The Lesson Study Process

Lesson study is a teacher-directed professional development model developed in Japan. Lesson when translated from the Japanese can also be called in English investigation or inquiry. The lesson study process is grounded in teacher research and is not like traditional lesson planning. The following steps have been developed to help teachers engage in lesson study research. Notice the links to additional planning materials within each step.

Step I - Identifying the problem and establishing the Overarching Goal
The lesson study process begins by teachers and administrators looking critically at their mathematics curriculum. Teachers need to look at the mathematics curriculum in their schools in relationship to what they know about their students' learning. Curriculum is not just material in books but the interaction of students with the learning opportunities being provided. This is a two-sided problem that involves looking at both what kids are having trouble learning and at how these concepts are currently being taught. We suggest:

A. Engaging in a Curriculum Alignment process
B. Developing an Overarching goal for the school.
C. Thinking about and engaging in Designing for Understanding
    - What are the enduring understandings we want our students to have?
    - How will we assess students to know if they have these understandings?
    - What learning opportunities can be designed to support students' gaining this understanding?

Step 2 - Developing the research question in the Lesson Study Group

Reflect back on the overarching goal your team, school, or district has developed for your students. How can you relate this goal to the learning needs you identified in stage one? Clearly identify the problem area you want to address. Then develop your question for the research you will be doing through lesson study. Visit our website for examples: http://mc2.nmsu.edu/mathnm/lesson_study/lsprocess.htm.

Step 3 - Designing the research lesson
Once you have identified the student learning problem you want to address it is time for planning. The research lesson must be developed in the context of the larger unit in which it exists and the overarching goal.

A. Plan the context for the research lesson by considering:
    - The mathematics or other content you want students to learn
    - The communication and discourse in which you intend students to engage.
    - The kinds of data you want to gather to answer your questions.
    - Considering principles related to engaged learning environments.
B. Use the research lesson format to plan the actual observation lesson. Spend time on each of the steps and put a special emphasis on what questions or problems your students might have during the lesson
C. Prior to doing the lesson share it with your mentor and other teachers via the web and ask for ideas and feedback. Also be clear about what data you want to gather and who will gather it.

Step 4- Doing and Observing the Lesson
The research lesson is the opportunity to try out your ideas in the real world of teaching practice. The time spent completing steps 1-3 should help you to realize your goals for student learning in the observed lesson. Two rounds of lessons are usually done with an opportunity to revise between the lessons.

Use the Observation Guidelines and be sure that all observers need to have copies of the research lesson and understand what data they will be gathering. Please make every effort to not change the lesson dates. Teachers from other schools as well as pre-service teachers can provide valuable feedback but find it difficult to participate if the dates change. This is also true for the MathStar staff.

Step 5 - Debriefing, reflecting and revising the lesson.
Immediately after the lesson all those who observed the lesson should spend a hour or so in a short debrief of the lesson. The debrief should start by allowing first the teacher(s) who taught the lessons to comment on their reactions to what happened followed by the team who designed the lesson. Then comments should be encouraged from the outside observers, the teachers and the staff. See debriefing guidelines. A second longer meeting should be held in a week or two to further reflect on the lesson using the actual video record of the lesson and the data gathered by the observers. If this is the first lesson cycle back to step 2. If you have completed two lesson cycles go to step 6.

One way to begin this meeting is to look back at your research question and then the process you used in the designing a lesson related to the question

Design: What was the planned learning for students?

Content- What was the concept you wanted students to learn? What evidence to you have of their understanding or lack of understanding?
Discourse: What discourse was planned and what kind of communication occurred?
Environment: What did you learn about your learning environment?

Hopefully the data gathered by the observers will help answer these questions as well as your own experiences in doing the lesson.

Step 6 - Sharing what you've learned

As teacher researchers you have learned valuable knowledge about how students learn and what kinds of instructional strategies seem to be most powerful for improving student learning. Just as sharing what they learned is an important part of student learning sharing teacher research is a necessary final stage to each research lesson cycle. You have much to offer to the field and to your colleagues. Use the lesson study report guidelines See information on data analysis.

The processes and documents described above were significantly influenced by the work of James Stigler and James Hiebert, authors of The Teaching Gap, and workshop materials from Clea Fernandez and the Lesson Study Research Group. These processes and materials are continuously evolving as we adjust them to the unique needs and challenges of the teachers, students and environment of New Mexico.

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Lesson Study - New Mexico Style incorporates the principles of Japanese Lesson Study, a form of professional development that breaks a tradition of isolation in education to bring teachers together as a professional community to improve teacher practice.

The Lesson Study approach to professional development builds on teachers' knowledge and experiences and provides a structure for continual improvement of instruction focused on student learning. It's based on...

- Maintaining a constant focus on student learning goals where the goal of improving teaching is to improve student learning.
- Reflecting on the practice of teaching as a community of professionals with the belief that long-term improvement of teaching depends on the development of effective teaching methods.
- Encouraging teachers to keep track of changes in practice so that their learning can be shared with the broader teaching community.
- Providing support within the context of school because improvements in teaching will be most successful if they are developed in classrooms where teachers teach and students learn.
- Valuing teachers as the driving force behind school improvement because teachers are the only ones who can ensure that students' learning improves in the classroom.

Debriefing Guidelines

Following the lesson, a minimum of two hours should be set aside for debriefing. Ideally, some time should be set aside for both observers and the lesson study group to take a break and gather their thoughts prior to the debrief discussion. Some questions to think about for the debrief include the following:

1. What parts of the lesson design helped to achieve the lesson goals?
2. What examples of student responses/reactions show how they were engaged in the lesson?
3. What could be added or changed in the lesson to better achieve lesson goals?
4. How would you expect students to respond to these changes?

The discussion during the debrief should focus on the different aspects of the lesson and how well the planned activities (i.e. introduction, launch, student exploration, etc.) helped achieve the lesson goals. The Lesson Plan itself should be used as a lens for the observation and debriefing. If outside observers were part of the observation, those teachers who planned the lesson should sit together during the debriefing. The purpose of this is to emphasize that the entire group (not just the teacher who taught the lesson) is receiving the feedback.

- Once the actual debriefing begins, the teacher who taught the lesson should have the first opportunity to comment of his or her reactions to the lesson followed by others in the planning group. This format allows the teachers to share insights about what was being studied, what worked, what did not work, and what they would change about the lesson.
- If the feedback session is after the second implementation of the study lesson, the planning member should clarify what they tried to achieve in the lesson, and how these goals were related the changes made between the two lessons.
- Once the teachers who planned the lesson have had opportunity to share their ideas, any outside observer should give feedback that is related to the goals of the lesson.
- The teachers who planned/taught the lesson should wait until all feedback about a particular aspect of the lesson has been received before responding to the observers. This waiting etiquette prevents the

discussion from becoming a point-volleying session and allows all participants to voice and absorb feedback in a reflective manner.

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Observation Guide

The data that observers collect is an integral part of the research lesson process and should be driven by what it is the research group wants to know. It should be tied to their long-term goals for students, as well as to their specific research lesson goals.

Prior to the observation, each observer should read through the lesson plan developed by the research group. The lesson can be downloaded from the MathStar website once it has been submitted by the Lesson Study group. The observer should take note of the mathematical focus of the lesson and the sequence of activities the teacher and students will be engaged in during the lesson. They should participate in a web chat prior to observing the research lesson and be sure they have a clear understanding of what it is they are expected to observe and how and why they are being asked to make the kinds of focused observations that they asked to do.

Observers should not interfere with the process of the lesson. They should not help students with the problem or give clarifying instructions to the students. The lesson should flow as if the observers were not present in the room. All observers should plan to participate in the debriefing session and be able to provide a neat, organized, detailed summary of the data that they have collected. This data and the conversation that surrounds it, will then help the research lesson team to reflect upon, revise, and summarize what they have learned via their lesson study.

Catherine Lewis has suggested that there are often research goals pertaining to academic/intellectual understanding, to students' motivation to the lesson, and/or to students' social behavior during the lesson. The key is that the focus should be driven by what it is the research group wants to know and by what constitutes good data towards the answering of their questions. If this is done, then there is lots of specific evidence that can be discussed in relation to how well the research lesson met the goals of the lesson.

There may be only one research focus during the research lesson or there may be more than one. For instance, if teachers have a goal of having students actively engaged in their own learning and they design a research lesson that they hope will meet this goal, they should discuss what is evidence of engagement. They might look for verbal, tactile, and kinesthetic evidence of engagement. Other examples of data that are to be collected could be: Are students participating by discussing and answering questions? Are students

actively problem solving, writing down ideas and solutions? Are students leaning forward and bright-eyed?

There may be one main goal and each observer may want to focus on a group of students and gather evidence about them? One observer may want to write down numbers of students from the class who participate? The teachers may be interested in a close look at what one student does during the lesson. Maybe, there are other things the research group wants to investigate. One observer may focus on engagement and another might focus on understanding.

The bottom line again is that the data that is to be collected should be driven by what it is the research team wants to know. During lesson study planning, before the facilitation of the research lesson there should be explicit discussion of what kind of data will help the research team gather evidence in regards to what they hope to accomplish from their research lesson. These goals should be communicated as specific data that observers should look for and notate.

A final observation example comes from our 2002 Summer Conference. Our core teachers collaboratively discussed observation criteria related to the main topics area of academics, motivation, social behavior, and student attitudes for the "cube lesson". This is what they came up with.

Academic
Are they using the vocabulary correctly?
Is there understanding of the math content?
(Are they actively demonstrating and explaining within their group? How? What are they saying and doing?)
Motivation
How many times are their hands raised?
Are they asking questions of each other?
Are they asking questions of the teacher?
Are they answering questions?
What types of body language do you observe? (shining eyes, 'aha' comments)
Social Behavior
What is the frequency of interaction? (How many times do students refer to and build on classmates' comments?
Is everyone valuing peer input? (How or how not?)
Are students friendly and respectful?
Is everyone participating?

Student Attitudes towards Lesson
What did you like most about the lesson? Why?
What did you like least about the lesson? Why?

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Final Report Guidelines

These guidelines provide an overview of the type of questions that we would like teachers from participating Lesson Study teams to discuss and reflect upon. All research reports should be written in complete sentences and paragraphs and be understandable by educators who have not seen the lesson before and should cover the following areas: mathematics learning, instructional strategies, and the lesson study process. These areas should explicitly be incorporated into data collection activities during the observation cycle of the lesson study process. Answers to each section should be supported by data that has been collected during observation and discussed during reflection and revision meetings. The final research reports are presented MathStar conferences and are made available online shortly thereafter.

Introduction

What is the research lesson topic you investigated this semester? How does this topic relate to the overarching goals for your students and your school? How did you go about planning for this lesson? What resources did you utilize? What is the mathematical focus of the lesson? (What do you want students to know and be able to do as a result of the lesson?) Why did you choose to focus on this mathematical area? What enduring understandings to you hope to help your students gain through this lesson study? Please describe your students (demographics, motivation, learning challenges, etc.).

Mathematics Learning

What have you learned about the way different students learn the mathematics content that your lesson study topic investigated? What does robust undertanding of this topic look like?

1. What concepts have students been working with prior to the lesson? What previous knowledge will the lesson build from? What extensions to this lesson would you like to share?
2. What misconceptions or knowledge gaps do students have regarding this concept? How do you know? (Please include examples of student work and adjustments you have made to the lesson plan and/or recommendations you have for other teachers to be prepared to address these misconceptions. A detailed list of student misconceptions may need to be on a separate sheet instead of within the lesson plan itself if space is an issue.)

3. How do you insure that students have gained the mathematical understandings for which this lesson is designed?
4. Summarize any understandings you have developed regarding students' mathematical learning (specific to this concept and in general) as a result of your involvement in this research lesson.
5. What did you learn about this mathematics content? How did you insure you had a strong conceptual understanding of this topic?

Instructional Strategies

1. How are the instructional strategies of the lesson designed to build students understanding of the mathematics concepts listed above? (e.g., What techniques did you use to make sharing of strategies useful and productive?)
2. What changes were made in the lesson from one iteration to the next? Why were these changes made? (Please include a summary of the development of the lesson towards the final form, highlighting why changes were made based on what you learned about the teaching and learning of this lesson.)
3. How did you engage students' interest and attention to the lesson? How did you sustain their minds-on engagement during the course of the lesson? How did you facilitate communication and collaboration during the lesson? How did you assess what your students knew and understood during the lesson? How did you put closure on the lesson?
4. Summarize any understandings you have developed regarding instructional strategies (specific to this concept and in general) as a result of your involvement in this research lesson. Please reflect upon, summarize, and include examples of what you have learned about classroom communication (e.g. how to foster it through instructional design and/or how to facilitate it via the types of questions that are asked).

Lesson Study Process

1. As a mathematics team, how has your involvement in the Lesson Study process impacted the way you work with other teachers at your school?
2. Personally, how did Lesson Study support your growth as a teacher?
3. What are the strengths and weaknesses of the Lesson Study process? In what general ways can the Lesson Study process be improved? How can the Lesson Study process be adapted to better fit within your school context? What recommendations do you have for integrating Lesson Study into your school schedule?

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OBSERVATION OF LEARNING ENVIRONMENTS (OLE2*)*
Feedback Form

Teachers and support staff should use this list of goals and observable behaviors from the OLE2 to plan instructional strategies that will lead to a more effective mathematical learning environment. The blank boxes may be used to document observed behaviors or to brainstorm strategies a teacher might use to move his/her practice closer to the stated goal.

Teacher's Name_____
Grade_____

Learning Goals/Targets:
_____

Goals and Observable Behaviors: Teachers

1. **The teacher demonstrates an understanding of mathematics concepts for teaching mathematics.**

   a. The teacher shares and maintains the learning goals/targets of the lesson with students and uses formative assessment throughout the lesson to ensure learning goals/targets are being met.

   b. The teacher adapts instructional strategies based on the student responses (whole group and individual) and consistently assesses each student's learning needs with changes based on mathematics progressions.

   c. When the teacher makes mathematical errors, student learning is enhanced because the errors are used as opportunities to build a deeper understanding of mathematical concepts.

2. **The teacher provides opportunities for students to develop their conceptual understanding and to make sense of the mathematics.**

   a. The teacher and students ask clarifying questions about conceptual understanding and students' responses are fully indicative of making sense of the mathematical concepts.

b. The teacher has students routinely defending their arguments, justifying their conclusions, addressing each other's responses, and working collectively towards an in-depth understanding of the concepts and their applications to problem solving.

c. The teacher has established a learning environment in which students consistently take responsibility to reflect and share their thinking related to the math goals/targets.

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January 2012
(revised November 2
and February 2013

OBSERVATION OF LEARNING ENVIRONMENTS (OLE2*)*
Feedback Form

Goals and Observable Behaviors: Students

3. Students ask questions, offer alternative solution strategies, and generate conjectures to show their understanding of the mathematics.

a. Students ask each other questions as they extend their thinking about the mathematics. *(e.g., "How else could we have done it?" or "Why does that work?")*

b. Students make conjectures and use representations and models to deepen their mathematical understanding and communicate their thinking to someone else.

4. Students engage in collaborative interactions with each other as they do mathematics in the lesson.

a. Most students are highly engaged in discussing the math with each other (>80%).

b. Students build upon each other's ideas about math concepts by making connections, and using reasoning to analyze each other's thinking and strategies to apply to other mathematical situations.

c. Students consistently use academic math vocabulary that reflects newly introduced terms as well as appropriate math terms not specifically mentioned in the lesson.

5. General Level of Implementation

Instruction is purposeful and all students are highly engaged most or all of the time in meaningful work that builds conceptual understanding of mathematics. The lesson is well designed and artfully implemented, with flexibility and responsiveness to students' needs or interests. Assessment and instruction are fully integrated and the teacher assesses the effectiveness of lessons by assessing student understanding of concepts. The teacher is able to independently develop lessons that are centered on a mathematical problem. **Instruction is highly likely to enhance most student s' understanding of mathematics and develop the capacity to successfully "do" mathematics.**

MathStar Research Lesson Template

Grade Level: **Date**:

Instructor: # of Students:

Class Time: Class Type (check one):

Location:

☐ Other

School, Room #, Address

☐ Regular ☐ SPED ☐ Bilingual/ESL

Comments: *(Describe social/ cultural context of school)*

I. Goals:

A. Overarching Goal: (*What kind of people do you want your students to be?)*

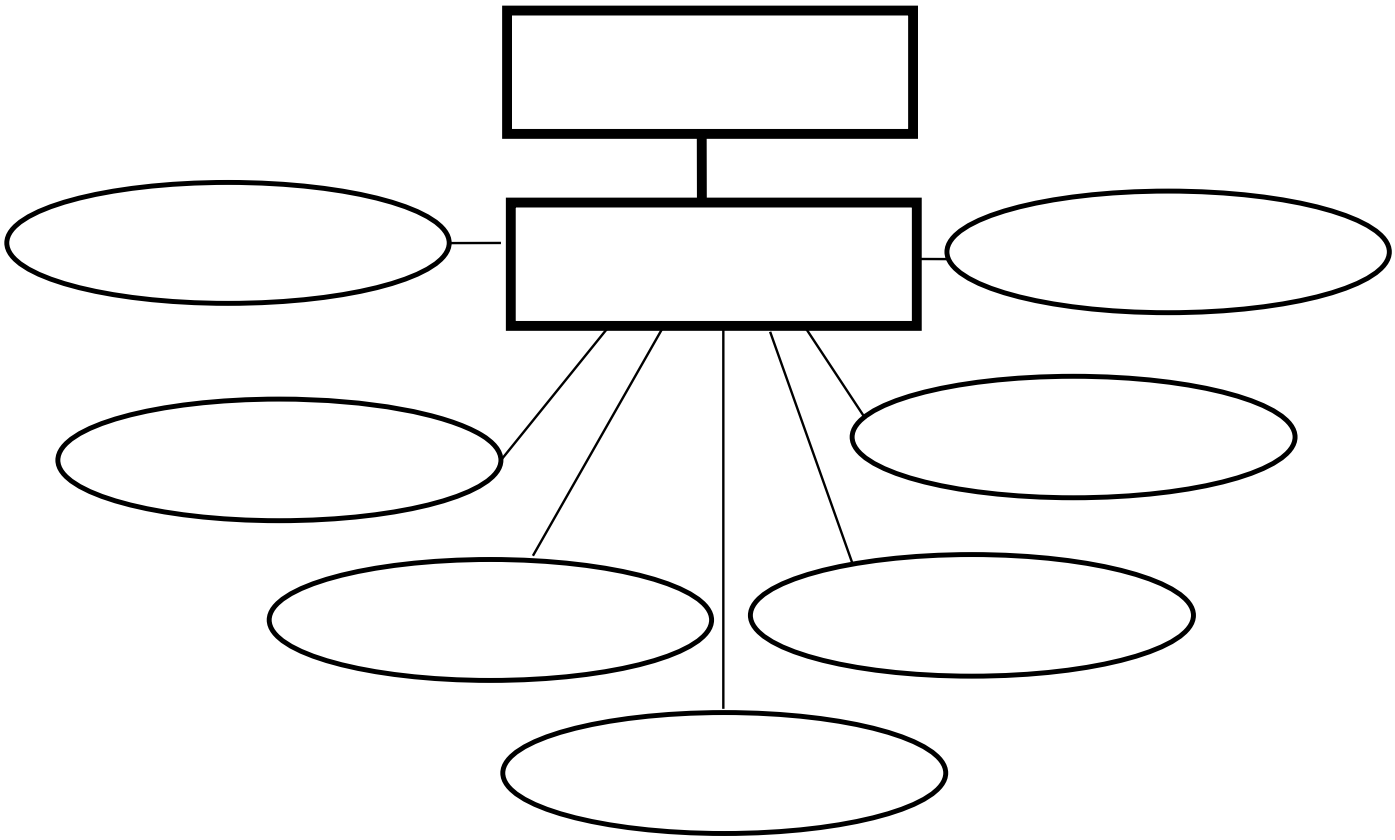
B. Content Goal: (*What kind of mathematicians do you want your students to be?)*

C. **Unit Goals: (*What are your math goals for your students as a result of doing this unit?)***

D. **Research Lesson Goal: (*How does this research lesson fit with the other goals? What do you want to learn about your students from this research lesson?*)**

II. Description of Unit: (1 to 2 sentences)

A. Sample *mathematical mapping template* of your lesson (Idea influenced by the work of Liping Ma):



B. Things to prepare/materials:

Launching the Lesson:

1. **Building a context for the lesson (*Connecting to meaningful things or previous lesson*):**

2. **Laying the framework for the learning experience (*Presenting the activity*):**

Possible Student Questions or Misconceptions	Possible Teacher Responses	What do students need to know/be doing to successfully engage in this part of the lesson?	Observed Lesson Data

Engaging students with concepts (*Exploring, Investigating, Problem Solving*):

Possible Student Questions or Misconceptions	Possible Teacher Responses	What do students need to know/be doing to successfully engage in this part of the lesson?	Observed Lesson Data

Sharing ideas/solutions (*Whole group, small group, written*):

Possible Student Questions or Misconceptions	Possible Teacher Responses	What do students need to know/be doing to successfully engage in this part of the lesson?	Observed Lesson Data

Closure/Summarizing (*Tying ideas together*):			
Possible Student Questions or Misconceptions	**Possible Teacher Responses**	**What do students need to know/be doing to successfully engage in this part of the lesson?**	**Observed Lesson Data**