classrooms. Contributions: I conclude with insights regarding future research and reform, for developmental math instruction both to realize robust mathematical learning goals and to facilitate students' successful completion of developmental math courses."

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