

# Lesson Study

## PARTICIPANT GUIDE

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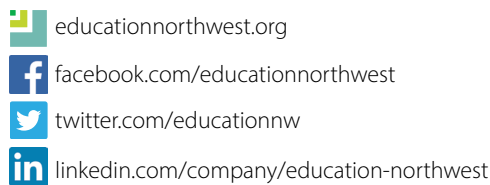
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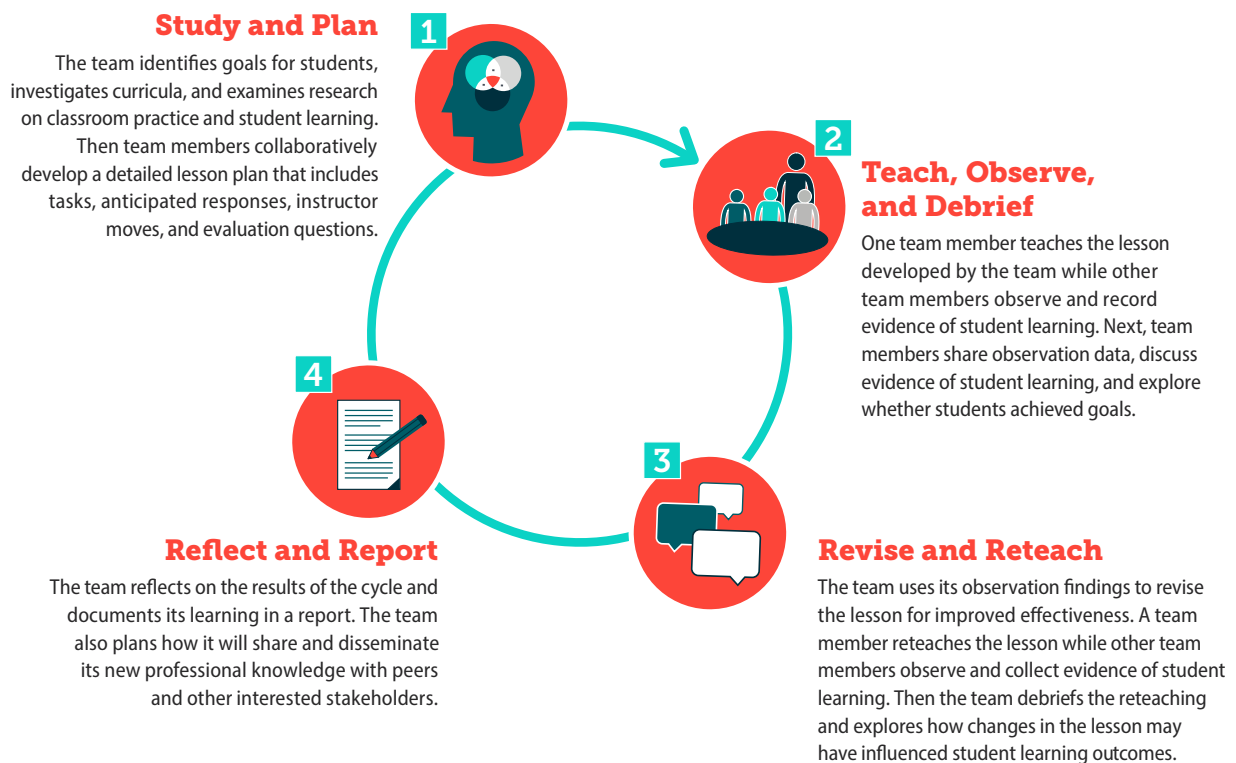


# Introduction

# 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**



## 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.

## 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**



### 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?



# Routines for Lesson Study



## 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**

## 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
<b>Step 1</b> Develop Collaboration Norms*	30 minutes		
<b>Step 2</b> Establish a Research Theme*	1 hour		
<b>Step 3</b> Identify and Study the Topic	2 hours		
<b>Step 4</b> Plan the Lesson	3–6 hours		
<b>TEACH, OBSERVE, AND DEBRIEF</b>			
<b>Step 5</b> Teach and Observe the Lesson	1 hour + time for teacher		
<b>Step 6</b> Debrief and Discuss Observation Data	1–2 hours		
<b>REVISE AND RETEACH</b>			
<b>Step 7</b> Revise the Lesson	3 hours		
<b>Step 8</b> Reteach, Observe, and Debrief**	2–4 hours + time for teacher		
<b>REFLECT AND REPORT</b>			
<b>Step 9</b> Reflect and Report	2 hours		
<b>Step 10</b> 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.

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# 10 Steps to Lesson Study

## **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***

## **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***

### 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?

## 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
	<b>Introduction</b>		
	<b>Student Task</b> 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?
	<b>Anticipated Student Responses</b> What are all the ways that students may approach and solve the task?		
	<b>Comparing and Discussing</b> How will we orchestrate class discussion so that students can share their thinking?		
	<b>Summing Up</b> 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](http://www.lessonstudygroup.net/lg/lesson_plans_table.php?clsg=1)



### OUR TEAM'S LESSON



*Team Notebook: Lesson Plan 1*



## **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*

## 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.

## **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.

## **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).



## FOLLOW THE DEBRIEFING PROTOCOL

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*



## **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***

## 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**

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

# Quick Reference Planning Guide

Preparation for each step of the lesson study process:

Stage and Step	Preparation
<b>STUDY AND PLAN</b>	
<b>1</b> 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.
<b>2</b> 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.
<b>3</b> 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.
<b>4</b> Plan the Lesson	Gather curricular and instructional materials, syllabi, standards documents, and research articles on student learning and evidence-based instructional practices.
<b>TEACH, OBSERVE, AND DEBRIEF</b>	
<b>5</b> Teach and Observe the Lesson	<i>Includes preparation for step 6.</i> 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
<b>6</b> Debrief and Discuss Observation Data	See above.

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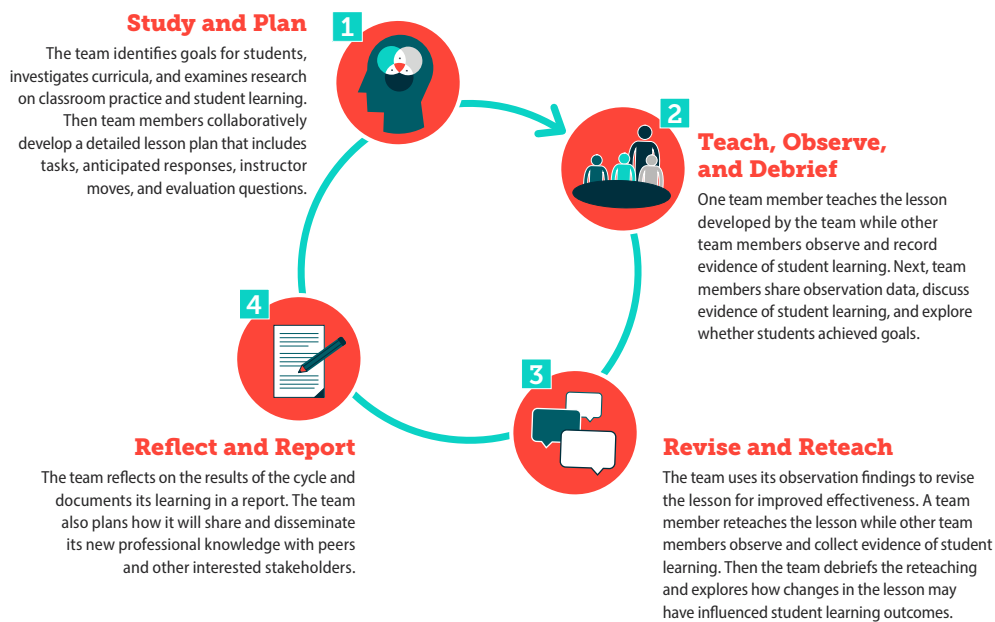
# Appendix

# 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



### 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

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

### 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).** The 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](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](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](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

*Community College Review* (2015)

Available for purchase from: <https://journals.sagepub.com/doi/abs/10.1177/0091552115576566>

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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