<table>
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<th>BREAKOUT ROOM</th>
<th>BREAKOUT SESSION I 9:30 – 10:30</th>
<th>BREAKOUT SESSION II 10:40 – 12:00</th>
<th>BREAKOUT SESSION III 1:45 – 2:45</th>
<th>BREAKOUT SESSION IV 3:00 – 4:30</th>
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| **California Suite**  
LS Across Content Areas | Lesson Study with The California Arts Project  
Kristine Alexander - TCAP | **Part 1:** Building Access to Academic Literacy in Early Elementary  
Maranda Shook – San Juan USD  
**Part 2:** Scaffolding Students’ Response to Literature  
Shannon Pella – A3WP | Embedding Assessment to Impact Lessons in Real Time  
Karen Cerwin – K-12 Alliance | **Part 1:** Lessons Learned through Lesson Study in Math  
Karen Luke, Davis Unified  
**Part 2:** Collaborating Across a County: Experiences of an Algebra Lesson Study Group |
| **Summit Room**  
LS in Elementary Science | **Part 1:** Collaborating Across Grade Levels in Elementary Science  
Kelly Bencken – San Juan USD  
**Part 2:** Water in All Its Forms – Science and Language Development Early Elementary  
Christie Wells-Arman – SCUSD | **Part 1:** Magnetism: Experiencing the Excitement of Science in 2nd Grade  
Matsa Mar – Sac City USD  
**Part 2:** Is it a Solid, Liquid or Gas?  
Lorena Orozco – Gonzales USD | Assessment Tools that Expose Student Misconceptions in Science  
Melissa Smith – Lake Elsinore USD | Conceptual Understanding Through Student Discourse  
Kathy DiRanna – K-12 Alliance |
| **Forest Suite**  
Lesson Study in the Upper Grades | Using Lesson Study to Focus on What’s Important  
Jo Topps—K – 12 Alliance | Ecosystem Stability and the Introduction of Non-Native Species  
Cristina McFadden – Natomas USD | Lesson Study on Deep Ocean Currents  
Rich Hedman – MASE/SASP | **Part 1:** Developing Student Understanding of “Changes of State”  
Medley, Santa Maria-Bonita USD  
**Part 2:** Lesson Study as the Focus of School-Wide Professional Development  
Bruns, Bachmeier, YCOE |
| **Foothill Suite**  
Initiating, Maintaining and Managing Lesson Study Programs | Managing Lesson Study Projects from a State-wide, District-wide and School-wide Perspective  
Kathy DiRanna, K-12 Alliance | The Middle School Science Education Leadership Initiative  
Nancy Taylor – San Diego COE | The Care and Feeding of Healthy Lesson Study Teams  
Mimi Coughlin - CSUS | **Part 1:** The Teacher Learning Collaborative (TLC) as a Model of Lesson Study  
Kathryn Schultz K-12 Alliance  
**Part 2:** Making Science Inquiry Accessible to English Learners through Lesson Study  
Lola Berber-Jimenez, Cal Poly |
| **Orchard Suite**  
Research into Lesson Study | An Introduction to Lesson Study  
Julie Oroscio – UC Davis Math Project | **Part 1:** Instructional Learning Teams: Combining the Power of Japanese Lesson Study with Intellectual Quality  
Josh Pfiester – Boise State  
**Part 2:** Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms  
Gabriela Dumitrascu, U of Ariz | **Part 1:** Developing Pedagogical Content Knowledge in Writing Instruction Through Lesson Study  
Shannon Pella – UC Davis  
**Part 2:** Lesson Study: Teachers’ Use of Student Assessments to Inform Reflective Practice  
Jenna Porter, UC Davis | **Part 1:** Lesson Study: Measuring Growth in Teacher Knowledge  
Bindu Pothen, Stanford University  
**Part 2:** Lesson Study: Lessons Learned  
Daniel Willis, Loras College (Iowa) |
# Keynote Speaker

**Lesson Study: How Can It Build System-Wide Improvement?**
*Presenter: Catherine Lewis, Mills College*
*PowerPoint Slideshow Handouts*

# Research Into Lesson Study Strand *(listed in order of conference presentations)*

**An Introduction to Lesson Study**
*Presenter: Julie Orosco, UC Davis Math Project*
*PowerPoint Slideshow Handouts*

**Instructional Learning Teams: Combining the Power of the Japanese Lesson Study with Intellectual Quality**
*Presenters: Josh Pfiester, Brian Whitney, Julia Zarbnisky, Boise State University*
*Full Text*
*PowerPoint Slideshow Handouts*

**Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms**
*Presenters: Gabriela Dumitrascu, Virginia Hook, University of Arizona*
*Full Text*

**Developing Pedagogical Content Knowledge in Writing Instruction Through Lesson Study**
*Presenter: Shannon Pella, University of California, Davis / Area 3 Writing Project*
*Full Text*

**Lesson Study: Teachers Use of Student Assessments to Inform Reflective Practice**
*Presenter: Jenna Porter, California State University, Sacramento / Project ACT*
*PowerPoint Slideshow Handouts*

**Lesson Study: Measuring Growth in Teacher Knowledge**
*Presenters: Bindu Pothen, Aki Murata, Stanford University*
*Full Text*

**Lesson Study: Lessons Learned**
*Presenter: Daniel Willis, Loras College, Dubuque, Iowa*
*PowerPoint Slideshow Handouts*
Keynote Speaker

**Lesson Study: How Can It Build System-Wide Improvement?**

**Presenter:** Catherine Lewis, Mills College

**Email:** clewis@mills.edu
Lesson Study: How Can It Build System-Wide Improvement? Catherine Lewis, Mills College

Lesson Study
How Can It Build System-Wide Improvement?
Sacramento, May 16, 2008
Catherine Lewis
Mills College, Oakland, CA

www.lessonresearch.net
clewis@mills.edu

This material is based upon work supported by the National Science Foundation under Grant No. 0207259. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Presentation Agenda
- Revisit lesson study process
- Pathways for teacher learning
- “Existence proof” of power in U.S.
- How lesson study builds system-wide improvement

Lesson Study is Spreading
Will it be one more fad?
- 1999: 0 sites
- 2000: First US public research lesson
- 2006: 318 Schools, 1222 Teachers, 24 Universities

We lack good data, so please fill out sheet. Group list available at www.lessonresearch.net
Lesson Study During 2006

From lessonresearch.net/What’s new?

Teachers: 1222
Schools: 318
Universities: 24

We lack good data, so please fill out sheet as we talk about each item

Lesson Study Cycle

1. STUDY
   - Study curriculum and standards
   - Consider long-term goals for student learning and development

2. PLAN
   - Select research lesson
   - Anticipate student thinking
   - Plan data collection and lesson

3. DO RESEARCH LESSON
   - One team teaches
   - Others collect data

4. REFLECT
   - Share data
   - What did we learn about student learning?
   - What are implications for this unit and more broadly?
   - What learnings and new questions do we want to carry forward in our work?

How does lesson study improve instruction?

Visible Features of Lesson Study
- Planning
- Curriculum Study
- Research Lesson
- Data Collection
- Discussion
- Revision
- Etc.

How does lesson study improve instruction?

Instructional Improvement

A Common (Mis) Conception of Lesson Study

Visible Features of Lesson Study
- Planning
- Curriculum Study
- Research Lesson
- Data Collection
- Discussion
- Revision
- Etc.

Key Pathway
- Lesson Plans Impact

Instructional Improvement
Lesson Study: How Can It Build System-Wide Improvement? Catherine Lewis, Mills College

How Does Lesson Study Improve Instruction?

Pathways
- Increased knowledge of subject matter and instruction
- Increased knowledge of students & student thinking
- Stronger collegial networks
- Stronger connection of daily practice to long-term goals
- Stronger motivation to learn and belief that changes make a difference
- Improved materials

Instructional Improvement

Visible Features of Lesson Study
- Planning
- Curriculum Study
- Research Lesson
- Data Collection
- Discussion
- Revision
- Etc.

Can patterns help us find an easy way to answer the question:

How many seats fit around any number of triangles, arranged in a row as shown?
Lesson Study: How Can It Build System-Wide Improvement? Catherine Lewis, Mills College

<table>
<thead>
<tr>
<th>INPUT</th>
<th>OUTPUT</th>
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<td>Number of Seats</td>
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</table>

Research Lesson 1
- All students filled out chart correctly but few could verbalize meaning of +2 pattern

Research Lesson 2
- Chart eliminated, students solved individual problems, shared findings
- Students showed their counting methods
- Many students could verbalize meaning of +2 pattern

Video Excerpts

Highlands School (K-5)
- 2000-01 1 volunteer LS group
- 2001-02 Most faculty join LS groups
- 2002-03 School-wide LS; continues through present

Kappan, Dec. 2006 “Lesson Study Comes of Age in North America”
Lesson Study: How Can It Build System-Wide Improvement?  Catherine Lewis, Mills College

Global Evaluation

e.g. “That was a great lesson”

Fixed Ability

e.g. “he is a low student”
Lesson Study: How Can It Build System-Wide Improvement? Catherine Lewis, Mills College

Pathway 1: Teachers’ Knowledge of Subject Matter & Instruction
- Study research and research-based materials
- Do lesson tasks, share solutions
- Collaborate with knowledgeable outsiders

Pathway 2: Teachers’ Knowledge of Students and Student Thinking
- Observe students, record & share observations
- Review student written work
- Read research
- Involve knowledgeable outsiders

Pathway 3: Teachers’ Collegial Networks
- Use protocols to build safety, efficiency
- Opportunities to learn from
  - New ideas
  - Conflicting ideas
  - Revision & integration of ideas
- Teachers come to feel responsible for others’ practice as well as own practice
- Shared vocabulary, linked to practice
Lesson Study: How Can It Build System-Wide Improvement? Catherine Lewis, Mills College

Pathway 4: Connection Between Long-term Goals and Daily Practice
- Develop research theme that includes long-term goals (ideal, actual)
- Include long-term goal in lesson planning
- Include long-term goal in data collection

Pathway 5: Teachers’ Motivation to Learn
- Inspired by instruction, reading, tasks
- Wanting your students to be as interested in learning as the students in the research lessons
- Identity changes, e.g., kindergarten teacher sees algebra is relevant; “excellent” teacher is one who keeps learning

Pathway 6: Belief that We Can Make a Difference in Student Learning
- Seeing that small changes in lesson make a dramatic difference for students
- Together getting traction on difficult problems (“When 3 people gather there is a genius”)
- Seeing the power of collective, incremental change (vs. silver bullet)

Pathway 7: Improved Lesson Plans and Materials
- Tools for collaborating, studying student thinking
- Lesson plans and instructional knowledge: spread through textbooks in Japan
Lesson Study: How Can It Build System-Wide Improvement? Catherine Lewis, Mills College

**Learning From and In Practice**

- Students
- Teachers
- Curriculum

Based on NRC, 2001 & Cohen & Ball, 2000

**System-wide Change**

- Teachers use lesson study to **pull** high-quality resources into their sites (teachers are not just **pushed**) and to solve problems they help define.
- Teachers, researchers, policymakers, foundations see lesson study as the **important proving ground**, where a shared agenda is negotiated.
- Textbooks and teachers manuals reflect what is learned through lesson study.

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**I like stretching my own brain.**

*Teacher from San Mateo, California*

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**If we had to use one word to describe our work for the past two years, it would be COURAGE**

.... to maintain this philosophy and pedagogical thinking as we struggled with our deficient MCAS scores … overcrowded classrooms…

*Lesson Study Communities Team Reflection, Massachusetts*
Lesson Study: How Can It Build System-Wide Improvement? Catherine Lewis, Mills College

I feel the biggest mistake we can make when pitching lesson study to US teachers is to tell them it is easy and painless. It is hard and possibly painful and they should prepare for it. The rewards, however, are fantastic. Real, concrete, observable improvement occurs in teaching.

Middle School Math Teacher, Paterson School #2, New Jersey

Further Information

Lesson Study: A Handbook... (Lewis) www.rbs.org
Building Our Understanding of Lesson Study (Wang-Iverson & Yoshida; www.rbs.org)
Mills College Lesson Study Group www.lessonresearch.net
Lesson Study Communities Project in Secondary Mathematics www2.edc.org/lessonstudy/
Global Education Resources www.globaledresources.com
Univ. of Wisconsin www.uwlax.edu/sotl/lsp/

Clewis@mills.edu

Email address:

lessonresearch.net

Website address:
Research Into Lesson Study Strand

An Introduction to Lesson Study

**Presenter:** Julie Orosco, UC Davis Math Project

**Email:** jcoroso@ucdavis.edu

An introductory session where you can learn the basics of lesson study and the research that supports it, discover the difference between lesson planning and lesson study, and see how lesson study embodies characteristics of effective professional development. Each phase of the lesson study cycle and the roles of various participants will be described.
An Introduction to Lesson Study

May 16, 2008
UC Davis Mathematics Project
Julie Orosco

An Introduction to Lesson Study

In this session you will:

• Discover the difference between lesson planning and lesson study.
• Learn the basics of lesson study and the research that supports it.
• See how lesson study embodies the characteristics of effective professional development.

Like Me!

• When I read a description, if it “fits”, please stand and say, “LIKE ME!”
• Let’s practice:
  – There are women here today
  – There are men here today
• Each time you stand, look around the room and see who is “like you.”

What Research Says

• Professional development is a tool that contributes to a school’s vitality.
• Successful schools use professional learning to build and strengthen a comprehensive approach to ongoing renewal.
• Professional development is not an isolated task but complements thoughtful school improvement planning.

-Powerful Designs for Professional Learning (2004), NSDC
An Introduction to Lesson Study  Julie Orosco, UC Davis Math Project

**Essential Features of Professional Development:**
- It is centered around the critical activities of teaching and learning.
- It grows from investigations of practice through cases, questions, analysis, and criticism; and
- It is built on substantial professional discourse that fosters analysis and communication about practices and values in ways that build colleagueship and standards of practice.

  *Ball and Cohen, 1999*

**Effective Professional Development**
- Experiential, engaging teachers in concrete tasks of teaching, assessment, and observation that illuminate the processes of learning and development.
- Grounded in participants' questions, inquiry, and experimentation as well as profession-wide research.
- Collaborative, involving a sharing of knowledge among educators.

**Lesson Study is:**
- Teacher-led, ongoing professional learning.
- Conducted with a common overarching goal.
- Focused on subject content in the context of student thinking.
- Informed by outside expertise through knowledgeable others.

  *Darling-Hammond and McLaughlin, 1995*
Lesson study is **not**:
- Teacher training
- About creating a perfect lesson
- Done in isolation
- Doing just one lesson study cycle

What Does Lesson Study Look Like?

The Practitioners
- Teachers
- Facilitator
- Outside Expert
- Guests

Teachers
- Gather as a team to work together long-term
- Discuss goals for students and content
- Research best practices in teaching
- Study available lessons
- Build their research lesson
An Introduction to Lesson Study  
Julie Orosco, UC Davis Math Project

**Facilitator**
- Part of the team long-term
- Maintain coherence in planning
- Focus on how the lesson will meet the research goals
- Establish an environment of collaboration
- Listen carefully to what each teacher is sharing, sometimes clarifying a point being made, other times probing for more information and sometimes modeling or coaching

**Outside Expert**
- Understand what the lesson writers are trying to accomplish
- Determine whether the team’s goals are being met while the lesson is being taught
- Focus comments on the content of the lesson
- Deliver comments in a way that cannot be construed as too negative
- Sum up all previous comments and bring closure to the debriefing

**Guests**
- Invited by teachers
- Should be part of the review prior to teaching of research lesson
- View research lesson and take notes on student interaction with the lesson
- Take part in debrief, keeping comments focuses on student thinking

**Questions About the Participants?**
- Think about the participants (teachers, facilitators, outside experts, guests) and their roles.
- Are there any burning questions swirling in your mind?
- Turn to a person close by and share your question. Provide answers to each other if possible.
- Any unanswered questions?
**The Elements**

The Planning Phase

- Teachers increase content knowledge as they study, solve and discuss problems.
- Teachers improve their “eyes to see students” by anticipating students thinking.
- Teachers develop stronger networks so they can better use other’s knowledge and resources.

The Research Lesson

- Helps teachers deepen their own thinking about the issues involved.
- Provides knowledgeable others with a format to provide feedback during the lesson planning process.
- Becomes a written record of the team’s work.
- Becomes a good resource for further improvement of the lesson.
An Introduction to Lesson Study  Julie Orosco, UC Davis Math Project

The Research Lesson

- Guests (other teachers, principal, outside experts) are invited to observe the lesson
- One member teaches the lesson
- The rest of the team members closely observe student learning and behavior to gather data

It is essential that all observers remember that they are NOT observing the teacher; they are observing students’ interactions and responses to the lesson.

The Elements

Planning Phase  Research Lesson  Post-Lesson Activities

The Post-Lesson Activities

- By looking closely at student learning, teachers’ motivation to improve instruction and their sense of efficacy increase.
- By hearing other teachers’ observations, teachers improve their ability to see lessons from a student’s point of view.
- By analyzing student work, teachers are better able to judge the effectiveness of teaching strategies.

Debriefing

The heart of lesson study is the discussion of the data collected during the research lesson.
Revising and Re-teaching

Based on the data collected during the observation and the resulting discussions, team members revise the research lesson to better meet the goals.

Ideally, the research lesson then goes through an additional cycle of teaching, observing, debriefing and revising.

REVISE and RETEACH

- Based on evidence, discuss possible changes to the lesson to increase effectiveness. This may involve more research.
- Redo task
- Anticipate student responses
- Review data collection plan
- Reteach revised lesson

Most Important Point

- Take a moment to think of the Most Important Point (M.I.P.) for you in what was presented thus far.
- Turn to a neighbor and share your point

4th Grade Mathematics Research Lesson

“I think students are pretty strong in seeing patterns but not necessarily in going to the next step of establishing a rule and writing an equation, at least at the beginning of 4th grade. We don’t always take them on to ‘How would we represent this with numbers?’”

Lesson Study Goal
Recognize and mathematically represent patterns

Research Goal
Become curious, eager learners
An Introduction to Lesson Study

Julie Orosco, UC Davis Math Project

Triangle Tables Problem

We have a long skinny room and triangular tables that we need to arrange in a row with their edges touching, as shown. Assuming each side can hold one seat, how many seats will 1 table, 2 tables, 3 tables hold? Is there a pattern that helps you figure out how many seats 10 tables will hold?

What the Team Saw and Heard

- Most students filled in the worksheets correctly (suggesting they grasped the mathematical rule)
- Some discussed the rule
- Few could connect the pattern to the actual problem
- Students needed to talk about how they counted.
- The table led students to the pattern, but away from the problem.

Revised Lesson

- Eliminated the worksheet
- Gave students cut out triangle “tables”
- Gave students a slip of paper to complete
- Had students share counting methods on board
- Had students organize the data

Student Worksheet

| Triangle Rule Machine | Name  
|-----------------------|-------
| INPUT | RULE | OUTPUT |
| Number of Triangle tables | Number of seats |
| 1 | 3 |
| 2 | 4 |
| 3 | 5 |
| 4 | 6 |

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</table>

Califonia Capital Lesson Study Conference
May 16, 2008
### How the Modifications Changed the Lesson

- Forcing students to organize the data without a given table promoted student understanding of the meaning of the +2 pattern
- Having the kids talk about their counting was a big improvement
- The changes made the lesson more accessible to other kids

### How the Lesson Study Changed the Teachers

- “The learning was so much more effective this time, it wasn’t about teaching, it was about learning.”
- “That idea can be used anywhere, to make sure that students are always learners in the classroom.”
- “We are only as effective as our level of understanding. We have to keep pushing ourselves into the ‘why’, the ‘how come’ that’s the challenge.”

---

**Lesson Study focuses on the heart of the educational process:**

- what actually happens between teachers and students in the classroom.

**What makes lesson study unique?**

- It is teacher-led, and long-term.
- It is planned collaboratively through intensive study.
- It supports a collaborative focus on student thinking through observation of classroom practice in real time.
- It offers a process that makes concrete, in an actual lesson, a goal for learning.
An Introduction to Lesson Study  Julie Orosco, UC Davis Math Project

**What makes lesson study unique?**

- It provides new and outsiders’ perspectives of teaching and learning.
- It fosters shared reflection based on classroom evidence.
- It makes concrete what reflection means, what problem solving looks like, and what thinking entails.

**What Research Says**

- Lesson study improves instruction through the refinement of lesson plans.
- Lesson study strengthens three pathways to instructional improvement: Teachers’ knowledge, teachers’ commitment and community, and learning resources.

---

**Let’s Review the Objectives**

Did you:

- Discover the difference between lesson planning and lesson study?
- Learn the basics of lesson study and the research that supports it?
- See how lesson study embodies the characteristics of effective professional development?

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- For electronic copies of this PowerPoint, log on to www.julieorosco.pbwiki.com and select “Lesson Study Conference” from the sidebar.
- For questions about Lesson Study, email me at jcorosco@ucdavis.edu
Instructional Learning Teams: Combining the Power of the Japanese Lesson Study with Intellectual Quality

Presenters: Josh Pfiester, Brian Whitney, Julia Zarbnisky, Boise State University

Email: jpfiester@hotmail.com

This session will explain the Instructional Learning Team (ILT) model utilized with 20 teacher teams to transform teaching practice, highlighting the work of two ILT teams in relation to important elements of professional learning communities. The study addresses 1) what changes in discourse were used to talk about instruction, learning and achievement, and 2) how does the ILT model influence teachers’ instructional practices.
INSTRUCTIONAL LEARNING TEAMS: COMBINING THE POWER OF THE JAPANESE LESSON STUDY WITH INTELLECUAL QUALITY

Joshua Pfiester, Doctoral Student
Jonathan L. Brendefur, Associate Professor
Roger A. Stewart, Professor
Brian Whitney, Doctoral Student
Julia Zarbnisky, Doctoral Student

Boise State University

Contact Information
Jonathan Brendefur, Associate Professor
Boise State University
1910 University Drive
Boise, ID 83725

jbrendef@boisestate.edu
phone: 208.426.2468
fax: 208.426.3807
ABSTRACT

Changing teacher practices to improve student learning is a perennial challenge in United States public schooling. According to DuFour and Eaker (1998) and Smith (2003) for teachers’ practices as a whole to change, faculties within schools must build a community of practice. Every profession periodically struggles with the provocative question related to practice: is it a craft or an industry? We actually feel this is a false dichotomy and that widespread and expert practice (industry) can be achieved through a collaborative environment focusing on the development of professional wisdom (craft). We believe such a “middle road” can be obtained in our professional development model: Instructional Learning Teams (ILTs). ILTs promote school improvement while also providing a process through which teachers can focus on more than day-to-day matters, collaborate with other professionals, re-energize themselves, and have time for sustained reflection about beliefs and practices. For over a century, American teachers have been disenfranchised as passive receivers of university-based research. We aim to contribute to Stenhouse’s radical argument: “Research…[is] the route to teacher emancipation” (cited in Cochran-Smith & Lytle, 1993, p. 4). Two of twenty contrasting ILTs are highlighted in this paper.

The research questions that guided this investigation were: 1) What changes in discourse that we use to talk about instruction, learning, and achievement occur over the course of the study? 2) How does the ILT model influence teachers’ instructional practices? Qualitative research methodologies were employed to begin to answer these questions. Additionally, rubrics developed by Newmann, Secada, and Wehlage (1995) were used to frame discussions and analyze instruction. It was found that the manner in
which teachers engaged in conversation about instruction, learning, and achievement were so qualitatively different, that teachers began to refer to their observations in terms closely aligned with those of authentic pedagogy. In addition, teachers were acculturated into a collaborative environment designed to foster reflection and systematic investigation of what we call school.

INTRODUCTION TO LESSON STUDY AND AUTHENTICITY

Learning to teach well, even for veteran teachers, is a complex, uncertain, and difficult task. However, quality teaching is an essential ingredient to increasing student achievement and promoting student understanding (Haycock, 2002; Newmann & Associates, 1996). This argument rests on the premise that if schools want students to read well, do mathematics and science, understand history, solve problems, communicate ideas, and reason, then we have to provide teachers with different professional development opportunities than they have had in the past (Stigler & Hiebert, 1999).

The ILT model allowed teachers a drastically different and meaningful way to examine their practices. It provided them with a framework for new discourse, acculturating them into a profession committed to working on improved practice and improved student learning and performance. This type of team and individual study is a “rigorous examination of one’s own practice as a basis for professional development, the idea is that each school, and indeed each classroom, is a laboratory in which the curriculum and problems experienced as problems by teachers are subjected to empirical examination by practitioners” (Henson, 1996, p. 53).

One key to promoting and increasing student achievement lies in improving instructional practices. The literature is ripe with examples and evidence that changing
teachers’ instructional practices is difficult because of the cultural nature of living within a specific and constrained type of teaching practice (Brown, Cooney, & Jones, 1990; Stigler & Hiebert, 1999; Zeichner & Gore, 1990). There are also a handful of examples that clearly demonstrate that teachers can change their practices to be more consistent with what the reform documents suggest (see NCTM, MSEB) and increase student achievement on standardized measures as well as promoting deeper understanding of ideas (Fennema, Carpenter, Franke, Levi, Jacobs, & Empson 1996). A study of these issues resulted in a powerful fusion of lesson study and intellectual qualities.

Lesson Study

The Japanese lesson study, which gained international prominence during the Third International Mathematics and Science Study (TIMSS) (Stigler & Hiebert, 1999), is similar to action research in that it is a systematic inquiry about an instructional problem. While lesson study forms the core of Japanese professional development, it is still a novelty for American teachers. This is not surprising to most teacher educators because we do not prepare preservice or inservice teachers to conduct classroom research or study their practice (Darling-Hammond, 1994; Kincheloe, 2003; Lampert, 1999). In fact, “the low involvement [in research] is attributable, at least in part, to the failure of preservice programs to prepare and require students to conduct research” (Henson, 1996, 55).

We propose that teachers not only engage in work with theory and practice in concert, but also become involved in lesson studies. This provides a format for all teachers to facilitate their development as professionals, where they learn about their
practice, and increase student performances. As Japan is significantly different in social and educational characteristics, lesson study must be adapted to the American context.

The lesson study process incorporates many elements of effective professional development experiences (Dufour & Eaker, 1998; Laucks-Horsley, Hewson, Love, & Stiles, 1998; Lewis, 2002; Stigler & Hiebert, 1999). The steps include:

1. Collaboratively identify a question or difficulty the team would like to explore.

2. The team investigates current research on the identified issue that enables them to become knowledgeable about best teaching practices and to learn how students’ think about that topic.

3. The team creates a lesson or series of lessons that addresses the identified issue.

4. One team member teaches the lesson, while the others actively observe, take notes, and, if possible, videotape the lesson. This documentation of teaching and learning provides an avenue for the next step.

5. Reaction, reflection, and modification of the lesson. During this process, teachers investigate the instructional strategies chosen and the student responses using this data to generate alternate possibilities, leading to a modification of the lesson(s).

6. A different team member teaches the modified lesson. The time period between the 1st and 2nd teaching of the lesson varies. The standard period for Japan is several days. The schools in the United States practicing lesson study have chosen periods from several days to several weeks. Steps 4 through 6 repeat until the team is comfortable with the results. Following this, the lesson is
analyzed as a whole in which student understandings and performances are acknowledged and attributions to success or failure are delineated.

7. Every lesson study concludes with a detailed written report that can be employed by other teachers in their classrooms (Henson, 1996; Stepanek, 2001). Depending upon the novelty of findings, the report’s dissemination may occur at the school, district, region or national level in Japan. The challenge for American educators is to find a wide audience in our fragmented educational environment.

Because American teachers are not used to this type of professional development nor used to critiquing one’s practice, we introduce the lens of intellectual quality. Newmann and Associates (1996) proposed the use of rubrics for what they called authenticity or intellectual quality. These rubrics (Newmann et al, 1995) focused the discussion of team members around specific elements of the tasks given to students, the type of instructional practices performed, and student work. The intellectual quality model has demonstrated that teachers whose pedagogy rates higher on the rubrics have students who perform higher on standardized achievement tests than teachers who rate lower on the scales (Newmann & Associates, 1996).

Intellectual Quality

As educators, one of our charges is to foster ways of knowing, which prepare students to make connections, to communicate about ideas, to reason, and to solve traditional and novel problems. Newmann and Associates (1996) demonstrated that when teachers focused on construction of knowledge, disciplined inquiry, and value beyond
school, students at differing cognitive abilities and backgrounds increased their scores on traditional achievement tests. Intellectual quality is defined by these three constructs.

Construction of Knowledge

Constructing or producing knowledge means that students engage with tasks that require making sense of a situation or phenomenon through discussions and exploration that rely on their prior knowledge and available resources (Newmann & Associates, 1996; Newmann, Secada, & Wehlage, 1995). This differs from asking students to reproduce or copy knowledge that has been given to them. As opposed to most school learning, rarely is there merely one way to derive a solution and often times there is the opportunity for more than one correct solution to be found.

Disciplined Inquiry

Disciplined inquiry relates to the intellectual processes that students go through while solving problems (Newmann & Associates, 1996; Newmann, Secada, & Wehlage, 1995). These processes include three components: use of prior knowledge, development of in-depth understanding, and elaborated communication. Prior knowledge consists of each student’s existing knowledge of facts, rules, algorithms (whether informal or formal), and general knowledge relevant to the problem at hand. In most conventional classrooms, which include k-12 and university courses, teachers remind students of applicable prior knowledge that they should have learned and then present problems for students to practice reproducing this knowledge. This type of rote practice does not afford students with the opportunities to build relational knowledge, where existing understandings are used to make sense of new information. Elaborated communication, the third component of disciplined inquiry, entails written and oral conversation that goes
beyond recitation. Students need to express their ideas through words, symbols, and products, with other students and with others more experienced in the field.

Value Beyond School

Engaging students in tasks that have value beyond the immediate activity is the third intellectual quality standard. “Authentic achievements have aesthetic, utilitarian, or personal value apart from documenting the competence of the learner” (Newmann & Archibald, 1992, p. 74). Giving students the chance to work on realistic problems or communicate their understanding to an audience outside of school, adds value to the task that goes beyond learning it simply to advance in school. As does helping students recognize and enunciate the connection between school learning and activities outside of school.

The idea that learning involves a deepening process of participation in a community of practice has gained significant ground in recent years (Smith, 2003). Professional Learning Communities and the Instructional Learning Team model are examples of educational communities. “Reculturing” of schools is necessary to promote this type of reform for teachers. This paper describes the characteristics of communities in practice, professional learning teams, and the Instructional Learning Team model. A case study of two schools that implemented the ILT model will be presented and their results explored.

ILTs and Professional Learning Communities

One way to analyze Instructional Learning Teams is to situate them against the research on professional learning teams. Initially, ILTs built communities of practice. This meant each member was expected to fully participate via collaboration and
reflection on shared goals. One way to do this was to structure the conversations around objective measures, such as the task, the instruction, and students’ work. The teachers had to share in the process of building the lessons and reflecting on the pedagogical process leading up to student performance (Stewart & Brendefur, 2005; Fullan, 1993, Rogoff, Turkanis & Bartlett, 2001).

Fullan (2001) stated that “most strategies for reform focus on structures, formal requirements, and event-based activities [that] do not struggle directly with existing cultures and which new values and practices may be required” (p. 34). Restructuring happens many times, while reculturing is necessary for change to occur and be sustained. Reculturing is how teachers come to question and change their beliefs and habits (Fullan, 2001). We believe the most fundamental way to reculture schools is transform them into professional learning communities (DuFour & Eaker, 1998; Dufour, Dufour, & Eaker 2005). The idea is to promote school improvement while also providing a process through which teachers focus on more than day-to-day matters, collaborate with other professionals, re-energize themselves, and have time for sustained reflection about beliefs and practices.

Researchers have listed critical elements as being essential to creating professional learning communities: shared norms and values, focus on student learning, reflective dialogue, deprivatization of practice, collaborative teams, action orientation and experimentation, continuous improvement, and results orientation (Dufour & Eaker, 1988; Lois, Kruse & Marks, 1996). This paper focuses on the first four elements to analyze the strength of the ILTs.
Shared Norms and Values

To bring teachers and administrators together for the purpose of participating in a professional learning community they must share a common vision of values central to teachers’ work. Shared understanding of common values and a collective commitment to guiding principles are what separates a learning community from traditional school faculty. These guiding principles include such things as teachers’ beliefs about students’ ability to learn, priorities in education, and the roles of parents, teachers and administrators. The following questions must be asked: “How do we facilitate and measure student learning?” “How will we respond when students do not learn?” These questions must be asked and the answers clearly communicated with parents and students and reinforced by the actions and practices of teachers and the school district as a whole. Mission, vision, and values are integrated into each element essential to learning communities.

Focus on Student Learning

By focusing on student learning, teachers begin to professionalize their discussions. Asking, what is most important for students to learn and how do we get students to understand and apply the material becomes the driving force of change. Attention to student learning is the core of professional learning communities. Faculty discussions and actions centered on enhancing student learning through improved instruction are the basis for improving opportunities for learning. By collaborating and communicating with other teachers, a clear consistent message is developed and sent to students.
Reflective Dialogue and Collective Inquiry

Reflection on curriculum, instruction and student development as a group can lead to a greater awareness of the practice of teaching and its effect on students. Continual questioning of the status quo, testing strategies, teaching methods, and educational practices is the catalyst for growth in a professional learning community. Collective inquiry can lead participants to recognize that the process of searching for answers is often more important than having an answer.

Deprivatization of Practice

Deprivatization of practice works together with reflective dialogue. In order to remove isolation, teachers must engage in dialogue. They discuss gaps left by teaching materials and offer alternative ideas and supplemental materials. It is also helpful to have teachers discuss ideas with teachers a grade below and above – vertical collaboration. This allows teachers to better understand prior and future expectations.

These issues can be overwhelming for a teacher working alone. Peers can be a source of insight and feedback which helps improve instruction. By sharing uncertainties about teaching, teachers can learn to talk about what it is they do when they are teaching and create a supportive environment (Warren-Little, 1996).

Additionally, when the task of looking at student work becomes a pivotal component of educators collaboration and beliefs about practice, the private nature of teaching as it was historically conceived is challenged. Jointly looking at student work and making adjustments to practice helps to deprivatize and improve practice.

METHODOLOGY
In the fall of 2002, Stewart and Brendefur (2005) began the Instructional Learning Teams Project (ILT). The intent of the project was to increase students’ academic understanding and achievement through the formation of teacher teams from Creating High Performance Schools (CHPS) districts (a statewide school improvement initiative). The ILT project used the Japanese Lesson Study process and the Principles of Intellectual Quality (Newmann, Secada, & Wehlage, 1995). The initial phase of the project began with 20 teams actively participating.

Each team decided upon a math or literacy focus, using state and/or other assessments to decide upon a specific area for improvement. After appropriate lessons were designed, the lesson plans which included the tasks students were to complete as a consequence of the lesson were scored using the authentic pedagogy rubrics. In most cases, the lessons were videotaped as they were taught and the student work collected at the conclusion of the lesson. Using the rubrics as the evaluation framework, the teams met to critique the instruction and the student work. Where possible the lesson was then changed and taught again, until the student work resulted in appropriate rubric scores.

To examine the interaction of professional learning communities, the instructional learning team process, and authentic pedagogy, the experiences of two participating schools will be described below.

Schools

Amity (pseudonym) is a middle school in the Intermountain West attended by approximately 700 6th-8th grade students. Forty teachers are employed on the instructional staff. While there is a building administrator to oversee daily operations, this district
employs a chief educational officer and an instructional guide to direct instruction for this
and two other schools.

The instructional learning team at this school was composed of a team leader and
five teachers. Although they were in close physical proximity to one another, these
teachers did not share similar grade levels and/or curricular subject areas. They taught a
variety of subjects, including art, special education, language arts, world history, and
Title One reading. The team decided upon developing teaching strategies for using
writing in their classrooms as their focus, and met 12 times after school from January
2003 to May 2003 for approximately two-three hours per week. While the CEO and
building administrator did not attend any of the meetings or observe any of the lessons
taught, the CEO did attend ILT training sessions at Boise State University.

Washington (pseudonym) is an elementary Title One school with approximately
500 students located in the city of Boise. Fifty-four percent of the students receive free or
reduced lunch. There were two instructional learning teams in this school who met
regularly once a week. A team leader guided and oversaw both teams. The principal did
not attend any of the ILT meetings, nor observe any of the lessons taught.

Professional Development

The first task of the team was to familiarize themselves with lesson study and
principles of intellectual quality. Three rubrics were used to score the principles; student
task (lesson plan), classroom instruction, and student work. All meetings and
instructional sessions were videotaped. This provided opportunity for critiquing,
reflecting, modifying and improving at all stages of the cycle.
The goal for the ILTs was to create a lesson and move through the following process:

1. **Lesson Plan Design**

2. **Score Task Rubric:** Through structured conversation, they scored the lesson they had designed, using the task rubrics. Familiarity with this rubric initially took some time. However, eventually its use became routine after a few scoring sessions.

3. **Modify Tasks:** Based on their conversation generated from the rubric, each team modified the tasks associated with the lesson.

4. **Teach and Video:** A designated team member went back to his/her classroom and taught the lesson. The facilitator videotaped the instruction.

5. **Score Instruction Rubric:** At the next meeting, the team watched the videos or excerpts from them and critiqued the instruction using the rubric.

6. **Collect and Score Student Work:** Teams collected student work. Each teacher then sorted student work into three piles of low, medium and high level. They met as a group and evaluated the student work using the student work rubric.

7. **Modify Lesson:** Utilizing the rubric for instruction and critique of student work, the teams made additional modifications to the lesson. They revisited the lesson and honed instruction to the point that they knew what part of the instruction was responsible for advancing learning, and what part was not effective.

8. Repeat the cycle (steps 1-9) for new lessons.
FINDINGS

Shared Norms and Values

Amity

Louis, Kruse, and Marks (1996) stated that “shared values find expression in school practice” (p.181). Although Amity’s Website states “Our mission is to challenge students to become confident, self-directed, lifelong learners who are responsible citizens within their communities,” some members of this instructional learning team were initially concerned about shared norms and values because of their mixed subject areas and curricular differences. They questioned whether they would be able to come together to improve instruction and raise student achievement.

The supportive environment of the team, however, allowed these teachers to express their concerns over differing curricular areas and instructional techniques. “Because our team was made up of teachers from different disciplines and differing levels of experience,” one team member wrote, “we got varied perspectives.” “When exchanges are most fruitful, colleagues air differences in a context of trust and respect for each other’s professional skills and contributions to the school community,” (Louis, Kruse, & Marks, 1996, p.187), thereby increasing shared norms and values.

As the team from Amity progressed through the instructional learning team process, the use of the intellectual quality principles helped focus and strengthen the shared values and norms across disciplinary boundaries. The art teacher commented, “I had always limited my writing assignments to short journal responses to art images. Yet through the use of the planning guides and other helpful materials, as well as strategies seen at work in other classrooms, such as peer review and the effective use of rubrics, I...
developed a longer term writing unit.” Another teacher wrote, “Our experience attests to the fact that teachers, working together for a common goal, create a synergy that yields results often surpassing an individual’s results.”

Washington

Visual evidence of shared norms and values was evident in Washington. Each hallway was carefully decorated with posters showing different values such as “Trust” and “Honesty.” Teachers purposefully modeled and reinforced these values and expected both students and other adults to do the same. All teachers in Washington also participated in a district-wide continuous school improvement model, and accompanying guidebooks were usually open and in use on teachers’ desks. Although these instructional learning teams began with a more common curriculum and grade level than that of Amity, they also grew closer in shared values and norms as they made use of authentic pedagogy. A fifth-grade teacher wrote, “By the time we put our lessons together, we were beginning to think with the rubrics in mind.”

Collective Focus on Student Learning

Amity

As they progressed through the instructional learning team process and became familiar with authentic pedagogy, the focus on student learning increased and became more collective in Amity. While they first concentrated on the instruction rubrics, they soon saw the value of scoring student work and aligning it with instructional change. A language arts teacher wrote, “I marvel at the growth of student performance throughout the revision process as evidenced by our ILT outcomes.” The team leader added, “Although we taught different subjects, the ultimate goal was the same, we wanted to
help our students become better writers. Examination of the student work samples of three of our members offer us hope that by May, student writing improved. In each of their classes we found evidence of student growth in voice, elaboration, organization and conventions. We can link their improvements to student tasks that showed high levels of value beyond school, construction of knowledge, and higher order thinking skills.” The school CEO commented, “My involvement in the ILT program has allowed me to gain knowledge of leadership strategies that support a school culture of high expectations, continuous improvement, and learning communities that advance student achievement.”

Washington

Washington had similar experiences as they progressed through the instructional learning team process, although they did not use the rubrics as much to score student work as the Amity team. A fifth-grade teacher commented, “There is more focus on your desired result.”

Reflective Dialogue

Amity

Each meeting of the instructional learning team at Amity contained significant amounts of reflective dialogue. Predictably, even more useful and focused reflection occurred as team members became more comfortable with each other, with authentic pedagogy, and with the use of the rubrics. The meetings had no time limit and took place after school, yet, one teacher commented “Our afternoon meetings might appear to be a sacrifice; however, I found them energizing and stimulating. After each session, I left with a renewed vigor to apply new insights in my classes.”
The reading teacher wrote, “We bring lessons to be scrutinized by our colleagues without the fear of being ridiculed. I felt I was being mentored in the truest sense of the word. As we spent time together, we learned to value each other’s opinions.” The history teacher added, “We learned to stick to the language of the rubric and offer ways to increase the quality of each person’s instruction. We had a powerful, thoughtful, and helpful team. This personal interaction has been priceless to me.” Even more powerful were comments from the team leader, who wrote “These…individuals took the group’s reflections, critique, and comments to the heart of their instructional practice, made deep revisions in their work, and saw growth in student skill as a result.”

Washington

Critiquing lessons, applying rubrics, and viewing videotaped lessons created a venue for reflective dialogue. Rich discussion led to a deeper understanding of authentic pedagogy and student learning. By revisiting the lesson and discussing it, the teacher’s honed the instruction until they knew what part of the instruction was responsible for advancing learning, and what part was not effective. The ILT teachers discussed changes they would make next time and then modified the lesson. Reflection such as this is what Zeichner and Liston (1996) call social efficiency focused. A focus on social efficiency shapes reflection towards the desire to compare and contrast personal practice against a stated “best practice” or acknowledged outcome.

As a result of this reflective dialogue regarding collecting and scoring student work teachers became aware that students had trouble communicating mathematics. This led to an interesting discussion of the gaps in math education. Explaining the process of solving problems, their application to real life and connections to previous concepts is not
traditionally expected of students. Ideas to resolve these issues and interventions to help remove these gaps were discussed.

Deprivatization of Practice

Amity

As stated previously, “by sharing uncertainties about practice, teachers learn new ways to talk about what they do…the typical norm of individual autonomy is diminished, and teachers become committed to practicing their craft in public ways” (Louis, Kruse, & Marks, 1996, p.183). The team members from Amity were initially nervous at the thought of being videotaped and critiqued by other team members. As team members became more comfortable with this process and the use of rubrics to comment upon and change instruction, they indeed began to practice their craft in a more public way. The compelling element of the group, the team leader wrote, “is the manner in which they came together to critique and support each other to improve their classroom practice.”

Washington

Team members at Washington were even more reluctant to videotape themselves during classroom instruction. A second-grade teacher only consented to have an observer take field notes during her reading lesson. Instructional practices were not as public in Washington as they were in Amity due again to the lack of time for deep and focused reflective dialogue. This lack of reflective dialogue also limited the amount of experimentation team members were able to partake in during their lessons.
All the ILT teachers stated the structure of the Lesson Plan Cycle, the process of scoring rubrics, and the collaboration among peers changed the way they wrote, taught and evaluated lessons. Things that the teachers identified as contributing to this success included starting small, establishing a level of trust among team members, establishing and honoring time to collaborate, learning about the ILT model, planning for the logistics of videotaping instruction, keeping track of the data, and supportive administrators.

Analysis of these two schools and the interaction of their instructional learning teams process, use of intellectual quality, and the elements common to professional learning communities yields mixed results. While both teams had some elements of professional learning communities at their inceptions, they actually acquired more of these common elements as they progressed through the instructional learning team process and used the standards of intellectual quality to change instructional practices. Although further study is necessary, these teams may not have acquired these elements had they not used the rubrics.

Because of the length of their meetings and the ability to have deep and focused reflective dialogue, it also appeared that the instructional learning team from Amity more deeply internalized the elements of the professional learning community and the elements of authentic pedagogy. This internalization and resulting change of instructional practice did indeed have a positive impact on student achievement. They also deprivatized their practice to a greater extent, consistently focused on student learning, and more effectively collaborated as a team. In fact, the team at Amity was so successful, the entire school has recently begun participation in this process.
While there were other elements missing, such as active participation by administrators, all team members from both schools believed that their teams were successful and, although to varying extents, felt their practices and beliefs were changed. DuFour and Eaker (1998) stated, “becoming a learning community is less like getting in shape than staying in shape—it is not a fad diet, but never-ending commitment to an essential, vital way of life” (p.28). A teacher from Amity echoed this very statement, commenting, “The instructional team philosophy is not just another fad or strategy to tryout in the classroom; rather, it has the potential to bring about a virtual revolution in teacher practices that can in turn have a powerful impact on student learning!” Teachers empowered by the ILT process become more discerning consumers of educational research. More importantly they become generators of research.
References


Instructional Learning Teams: Combining the Power of the Japanese Lesson Study with Intellectual Quality
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Instructional Learning Teams: Instructional Learning Teams:
Combining the Power of Japanese Lesson Study with Intellectual Quality.

Joshua Pfiester, Doctoral Student
Brian Whitney, Doctoral Student
Julia Zarbinisky, Doctoral Student
Jonathan L. Brendelur, Associate Professor
Roger A. Stewart, Professor
Boise State University
California Capital Lesson Study Conference
May 16, 2008

Contrast of American and Japanese Education

- [Japanese Lesson Study]... is in stark contrast to American classrooms where each teacher plans and teaches in almost complete isolation. When a brilliant American teacher retires, almost all the lesson plans and practices that he or she developed also retire. When a brilliant Japanese teacher retires, he or she has left a legacy to be enhanced by future teachers.

Instructional Learning Teams

- Is a professional learning community model that combines lesson study and intellectual quality.
- Our efforts attempt to reculture education and in the process create a framework to transform private craft knowledge into a body of teaching leading to path of “teacher emancipation” (Stenhouse).

Lesson Study

- Forms the core of Japanese professional development. The collaborative process explains why public education has evolved.
- Japanese elementary teachers [see] their science instruction... as heavily influenced by Western approaches, including the work of John Dewey and Jerome Bruner.
- Developing “the eyes to see children” is, in the view of many Japanese educators, the most important goal of lesson study.
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**Intellectual Quality Map: Tasks**

- **Intellectual Quality**
  - Construction of Knowledge
  - Disciplined Inquiry
  - Value Beyond School

**Intellectual Quality criteria for tasks and standards**

- **Construction of Knowledge**
  - Organization of Information
  - Consideration of Alternatives

- **Disciplined Inquiry**
  - Content
  - Process
  - Elaborated Written Communication

- **Value Beyond Instruction**
  - World Beyond the Classroom
  - Audience Beyond School

**ILT Scoring Activity: Task**

5th Grade Mathematics:

If a 12-tooth gear turns one time, how many times would each of these gears turn: 2-toothed gear; 3-toothed gear; 4-toothed gear. Explain how to find the number of turns that a gear will take when connected to another gear. How does this relate to bicycling?

**Scoring the Task: Construction of Knowledge**

1. The task does not require students to organize, synthesize, interpret, explain, or evaluate complex information. Alternative solutions are not required.
2. The task requires students to select and organize information, but students are not asked to interpret, evaluate, or synthesize. Alternative solutions are suggested, but not explicitly required.
3. The task requires students to select and organize information and interpret, evaluate, or synthesize it to go beyond the surface level. The task requires consideration of alternative solutions.
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Scoring the Task: Disciplined Inquiry

1. The task requires students to produce short answers without detail or elaboration. Only a surface understanding of content and processes is required.
2. The task requires students to provide some evidence of thinking, but does not require justification of results and conclusions. Some elaboration is required to show understanding of concepts and processes.
3. The task requires the student to explain thinking or justify results and conclusions with enough elaboration to demonstrate a deep understanding of concepts and processes.

Scoring the Task: Value Beyond Instruction

1. The task does not involve an issue that students are likely to encounter beyond school.
2. The task involves an issue that students are likely to encounter beyond school, but the connections are not clearly apparent.
3. The task clearly involves an issue that students are likely to encounter beyond school and the connections are apparent.

Attentive to Institutional and Cultural contexts

Annie
- K-6 elementary school
- Blue-collar families of European descent
- Included information from other cultures in her lessons

Stephanie
- K-5 year-round elementary school
- Privileged backgrounds; primarily of European descent
- Students had been abroad and/or visited other parts of country

Participation in Curriculum Development and School Change Efforts

Annie
- Lesson scores low based on Intellectual Quality (IQ) standards
- “I wrote my lessons for the week before thinking about where the kids might be. I rated them according to the rubrics first because I figured I could just teach them and the children would go along with me. Well, newsflash to me! My kids were not ready so ever...”

Stephanie
- Lesson scores low based on Intellectual Quality (IQ) standards
- “I didn’t realize it at the time but I chose the same students to go up to the board. Instead of letting them explain their work, I explained it for them. That is not what I wanted to do, but that is how I did it..."
Instructions Learning Teams: Combining the Power of the Japanese Lesson Study with Intellectual Quality  Josh Pfiester, Brian Whitney, Julia Zarbnisky, Boise State University

Examiners, Frames, and Attempts to Solve the Dilemmas of Classroom Practice

**Annie**
- Revised and re-scored lessons
- Focused on improving the construction of knowledge sections of her lesson plans
- “The revision wasn’t too bad. I feel that my revised lesson plans are much better and I know how to help the students with decomposing numbers.”

**Stephanie**
- Focused on students demonstrating understanding and articulating their ideas in her lesson plans
- “It is necessary to utilize feedback from the students to help direct instruction. By expanding on the questions that students ask during a lesson, I am able to cover what they want to know and acknowledge what they do know about the lesson.”

Responsibility for Professional Development

As an on-going and daily process, the use of lesson study along with the intellectual quality standards altered the curricular and instructional opportunities teachers afford their children. Professional development was created on a daily or weekly basis throughout the year, focused on current concerns, and was provided in a timely fashion so that student understanding was effected.

Conclusions

- Teachers at all levels of their developing understandings are both producers and consumers of knowledge.
- As they participate in experiences that allow them to construct knowledge and engage in disciplined inquiry, they are able to actively develop both knowledge and skills and generate these concepts and principles in their experiences and work in classrooms.
- Acculturation into ways of understanding about the field of teaching that allow for reflection, collaboration, problem solving, studying and modifying instructional practices.
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms

Presenters: Gabriela Dumitrascu, Virginia Hook, University of Arizona

Email: gdumitrascu@math.arizona.edu

This research explores how lesson study organized through the Center for the Mathematics Education of Latinos/as has changed teachers’ understanding of mathematical content and teaching mathematics to Latino/a students while incorporating students’ linguistic and sociocultural resources in their instructional practices. The session will explain modifications to the Japanese lesson study process brought about to accommodate teachers’ and schools’ needs and improve teachers knowledge-for-practice, knowledge-of practice and knowledge-in-practice.
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Gabriela Dumitrascu, Virginia Hook, University of Arizona

gdumitrascu@math.arizona.edu

Virginia Horak
University of Arizona

horak@math.arizona.edu
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms Gabriela Dumitrascu, Virginia Hook, University of Arizona

Abstract

This paper presents the findings of a lesson study research project undertaken by a team of teachers and researchers in the Center for the Mathematics Education of Latinos/as. We examined changes in teachers’ understanding of mathematical content and of teaching mathematics to Latino/a students while incorporating in their instructional practices students’ linguistic and sociocultural resources. The four teachers that participated in the project were from a middle school with high population of Latino students, which was ranked by the school district as underperforming for the past three years. In our approach of the lesson study cycle, we tried to accommodate the teachers’ and school’s needs and at the same time to create an activity system where the teachers can improve their knowledge-for-practice, knowledge-of-practice and knowledge-in-practice. Consequently, we changed the structure of each of the three cycles that were part of the project. Our paper presents the reasons that led to these modified versions of the Japanese lesson study cycle, and the change experienced by one of the teachers that participated in all three lesson study cycles of the project.
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms

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Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms

Lesson study has been for the past decade of the educational reform in the United State a novel approach for improving mathematics teaching learning that captured the attention and the interest of many teachers and researchers. Addressing the problematical issues in the new reform in education, which requires a critical switch from direct and teacher-centered instruction toward inquiry and student-centered education, has found a valuable approach in lesson study settings. By its structure, a lesson study cycle builds a community of teachers that focuses its activities on exploring and improving the learning-teaching relationship. Therefore, based on social theory of learning, we can reasonably assume that any practitioner of lesson study will experience a positive change as an individual and as a professional. What becomes important at this point is to unveil and bring to the surface evidence that elevates this assumption to the level of reality. Research has been shown that by participating in lesson study, teachers can construct and expand the pedagogical content knowledge needed for reform-minded teaching (Fernandez, 2005). However, we need more systematic research of the opportunities, avenues and facets of learning that every teacher participating in lesson study experience. With this perspective in mind, we focused the analysis of the impact that the practice of lesson study has on participant teachers, and more specifically on the evaluation of their professional growth. As a consequence, the research question that guided our analysis
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms  Gabriela Dumitrascu, Virginia Hook, University of Arizona

was: What are the changes in teachers’ knowledge-for-practice, knowledge-of-practice and knowledge-in-practice while practicing in lesson study? We present the findings of our analysis by the case study of a teacher that participated in all the three lesson study cycles which were parts of our project.

The study from which we are presenting in this paper was conducted under the umbrella of the Center for the Mathematics Education of Latinos/as (CEMELA), a multi-university consortium focused on the research and practice of the teaching and learning of mathematics with Latino students. One of its goals is to develop a model of the mathematics learning and teaching that incorporates the cultural, social, and linguistic resources provided by the Latino communities. In this context, lesson study has become an important tool for investigating an overarching CEMELA-wide research question: what are the issues and challenges teachers face as they adapt or create instruction in mathematics to meet the needs of Latinos, particularly in light of language and culture?

Our goal for the lesson study research project is to identify and analyze the changes in teachers’ understanding of mathematical content and of teaching mathematics to Latino/a students while incorporating in their instructional practices students’ linguistic and sociocultural resources. Therefore, we aim to create a learning community in which the participants experience: the mathematical discourse endorsed by the collaborative planning of a research lesson; the challenges of teaching and observing the research lesson in order to improve its impact on students’ understanding and learning of the mathematical content; and the reflective practice of the complex process which is teaching mathematics.
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms
Gabriela Dumitrascu, Virginia Hook, University of Arizona

The project started in Fall 2005 with a group of four teachers from a middle school situated in a low-income Latino community in a southern town of Arizona. From the beginning, the project was considered to be a collaboration between researchers and teachers. Since each of the participants was novice to lesson study, our first attempt was to structure the cycle by following the Japanese model described by Takahashi & Yoshida (2004). However, there were three initial factors that shaped our first cycle. The first factor was the researchers’ intent to provide information that would advance teachers’ knowledge-for-practice. Therefore, the planning part of the cycle became a sequence of readings provided by researchers followed by discussions. The planning of the research lesson was based on decisions reached in our group meetings. The second factor was the diversity of the teachers. The group covered all the middle school grade levels: two teachers were teaching 8th grade mathematics, one was teaching 7th grade mathematics, and one was teaching 6th grade mathematics. For this reason, the group considered that the research lesson has to be taught at each level. This factor influenced the selection of the goal for the cycle and the topic of the research lesson by reflecting on problematic teaching areas common to all three grades. The third factor that was influencing the whole logistic of the cycle was the school’s characteristic. The lesson study was taking place in a middle school with 86% Latino students out of which 24% were identified as English language learners, and 84% of the students were eligible for free or reduced lunch. Therefore, the social and cultural aspects involved in this particular educational setting were strongly emphasized during planning, teaching and debriefing the research lesson. Moreover, for the school year 2004-2005 the school was ranked as underperforming by the Arizona Department of Education. In order to improve the
school’s situation, the district made considerable changes to the school’s organization, and the teachers were given extra activities and responsibilities. Because of this, to schedule the meetings for lesson study became heavily problematic.

The project included three complete lesson study cycles. The first cycle had as its research lesson topic: “Adding fractions with unlike denominators” which was taught three times in 6th, 7th, and 8th grade classrooms. The debriefing and revising of the lesson took place each time right after the lesson and lasted 30 to 45 minutes. For the second lesson study cycle, the topic of the research lesson was: “Analyzing Games of Chance.” It was taught again in 6th, 7th, and 8th grade classrooms and we debriefed for 30 to 45 minutes after each lesson.

A very critical point for our practice and development of the lesson study was that after the second cycle, the teachers had to prepare a presentation of their experience for the NCTM-2007 conference. To make the presentation, the teachers used the same approach as a lesson study cycle. They met regularly to reflect on their practices of the lesson study cycles and to plan the presentation. They gave two presentations in front of two different audiences, debriefing and making revisions after each presentation. The higher level of critical analysis and thinking that was initiated by this experience, led us to think of extending the lesson study cycle model with a new stage in which the participants reflect on the entire lesson study process.

The group had already planned for the third cycle when two of the teachers moved to other schools and another teacher was unable to continue due to new duties at the school. In this situation the 6th grade teacher organized a lesson study cycle with another 6th grade teacher with the goal to create a lesson that would help low performing students
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms

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understand the long division algorithm. The research lesson was taught twice and after each lesson we had debriefing and revising sessions for 45 to 60 minutes. This was the third lesson study cycle included in our project.

Theoretical framework

To analyze how our teachers changed during their participation in our lesson study project, we combine two key aspects of teachers’ professional growth: the nature of knowledge needed for teaching and a measure for the change in each type of knowledge. First, we consider that the knowledge needed for teaching can be classified into three categories: knowledge-for-practice, knowledge-in-practice, and knowledge-of-practice (Cochran-Smith & Lytle, 1999). Second, the structure of a lesson study cycle allows us to historically construct activities (planning a research lesson, teach the research lesson, and debrief and revise after each lesson taught) in which zones of proximal development (ZPD) ("the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers." Vygotsky, 1978, p. 86) can be identified while teachers are participating in these activities.

Therefore, to measure our teachers’ development, we use activity theory to explain the intellectual growth as the process in which each participant gains knowledge through external mediation within a community where he/she follows established rules while performing a specific part of the whole group activity (Cole, 2003). In this framework growth is represented through the process of appropriation. For each category of knowledge: knowledge-for-practice, knowledge-in-practice, and knowledge-of-practice, we consider five levels of appropriation: lack of appropriation, appropriating a label
(knowing a tool’s name but none of its features), appropriating surface features (knowing some or most features of a tool but not being able to use them as a “conceptual whole”), appropriating conceptual underpinnings (understanding the theoretical basis of a tool and being able to use it occasionally in new contexts), and achieving mastery (using the tool effectively) (Grossman, Smagorinsky & Valencia, 1999).

Under the arch of the theoretical perspectives described above, we focus our analysis on the teacher that was part of the lesson study group in each of the three cycles of our project.

Methods and Data

This study is based on data collected in three stages: before the lesson study project started, during the project, and after the third cycle in a setting different from lesson study.

Before starting lesson study, all our teachers were participating in a professional development cohort for middle school mathematics teachers organized by the CEMELA project. During this time, the researchers of the CEMELA project conducted an interview on teachers’ view and concerns about learning and teaching mathematics. Moreover, during the same period of time, the CEMELA project was trying to adopt an observation protocol as a common instrument used to examine classroom environments, and a series of observations was done for this purpose. Therefore, in order to create our teacher profile before her participation in lesson study, we combine the data provided by these two sources.
During lesson study we video-taped every planning meeting, every research lesson, and every debriefing session. From the analysis of these videos we were able to identify instances of teacher growth.

The third stage of the data collection was facilitated by a small project required by a teacher education graduate course. For this project, the teacher was interviewed once and her classroom practice was observed three times. The audio recorded interview and the field notes collected during the classroom observations were also included in our qualitative analysis in order to recognize if any of the experiences that the teacher had with lesson study were transferred to teacher’s current practices.

Findings

Ms. John is a sixth grade teacher in her fourteenth year of teaching. She spent her entire teaching career in the same middle school which has always had a high percentage of Latino/a students. Despite her long experience with this population of students, she is continuously concerned by the fact that she is not able to overpass the language barrier which is between her and her ELL students, since she speaks only English. For this reason, her main interest in the professional development activities in which she participated, including lesson study, was to learn strategies that she can use when she feels that she is not communicating with her students. She especially appreciated our lesson study setting because she was able to collaborate with her Latino/a colleagues and observe them teach.

As mathematical background, she completed the required college level course for a bachelor’s degree in elementary education and some courses beyond these. She describes her experience as a learner of mathematics in the following way:
“Math was not a strong subject, my grades were C’s and D’s. I spent my Sunday evenings with my grandfather. He was my tutor since he was a mechanical engineer professor at the university. This tutoring was imposed when I would receive a D for the home-works. I would have to continue the tutoring until the grade was brought up. I enjoyed the sessions because I adored my grandfather. When I took the college courses, I worked hard and probably depended on my children for help.”

Ms. John considers that she can handle basic math, but she thinks she does not have the kind of mind needed to do advanced math. For her, to be good at mathematics means to remember formulas, principles, procedures, and to think in a logical step-by-step manner. This view is reflected in her teaching style. A typical lesson taught by Ms. John involves a warm up problem on which students are asked to work on about 5 minutes, a review of the homework done usually by showing the correct answers on transparencies; then either she introduces new content followed by an application and students have to reproduce a similar one or she performs some exercises on transparencies and students are asked to work similar ones individually. However, Ms. John showed a real enthusiasm to try the new ways of teaching exhibited by lesson study.

As a mathematics teacher, Ms. John experienced a positive change by participating in lesson study. We analyze this change through the lenses of the three categories of knowledge needed for teaching: knowledge-for-practice, knowledge-of-practice and knowledge-in-practice.
Changes in Knowledge-for-Practice

Cochran-Smith and Lytle (1999) consider as being part of the knowledge-for-practice, all the general theories and research-based findings from all the domains included in the process of education. These domains are the content and subject matter, the foundation of education, human development and learners, classroom organization, pedagogy, assessment, the social and cultural context of teaching and schooling, and teaching as a profession. Even if it is not stressed in the structure of the lesson study that the participants in a cycle would explore the knowledge-for-practice domains, the CEMELA researchers considered from the beginning that the planning stage of the lesson study is the appropriate context in which teachers can improve their mathematical and pedagogical knowledge needed in the socio-cultural environment created by low income Latino communities. Therefore, the main goal of the researchers as members of the lesson study group was to provide theoretical information about the mathematical content, strategies of teaching, and theories of learning that would contribute to a profound and thoughtful analysis of the topic chosen for the research lesson.

In the first lesson study cycle the group of teachers wanted to create a research lesson that would help students to understand the addition of fractions with unlike denominators which they considered as being a crucial problem at all grade levels. The set of readings selected for this topic included The Teaching Gap by Stigler & Hiebert and several chapters from Teaching Fractions and Ratios for Understanding by Susan Lamon. These readings brought a perspective on teaching fractions that was new for Ms. John. To let students struggle, to make mistakes, and to guide them from there was not considered as a possible way to teach. She said that she “would not let them to make the mistake” and
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms
Gabriela Dumitrascu, Virginia Hook, University of Arizona

she “would not set them up for failure,” in referring to her students. The readings lead Ms. John’s to see a new teaching approach: to let students make mistakes.

“The one that I like it here, which it was great, was adding two fractions, it was like 1/4 and 1/2, and if a kid comes out with 2/6, explain how he got that. Does that make sense? Why does that happen? I like that, I thought let them to make the mistake and then explain to me. And then, once they see that, oh… I have to prove it, and that did not work, how many of them from then on will continue to add the denominator when you are not supposed to. That I thought was great. Let them make the mistake.”

In the second lesson study cycle, all four teachers agreed to plan a research lesson on probabilities. The topic of the lesson was “Analyzing Game of Chance” which is part of the Connected Mathematics Project curriculum adopted by the school district. This time, in addition to the readings related with the topic, we decided to play the “Roller Derby” game included in the lesson’s investigation, slightly modified, to allow a deeper approach of the game. This activity helped Ms. John to understand the meaning of the probability computations involved in the analysis of the game. She told us, in one of the following meetings:

“I probably would not be able to do that [a problem from a standardized test] if we had not reviewed them by playing that game … because we sat out there and we said: oh … how can we find out? Then right away, that was what we started to do it. I would not be able to do that problem, to show the students how to show their work”
Moreover, this event that happened in her classroom helped Ms. John to understand how beneficial it could be for a teacher to do each activity that will be presented to students. Once more, a new aspect of teaching was unveiled to Ms. John.

The goal of the third lesson study cycle was to design a lesson that would help the low-performing students understand the long division algorithm. As in the previous two cycles, we started with a discussion of the research done on teaching the long division algorithm. Ms. John was very surprised, and she looked confused by the fact that the research stressed that understanding place value of the digits is critical for performing the long division algorithm. She confessed that she has never thought of place value when she divides two numbers. She would even delete the same number of zeros from the end of the numbers if both numbers happen to end with zeros.

All the instances described above are evidence of Ms. John’s ZPDs development while participating in lesson study related to the knowledge-for-practice domain. First, the pedagogical strategy of letting students struggle and make mistakes which was at the lack of appropriation level before the lesson study, reached the conceptual underpinnings level since this strategy was used by Ms. John while she was teaching the research lesson. Second, Ms. John’s understanding of the meaning of probabilities computed in the analysis of the “Roller Derby” game increased from appropriating a label to appropriating surface features. Some mistakes made by Ms. John while teaching the research lesson of the second cycle show that she was not at the conceptual underpinnings level of appropriation. Finally, the level of appropriation for the place value role in performing the long division algorithm went from lack of appropriation up to appropriating a label
since she was arguing that deleting the zeros from the ends of the numbers does not change the answer.

Changes in Knowledge-of-Practice

Knowledge-of-practice comes from a teacher’s own experience by direct interaction with the process of teaching. As Cochran-Smith & Lytle state: “teachers across the professional life span play a central and critical role in generating knowledge of practice by making their classroom and school sites for inquiry, connecting their work in school to larger issues, and taking a critical perspective on the theory and research of others.”

In a lesson study cycle, teaching the research lesson provides a unique and valuable experience. The uniqueness comes from the fact that the teacher has to follow a lesson plan that contains only partially her/his ideas. The teacher that teaches the research lesson has to interweave her/his style, personality, and knowledge with the ideas, strategies and approaches that were imbedded in the lesson plan by the other participants. This non-easy task creates the challenge that can bring teachers to their ZPDs. For this reason, we consider it important to have each teacher teach the research lesson at least once.

Ms. John taught each of the three research lessons. In the first and second cycle she was the second teacher to teach the research lesson. In the third cycle she was teaching first. In each of the lessons taught by Ms. John, we were able to identify moments of her professional growth. In “Adding fractions with unlike denominators,” by letting students struggle she was able to identify that there are students that can have an incomplete understanding of adding fractions with unlike denominators. While observing students trying to figure out the correct answer for adding 2/6 and 1/4, Ms. John heard the
conversation between two students who were confused about the new numbers of the numerators. They seemed to understand that the common denominator 12 is the least common multiplier of 6 and 4 but they wondered why the numerators were then 4 and 3. This discovery pushed her to think about the need to point out the change of the numerators at the same time as the change of the denominators. During the debriefing Ms. John expressed her observation and thinking to us:

“I think that would be the next lesson. We see how we find the common denominator. Now, how do we find the numerator that goes with the common denominator?”

Therefore, for her, it was important to reopen the discussion with the whole class in their next meeting to clarify and reorganize the knowledge that the students partially acquired in the research lesson that she taught.

Teaching the probability research lesson “Analyzing game of chance” facilitated another learning moment for Ms. John. One of the goals of the lesson was to have the students visualize the connection between the experimental data and the theoretical data. Therefore, during the planning, the teachers decided to collect the data that students generated when they played the game, to make a chart with these experimental data, and then to compare this chart with the theoretical data. The chart with the experimental data was supposed to have a bell shaped form similar to the chart of theoretical data. When Ms. John taught the research lesson, she was having only a surface-features appropriation of the meaning of the charts and consequently she wrongly created the graph of the experimental data. First, she did not maintain a straight horizontal line for the bottom of
the chart and second, when she came close to the middle of the chart she changed from recording the data in two columns to recording them in three columns (see Picture 1).

![Picture 1](image_url)

These mistakes altered the shape of the chart which was noticed by Ms. John right after passing the middle point of the data. She tried to reorganize the data but the class time was over, and thus the lesson did not include the complete chart of the experimental data.

The goal of the third research lesson was to perform the long division algorithm through the lens of place value. The lesson started with a word problem which was asking to divide a length expressed in yards, feet, and inches into lengths expressed in feet and inches in a repeated subtraction setting. The strategy that the students were supposed to discover was to divide first the yards by the divisor then to reorganize the remaining lengths and divide these feet by the divisor, and at the end to reorganize the inches left over and to do another division if it was possible. The connection between place value and the steps of the long division algorithm was at the appropriating a label for Ms. John, since she misled the students by accepting a solution that did not reorganize the remaining lengths. However, during the whole class discussion about the different strategies used to solve the problem, Ms. John understood her mistake and correctly reviewed the main ideas of the lesson.
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms  Gabriela Dumitrascu, Virginia Hook, University of Arizona

As we tried to depict in this section, by teaching the research lessons, teachers experience challenges that can situate them into their ZPDs. During her teaching of the first research lesson, Ms. John became aware of the fact that there may be students who have an incomplete understanding of addition of fractions with unlike denominators. The ZPD created through this event improved Ms. John’s knowledge about student understanding of adding fractions with unlike denominators. The new aspect of incomplete understanding was at the lacking of appropriation level before she taught the research lesson and she appropriated surface features after the lesson. She did not have a conceptual underpinnings appropriation because she was considering that the cause of the incomplete understanding is the fact that the students do not know that: “What you do with the denominators you have to do with the numerators”. Through this statement, Ms. John showed that she cannot go beyond the procedure to the conceptual meaning of adding equivalent fractions that have the same common denominator.

In the probability research lesson, by wrongly recording the data, Ms. John was appropriating surface features of the understanding of the probabilities computed in the analysis of the “Roller Derby” game. When she noticed the mistake and tried to mend it, we considered this evidence of the nascent stage of her conceptual underpinnings appropriation.

From the third research lesson taught by Ms. John, we are able to identify her appropriation levels for the place value role in performing the long division algorithm before and after the lesson. Before the lesson she was appropriating a label, after the lesson she was appropriating surface features since she was able to correctly rework the strategy but she did not make any direct connections with the long division algorithm.
Changes in Knowledge-in-Practice

Knowledge-in-practice includes all the knowledge that a very competent teacher has and they are directly reflected in their practice. It is assumed that “teachers learn as they have opportunities to examine and reflect on the knowledge that is implicit in good practice – in the ongoing actions of expert teachers as they choose among alternative strategies, organize classroom routines, and make immediate decisions as well as set problems, frame situations, and consider/reconsider their reasoning” (Cochran-Smith & Lytle, 1999, p. 262).

The structure of lesson study creates a valuable source for knowledge-in-practice. We make a distinction between two features of this source. The first one is provided by observing an open research lesson which implies that the lesson was already revised several times before it was open to the public. The second feature comes from observing the other members of the group teaching the research lesson that was designed during a lesson study cycle.

Ms. John was not able to observe any of the open research lessons taught by more experienced practitioners of lesson study but she observed every research lesson taught in our lesson study cycles. We came to believe that each time Ms. John observed a lesson she improved her knowledge, generated new ideas, and gained new perspectives about teaching. For example, when Ms. John observed the probability research lesson revised after she taught it, she was able to see the correct chart of the experimental data and to fulfill the conceptual underpinnings stage of appropriation for the understanding of the meaning of probabilities computed in the analysis of the “Roller Derby” game.
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms

Gabriela Dumitrascu, Virginia Hook, University of Arizona

Changes across the Domains

Ms. John experienced a cumulative growth across all three domains as evidenced by the previous example. In the knowledge-for-practice domain Ms. John’s understanding of the meaning of probabilities involved in the “Roller Derby” game went from appropriating a label to appropriating surface features, in the knowledge-of-practice domain it went from appropriating surface features to appropriating a nascent stage of conceptual underpinnings, and in the knowledge-in-practice domain, the conceptual underpinnings appropriation stage was fulfilled.

At this point of our analysis, we consider that the lesson study has a strong potential to support teachers cumulative growth which should be our aim for a more effective professional development program. We should mention that the order of the domains does not always follow the same sequence as illustrated by our example and also may not include all the domains. For example, Ms. John’s knowledge about the use of the white board to store students’ answers started at appropriating a surface feature while she was observing another teacher teaching the research lesson of the first cycle. She noticed that by collecting verbally the answers of the problem, there were students that were repeating what was already said and for her this was time consuming. Consequently, when she taught the revised lesson, she tried to avoid this situation by storing students’ answers on the white board. Therefore, the use the white board was only for a better management of the time. However, during the lesson, the answers stored on the board became references for students, captured their attention, and initiated mathematical discourse. This experience surprised Ms. John and led her to the conceptual underpinnings level of appropriation on the use of the white board.
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms Gabriela Dumitrascu, Virginia Hook, University of Arizona

Conclusions

The purpose of this paper was to highlight the complex nature of the professional growth experienced by teachers who participate in lesson study cycles. We consider that a socio-cultural approach through activity theory would enhance our understanding of the strength of lesson study in the development of teachers’ education. Moreover, the theoretical framework that we used can also guide our thinking about how we facilitate the growth of the teachers.

Ms. John’s example brings evidence that by a thoughtful design of the lesson study structure, all the facets of the teaching-learning process can be addressed. Lesson study has the potential to accommodate the needs of students, of teachers, of school, and of the new educational reform. This is evidenced by the growing number of teachers and researchers attracted to the process. As a consequence, a constellation of interpretations and approaches to the process has developed. Therefore, there is a need for research to identify what new trends and characteristics of lesson study are.
Lesson Study: A Site for Teachers’ Professional Growth and Use of Instructional Innovations in ELL Classrooms Gabriela Dumitrascu, Virginia Hook, University of Arizona

References


Developing Pedagogical Content Knowledge in Writing Instruction Through Lesson Study

**Presenters:** Shannon Pella, University of California, Davis / Area 3 Writing Project

**Email:** smpella@ucdavis.edu

This study is a description of what happens as writing teachers develop a lesson with a focus on Response to Literature. The research will summarize how a lesson study focused on writing instruction affects the formation of a writing teacher’s pedagogical content knowledge.
Developing Pedagogical Content Knowledge in Writing Instruction through Lesson Study

By Shannon Pella (smpella@ucdavis.edu)
UC Davis and Area 3 Writing Project

This study is currently in progress as of 2/29/08. I have included here excerpts from my research proposal if it may interest the reader.

ABSTRACT:
Research on lesson study, particularly in Math and Science, has shown that inquiry, reflection, and collaboration in a deep, complex structure, have proven to contribute to the knowledge base of teachers. Few studies have shown how teachers in k-12 classrooms develop pedagogical content knowledge in writing instruction. This research is a three month inquiry made up of four Area 3 Writing Project teacher consultants and a participant-researcher from the Graduate School of Education at UC Davis. The study is centered on the following question:

How does a lesson study, focused on writing instruction and social justice affect the formation of a writing teacher’s culturally relevant, pedagogical content knowledge?

This study is a concise ethnographic description of what happens as writing teachers develop pedagogical content knowledge in with a focus on Response to Literature during one lesson study cycle.

PROPOSED PAPER:
There is a growing body of research on teacher education aimed at uncovering the ways in which teachers develop the knowledge and skills necessary to become effective. Absent from much of the research are studies (conducted) in order to understand how different forms of pedagogy result in different kinds of outcomes (AERA, 2005). Integral to knowledge growth are ways in which teachers develop pedagogical content knowledge, “that special amalgam of content and pedagogy that is adapted to the diverse interests and abilities of learners” (Shulman, 1987).

Thus, there is a need for research that describes how pedagogical content knowledge is developed as it relates to the teaching of writing and how this pedagogy manifests in culturally diverse urban classrooms. Further, there is a stated need to study how this knowledge base for writing instruction contributes to student achievement in writing particularly for students of color, language minorities, and urban students living in poverty.
It has been argued for some time now that teaching needs to be professionalized, that teachers do not have a way to harvest their collective experiences, share common concerns, and systematically integrate and refine their knowledge (Chokshi & Fernandez, 2002). Traditionally teachers have not been in control of their own professional development. Professional development is often focused around a textbook adoption, managing a current curriculum, or about teaching practices, where too often a consultant is brought in to teach about ways to make gains in student achievement. The persistent achievement gap between students of color and their white middle class counterparts suggests that these professional development approaches need to be reexamined.

Lesson study, also known as a research lesson, is a Japanese approach to instructional improvement which revolves around teacher collaboration. Teachers plan and design a lesson together focusing on a specific area of content. They observe one member of the group teach the lesson and then debrief the “public teaching”, revise the lesson and often repeat the process (Fernandez, 2002). Little research has been done on the particular ways in which teachers develop culturally relevant pedagogical content knowledge when engaging in lesson study. Also limited in the lesson study literature is a focus on writing instruction as a research theme. Additionally, there is a lack of research available that reveals how teachers develop a knowledge base for teaching writing as well as literature that describes what the knowledge base for teaching writing includes.

This research proposal addresses the above stated needs and problems by studying how they are interrelated and how they can be addressed in the context of a teacher collaborative learning community involved in lesson study.

The researcher will take a grounded theory approach to data analysis by using the “Content analysis and analytic induction method” as well as the “Constant comparative method” (Merriam, 1998), to identify patterns and themes that emerge from these data. Raw data will be coded from transcriptions, videotapes and field notes as well as student artifacts by constructing categories that capture relevant characteristics of all of the contents of the documents (Merriam, 1998). Particular attention will be paid to the language participants use when connecting current pedagogy to either their
Developing Pedagogical Content Knowledge in Writing Instruction Through Lesson Study
Shannon Pella, University of California, Davis / Area 3 Writing Project

lesson study or their students’ achievement. Exit interviews and surveys will triangulate data from the
data set acquired throughout the year.

Outcomes should reveal ways in which the lesson study process of collaborative inquiry in the
context of middle school and intermediate elementary language arts classrooms contributes to the
development of pedagogical content knowledge in writing instruction.
Lesson Study: Teachers Use of Student Assessments to Inform Reflective Practice

Presenters: Jenna Porter, California State University, Sacramento / Project ACT
Email: jimporter@csus.edu

This research used lesson study as a tool for improving instruction based on student assessments. Teachers designed and revised lesson plans to include a balance of activities and matching assessments grounded in Sternberg’s Triarchic Theory of Intelligence.
Lesson Study: Teachers Use of Student Assessments to Inform Reflective Practice
Jenna Porter, California State University, Sacramento / Project ACT

Lesson study: Teachers use of student assessments to inform reflective practice
Jenna Porter
jmporter@csus.edu

A Javits Gifted and Talented Students Education Program (Grant: 84.206A) to identify and serve underrepresented students of above average Ability, Creativity, and Task Commitment
http://www.csus.edu/indiv/j/jelinekd/ACT/ProjectACT%20%20Cover.htm

Project Goals
- To improve GATE identification processes
- To provide a professional development series for classroom differentiated instruction strategies, which is readily replicable in other school districts
- To offer additional educational opportunities for underrepresented or underserved students

Year 1
- Davis Unified School District
- ATS summer GATE component-examine gifted identification to program outcomes
- Focus on differentiation

Year 2
- Davis and Sacramento school districts (Equity Network from CSUS to include underrepresented students)
- 9 teams from 4 school districts
- 2 Day Training with Sternberg’s Successful Intelligence focus
- Teachers designed assessments (pre/post) focused on analytical, creative, practical intelligences
Lesson Study: Teachers Use of Student Assessments to Inform Reflective Practice
Jenna Porter, California State University, Sacramento / Project ACT

Year 3
2 Sacramento school districts
Focus on formative assessments and evidence of student learning
How do teachers use assessments in designing lessons?
Focus on sustainability of lesson study

Features of Lesson Study
- Focused on teacher-generated goals
- Thoughtfully planned in collaboration with others including teachers or content specialists
- Observed by other teachers and specialists
- Data collection and/or record keeping for analysis and reflection
- Discussed by lesson study participants (Lewis & Tsuchida, 1998)

Lesson Study Cycle

Plan Design
- Identify Goals
- Unit Plan Balancing Triarchic Abilities
- Design a "research" lesson

Try Out Lesson(s)
- Analysis of Student Work
- Peer Review
- Collect Evidence
- Team Observations

Feedback
- Revise Design

Review & Improve
- Narrowing the Gap (Id goals)

5 Step Lesson Design Process
- Student Learning Profiles
- Narrowing the Gap (Id goals)
- Evidence of Student Learning
- Unit Design
- Lesson Design
Student Learning Profiles

- What are the demographics of the community? (geographic location and population of the community and school, the socio-economic profile, race or ethnic breakdown, any other factors)
- Key factors about your classes that will influence your planning and teaching. (Academic development, Language development, Social development, and Socio-economic and cultural context.)

Narrowing the Gap

- Think about your students in terms of analytical, practical and creative thinking. What characteristics of these thinking abilities do your students currently display?
- What gaps do you see between acquiring a balance of these three thinking skills and how children are actually developing in your classes?
- Discuss these gaps with your group. Write a group goal related to narrowing the gap.
- Provide a Narrative Overview of a unit that will help you achieve that goal.

Evidence of Student Learning

- What diagnostic assessments will you use to assess prior knowledge; practical, creative & analytical skills; and misconceptions?
- What formative assessments will you use to inform student understanding throughout the unit?
- What summative assessment(s) of student learning will you use? What do you expect these summative assessments to tell you in terms of student understanding and inquiry skills?
- What specific criteria will you use to evaluate student understanding and inquiry within the 3 domains of analytical, creative & practical intelligence?

Unit Design

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<thead>
<tr>
<th>Step 4: Design Your Instructional Blueprint</th>
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<tr>
<td>Instructional Strategies and Learning Tasks to Support Successful Intelligence</td>
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<td>Essential Questions</td>
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<td>Analytical</td>
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<td>Every Rock Tells a Story</td>
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Lesson Study: Teachers Use of Student Assessments to Inform Reflective Practice
Jenna Porter, California State University, Sacramento / Project ACT

Lesson Design

**Purpose** (Why are you teaching this lesson? How is this study lesson related to the lesson study “gap” and “goal(s)?”)

**Objectives**

**Procedures**

**Differentiation (Successful Intelligence)**

How will instruction be differentiated to balance analytical, creative and practical activities?

**What Should Observers Be Looking For?** (What evidence will help you know students achieved the objectives for this lesson?)

Pre Conferencing

**Pre Conference Questions** - Discuss objectives, evidence of student learning to be gathered, challenges, differentiation, etc.

What have your diagnostic assessments told you about students’ prior knowledge and preconceptions that may influence this lesson? How have you modified your original plan to account for this?

1 team used CST scores from previous years as diagnostic

1 team stated that, “Students understand prefixes but not necessarily root words”

Post Conferencing

**Post Conference Questions** - Discuss observations, evidence of student learning, revisions for next lesson

How can you use observations and student data to improve your instruction?

Objectives of Study

- Examine paired differences in student achievement pre to post lesson study participation (Teacher designed assessments)

- Compare lesson study to non lesson study participant assessments to determine the relationship on student learning

- Examine teacher perspectives on their lesson study processes and utilization of Sternberg’s Triarchic Intelligence relative to student achievement
Lesson Study: Teachers Use of Student Assessments to Inform Reflective Practice
Jenna Porter, California State University, Sacramento / Project ACT

Paired Differences
Pre to Post Lesson Study
Year 2

<table>
<thead>
<tr>
<th>Team</th>
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<th>p value</th>
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<td>18.05</td>
<td>0.0001</td>
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<tr>
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Average Percent Differences
Pre to Post Lesson Study

Lesson Study Compared to Non Lesson Study participation

Teacher Perspectives on most important features of lesson study-Year 2
Lesson Study: Teachers Use of Student Assessments to Inform Reflective Practice
Jenna Porter, California State University, Sacramento / Project ACT

Teachers Use of Assessments
Year 3 Survey Data

- “How have your views of assessment changed because of your participation in lesson study?”
- Assessment as a process (pre, formative, post)
- LS as time to examine teacher designed, not mandatory assessments
- Importance of diagnostic assessment to design lessons
- Backwards mapping- looking at goals or CST’s first, then plan

Future Direction of Project
Year 3

- Compare participants to non participants using standardized tests to examine impact of lesson study on student achievement
- Support teachers in understanding and using student assessments to improve instruction
- Sustainability of lesson study without grant support
Lesson Study: Measuring Growth in Teacher Knowledge

Presenters: Bindu Pothen, Aki Murata, Stanford University

Email: bpothen@stanford.edu

The study investigated how pre-service elementary teachers experienced lesson study in their mathematics methods courses and how lesson study facilitated their knowledge development as teachers. Data utilized from mixed methods focused on the growth of three types of teacher knowledge: content knowledge, pedagogical knowledge and pedagogical content knowledge. This report highlights how one group of pre-service teachers came to understand student learning, and how they used that understanding in planning and teaching.
Lesson Study: Measuring Growth in Teacher Knowledge
Bindu Pothen, Aki Murata, Stanford University

LESSON STUDY:
MEASURING GROWTH IN TEACHER KNOWLEDGE

Bindu E. Pothen
Stanford University
bpothen@stanford.edu

Aki Murata
Stanford University
akimura@stanford.edu

This study investigated how preservice elementary teachers experienced lesson study in their mathematics methods courses and how lesson study facilitated their knowledge development as teachers. Data utilized from mixed methods focused on the growth of three types of teacher knowledge: content knowledge, pedagogical knowledge, and pedagogical content knowledge. This report highlights how one group of preservice elementary teachers came to understand student learning, and how they used that understanding in planning and teaching.

Introduction

Teaching has been reduced to an overly simplified task, when in fact it is a very involved, complex process. When we examine the practice of a skilled teacher, it becomes clear that a highly developed knowledge of content, access to a wide repertoire of teaching strategies, and deep understanding of students is necessary (Ball & Bass, 2000; Lampert, 2001). In reality it can take years of practice to attain this level of knowledge and skill in becoming a proficient teacher.

Some believe that content knowledge and teaching strategies may be acquired in a quick, rather straightforward manner by beginning teachers. However, preservice teachers often lack exposure to students, making it a challenge for them to understand how content and pedagogy connect to student learning. Placement in schools, with the aid of an experienced cooperating teacher, can work to address this problem in part. Still, scaffolded examinations of student thinking can be advantageous as preservice teachers make sense of their emerging practice. Lesson study can serve to focus teachers' attention on the critical work of student learning (Fernandez, 2005).

Theoretical Framework

Lesson Study

Lesson study is a professional development tool that originated in Japan. Since the 1990s, it has spread rapidly in the United States (Fernandez, 2005; Lewis, Perry, & Murata, 2006; Lewis & Tsuchida, 1998). Some key features of lesson study serve to transform teachers' knowledge (Fernandez, 2005): lesson study enables teachers to work collaboratively in the lesson planning cycle (assess, plan, teach, reflect); and it provides contexts to demonstrate reform mathematics teaching in the classroom by helping teachers see the lesson through the eyes of the students. Participation in this form of professional development has the potential to transform teacher beliefs and knowledge.

Teacher Knowledge

Three types of teacher knowledge were formalized by Shulman (1987) and others (Grossman, 1990; Hill, Schilling, & Ball, 2004) that need to be transformed in order to support teacher learning: (1) content knowledge, (2) pedagogical knowledge, and (3) pedagogical content knowledge. In other words, teacher educators need to provide opportunities for teachers to: (a) deepen their understanding of mathematics content, (b) build a repertoire of effective teaching strategies, and (c) connect emerging knowledge of content and teaching strategies to reconceptualize how students can best think about and learn mathematics.

In lesson study, teachers are supported to go beyond a simple comprehension of the mathematics content (e.g., procedural understanding) and gain a stronger conceptual grasp of the material they teach.
Lesson study provides the impetus for teachers to examine current research findings on student learning, pre-assess their students based on these findings, and plan an effective lesson, broadening their existing ideas of effective teaching strategies. Through this process, lesson study continuously focuses teachers' attention toward students' thinking on certain mathematics topics, highlighting effective mathematics teaching with a conceptual focus.

Using the three types of knowledge conceptualized by prior research as a framework, this report describes how three cohorts of preservice elementary teachers experienced lesson study in their mathematics methods courses, and how these experiences facilitated their knowledge development and transformation. In particular, a case study of one group is used to highlight teachers' development of knowledge specifically related to student thinking. This study aims to answer the following research questions:

- *How does lesson study facilitate the development and transformation of content knowledge, pedagogical knowledge, and pedagogical content knowledge of preservice teachers?* How does one lesson study group come to understand student learning and use that understanding for planning and teaching?
- *What characteristics of lesson study are integral to the knowledge development process?*

**Methods**

Three cohorts of elementary preservice teachers in their respective mathematics methods courses at a major research institution in the western United States participated in the study. All teacher education students engaged in the lesson study process which was central to one quarter's course(s). In order to identify if and how teachers' content knowledge, pedagogical knowledge, and pedagogical content knowledge were changed, and how lesson study played a role in this change, a combination of both a quantitative and qualitative research design was used.

For quantitative data, all three cohorts of elementary preservice teachers took a pre- and post-survey (Hill et al., 2004) at the start and end of the teacher education program. This survey was developed by the Study of Instructional Improvement (SII)/Learning Mathematics for Teaching/Consortium for Policy Research in Education (CPRE) at the University of Michigan and primarily assesses preservice teachers' pedagogical content knowledge and content knowledge. All questions from these pre- and post-surveys were coded as corresponding to the types of teacher knowledge. This enabled analysis of each knowledge on a separate basis. The groups' overall scores were also used to determine the teachers’ learning in the courses. Furthermore, cohort three teachers took a short pre- and post-survey specifically focused on geometry, as their lesson study content topic was geometry. The purpose of the surveys was to determine whether there was a relationship between participation in lesson study around geometry and teachers' content knowledge of geometry.

Qualitative methods, including unstructured interviews and classroom observation of the lesson study groups' planning processes and final lessons, were utilized to understand the complex learning shift. Teachers wrote open-ended reflections immediately after their lesson study experience as well as at the end of the program. Data were collected in the form of reflection papers of all the teachers. Teacher reflection data were first coded and analyzed for the types of knowledge that teachers formalized through the lesson study process as a whole. Percentages were calculated to determine which codes were referenced most often. Then, characteristics of lesson study were identified and linked to the teacher learning.

**Results**

The pre- and post-survey results show overall increases across the knowledge types and across all cohorts (see Table 1 for a summary of the results).
Lesson Study: Measuring Growth in Teacher Knowledge
Bindu Pothen, Aki Murata, Stanford University

<table>
<thead>
<tr>
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<tr>
<td>Overall</td>
<td>Content Knowledge</td>
<td>Pedagogical Content Knowledge</td>
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<tr>
<td>Pre-Survey</td>
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<td>69%</td>
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<tr>
<td>Post-Survey</td>
<td>78%</td>
<td>78%</td>
</tr>
<tr>
<td>Gain</td>
<td>6%</td>
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Table 1. Percentage of correct answers on pre- and post-surveys

While it is important to note the increase in overall scores for all cohorts, it is also notable how both the content knowledge and the pedagogical content knowledge scores increased.

A close look at the change in geometry content knowledge for Cohort 3 shows that the group improved by 7%, growing from 74% to 81%. Due to the small sample size for Cohort 3, however, our confidence level is not very high indicating that these results are not statistically significant. Still, eight out of eleven preservice teachers did improve in their geometry content knowledge.

Case Study of Lesson Study Group

Fernandez (2005) defines pedagogical content knowledge:

Such knowledge entails understanding how students think about specific content, in particular the difficulties it presents to them, and being familiar with productive strategies that can be used in the classroom to further develop students' thinking and help them overcome their difficulties (Fernandez, 2005, p.2).

Our research shows that lesson study focused teachers' attention on development of their pedagogical content knowledge. As expected, the preservice teachers entered and exited the program with a range of levels of understanding in this area. Most teachers related their increased awareness of the importance of closely paying attention to student thinking. In order to showcase preservice teachers' learning, we share specific findings of one lesson study group's learning process. The group consisted of three teachers, Shelley, Karen, and Victor, from the 2007-2008 cohort (cohort 3).

Research Lessons

The teachers spent several weeks in planning a research lesson related to helping students understand the properties of various three-dimensional shapes. The lesson objective was to help develop students' spatial sense by constructing three-dimensional shapes from two dimensions, and by deconstructing three-dimensional shapes into two dimensions. The group members also indicated a desire for students to develop relevant mathematical vocabulary through the process. Shelley, Karen, and Victor agreed that to bring about this type of understanding in students, they would need to craft a hands-on, exploratory activity.

During the main research lesson, Victor briefly modeled the activity that the students would engage in (sorting various shapes into the categories 'triangle' and 'not triangle'). He then gave students the opportunity to explore and sort many types of three-dimensional shapes in a group setting, with a handout as a scaffold. Essentially, the students were asked to sort the shapes into similar groups based on their properties. At the end of the lesson, Victor led a whole-class discussion on the learnings that resulted from the activity, and solicited input from students on what they hoped to learn for the rest of the unit. The purpose of the whole-class discussion was to make the properties more clear, while also modeling use of mathematical vocabulary.
Lesson Study: Measuring Growth in Teacher Knowledge
Bindu Pothen, Aki Murata, Stanford University

Learning Through Assessment
The lesson study groups were asked to design a pre-assessment to administer to a sample of their students. After students had a chance to work on the problems, Shelley, Victor, and Karen asked students to describe their thinking and process on each of them. The preservice teachers assessed how students were able to think about and manipulate shapes in their minds. Most of the problems given to students focused on determining students' spatial visualization skills. For example, one problem showed a shape and its mirror image, and asked students if these were the same shape. A majority of students had this understanding. In another problem, students were given a three-dimensional object that they could examine and physically manipulate. They were asked to circle the two-dimensional shapes that came together to form this three-dimensional shape. On this problem, students scored overwhelmingly poorly.

After giving the assessment, the preservice teachers came together and discussed their findings. They deliberately used the data to build a lesson based on students' emerging understanding. What was most powerful about these preservice teachers’ thinking around student assessment was that it was a valuable exercise that revealed the importance of uncovering the student thinking behind a problem, rather than merely calculating the students' scores. Teachers were stretched to think about why various problems were most difficult for students.

Victor wrote, “Rather than thinking of student misunderstanding as them getting it wrong, now I think of this as learning opportunities. When a student says something that is incorrect, rather than quickly fixing their errors and getting them on the 'right track,' my focus now is to understand how my students understand the material. After giving them a chance to demonstrate their understanding, then I would give them an opportunity to test their concepts to see if it works. In teaching math this way, students are able to organically come to their own understanding of material.”

Karen corroborated Victor's sentiment: “I am so much more critical of the mistakes that students make, and use that as a way to pinpoint where I need to be more explicit as well as exactly where and how I can help my students understand the material. I am not afraid to ask students to explain further things that they say in response to questions that I ask during a lesson. There might be something there that will really help others in the class, and who am I to dismiss something a student says because I don’t know what they are initially saying.”

She also directly credited lesson study in her increased learning on the use of assessment. “This past lesson study unit was such a wonderful thing to be a part of in helping me think about math lessons and use direct evidence from students as to how to better a lesson.”

Learning Through Group Planning
The group planning process in lesson study seemed to affect the preservice teachers' ideas about teaching in different ways. For example, Shelley mentioned the positive experience of working with a group in planning exploratory lessons. She stated, “We wanted to give our students plenty of opportunities to explore materials, so that they could discover the properties of cubes on their own. It was a good experience for us to try to plan lessons that would be effective for the students in each of our classrooms. We ended up making our lessons very hands-on and experience-based, which is something that we thought would work for all of our students. The more I think about these lessons that we made, and how they worked out in our classrooms, the more I appreciate the lessons in which students learn through experiences.” Clearly, the sum is greater than its parts and teachers were able to develop a better lesson through group think. Also, as indicated by Shelley’s comment above, future ideas of teaching in their own classrooms were influenced by participation in the group planning process.

Learning Through Teaching and Observing
Shelley also noted the way in which observing her colleagues aided her in making changes: “The
Lesson Study: Measuring Growth in Teacher Knowledge
Bindu Pothen, Aki Murata, Stanford University

lessons themselves were a good learning experience. I got to see Karen and Victor teach their first lessons before I taught mine, so I got to modify our lesson plans for what seemed to work, and also what I imagined would work with my students. I realized that worksheets need to be very clear and explicit, and it’s always a good idea to model exactly what you want the students to do to get them started.” Pedagogical strategies were obtained through observation of other teachers.

Specifically in relation to preservice teachers' growth in student thinking, lesson study seemed to play a major role. In engaging in lesson study, preservice teachers were encouraged to teach exploratory lessons. All three of the case study teachers noted that the discovery aspect of their collaboratively-planned lessons was critical in maintaining student interest. However, some also noted that while the students enjoyed this style of teaching, they were not accustomed to it. The students struggled somewhat in coming up with their own solution methods, as they were used to being given a step-by-step solution process.

Despite the challenges we expect preservice teachers to face in implementing reform methods, the scores on the pre- and post-survey items on student thinking grew over time for all cohorts. See the figures in Appendix A for the mean score increases, along with the standard deviations.

Learning Through Debrief and Reflection

Victor discussed the benefits from being observed and engaging in a debrief session after the formal lesson, “During my research lesson, my colleagues were able to collect data as I was teaching. I found this beneficial because as a teacher, my mind was narrowly focused on lessons and management of materials and students. Conversely, my colleagues were able to focus almost entirely on student learning. My colleagues thus offered me a different perspective on what was happening in the classroom.”

Many preservice teachers also left the lesson study experience with more skill in how to address gaps in student thinking. Certainly the lesson study experience has propelled preservice teachers in the right direction. With more classroom experience, they will become adept at dealing with all students.

Shelley wrote, “While it is difficult to have a curriculum that allows for students who are at different levels in math, it is possible. In my...lessons, I got to use whole-class instruction, but the lessons allowed for students to work individually or in small groups. Lessons that are based on explorations, and what students notice about what they are exploring, can get students at all levels engaged. At the end, students think about and then share out something that they noticed, and this can be anything. I think that if my class goes into a unit with one or two main, guiding questions that all students should be able to think about and explore, then the unit will be successful for all students. For the more advanced students, though, it is important to be thinking of questions to ask them that will advance their thinking. And it is important to think of these questions beforehand”

All three teachers watched video of their own teaching of the lessons. This reflection process further enhanced teacher learning. Victor noted, “We asked our students to work in groups. What I realized [was] that most of these students although ostensibly working together were not engaging in group-work in a way that was most beneficial. In looking at video and observations, it became apparent to me that students need to have solid expectations for how they should be expected to work in groups.”

Discussion

The study suggests that lesson study has the capacity to influence preservice teachers' beliefs and transform their knowledge which is crucial for effective teaching. At the very least, lesson study pushes preservice teachers to examine their existing mathematics content knowledge, pedagogical knowledge, and pedagogical content knowledge. The lesson study experience forces teachers to examine critical elements of teaching in an authentic way – through the lesson planning-teaching-reflecting cycle.

What is specific to lesson study that allows this type of learning to occur? First, the opportunity to
Lesson Study: Measuring Growth in Teacher Knowledge  
Bindu Pothen, Aki Murata, Stanford University

Experience the coherent lesson planning cycle is critical. Preservice teachers seldom have the chance to engage in the entire cycle in their own classrooms. Second, the lesson debrief with colleagues and experts enables teachers to gain assistance in interpreting student thinking. We cannot expect teachers to have mastered this skill upon entering the classroom. Rather, they need scaffolded learning opportunities such as those provided by lesson study. Third, because lesson study is based on collaboration with colleagues, multiple voices can contribute to the creation of the best learning environment for students. Preservice teachers identified how helpful it was to experience each other’s teaching process (by observing and debriefing) to make sense of their own teaching. Finally, lesson study places the student at the center of the professional development, rather than the teacher. This allows for a judgment-free experience, encouraging teachers to speak freely and openly about questions and issues that are central to their advancement as professionals.

References


Appendix A - Distribution of Three Cohorts’ Pre- and Post-Survey Results

Cohort 1 (2005 – 2006)

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<tr>
<th>Group</th>
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<th>Std Dev</th>
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t-test: 95.8% confidence

Figure 1. Distribution of Cohort 1 pre- and post-survey results

Cohort 2 (2006 – 2007)

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<tr>
<td>Cohort 2 Post</td>
<td>84.8</td>
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</table>

t-test: 99.3% confidence

Figure 2. Distribution of Cohort 2 pre- and post-survey results
Lesson Study: Measuring Growth in Teacher Knowledge
Bindu Pothen, Aki Murata, Stanford University

Cohort 3 (2007 – 2008)

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<tr>
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<td>Cohort 3 Pre</td>
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<tr>
<td>Cohort 3 Post</td>
<td>75.8</td>
<td>9.1</td>
</tr>
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</table>

t-test: 91.8% confidence

Figure 3. Distribution of Cohort 3 pre- and post-survey results
Lesson Study: Lessons Learned

Presenters: Daniel Willis, Loras College, Dubuque, Iowa

Email: Daniel.Willis@loras.edu

The speaker is co-director of a professional development project for elementary school teachers in eastern Iowa. The project, funded by a Title II (MSP) grant, is centered on mathematics content, problem-based instruction, and Japanese-style lesson study. The speaker will survey the lessons learned by the project directors since the project began in 2002.
Lesson Study: Lessons Learned
Daniel Willis, Loras College, Dubuque, Iowa

Overview of Talk

- Project Background
- Lessons Learned: Lesson Study
- Lessons Learned: Problem-Based Instruction
- Lessons Learned: Curricula & Textbooks
- Issues / Questions

Project Background

Our first 10,000 mistakes ...
Lesson Study: Lesson Learned
Daniel Willis, Loras College, Dubuque, Iowa

Loras College
- Catholic Liberal Arts College
- 1700 students
- Eastern Iowa
- Mississippi River

Iowa’s “Every Student Counts”
- NCTM Standards-Based Curricula
- Teaching for Understanding
- Problem-Based Instructional Tasks
- Distributed Practice

Loras College Lesson Study Project
- Focus: K-6 Mathematics (since 2002)
- 49 teachers in 12 school districts
- Current funding: Title II (MSP) grant (3 years) at $150,000 / year
- Matching funding: Loras College, Area Education Agencies, school districts

Current Project: Typical Year
- Summer workshops: Content & Lesson Study
  - Week 1 (June)
  - Week 2 (August)
**Lesson Study: Lesson Learned**
Daniel Willis, Loras College, Dubuque, Iowa

---

**Current Project: Typical Year**

- **School Year Activities**
  - Lesson Study process in school
  - Full group meetings
  - ICNs / speakers
  - Optional Math content class
  - Public research lessons
  - Dissemination
  - Area Leaders

---

**Lesson Study Fairs**
May 2003 & May 2004

- Introductory talks
- Poster sessions
- Public research lessons & discussions

---

**Lessons Learned:**
Lesson Study

*Isolation is the enemy of improvement...*
...while other countries are continually improving their teaching approaches, the United States has no system for improving. The United States is always reforming but not always improving...

Stigler & Hiebert, *The Teaching Gap*

---

**NSDC Professional Development Standards**

- Collaborative
- Sustained over Time
- Data Driven
- Carefully Designed
- Quality Teaching

---

**Japanese-Style Lesson Study**

- School based
- Collaborative
- Sustained over time
- Focus on learning
- Data driven
- Action research

---

**Things We Have Learned About Organization**

- Shared Leadership
- Start Small
- Recruiting
- Math vs. Reading
- Effort vs. Ability
- Math Initiatives
- Logo; T-shirts
Lesson Study: Lesson Learned
Daniel Willis, Loras College, Dubuque, Iowa

Things We Have Learned About Research Lessons

- Process goals
- Blackboard
- Note-taking
- Interruptions
- Lesson Plans
- Teachable moments

Assessment / Accountability

- Assessing Teachers:
  - Michigan (LMT) test
  - Teacher Implementation Survey
  - Meeting Minutes
  - Lesson Plans
  - Reports

Assessment / Accountability

- Assessing Student Achievement:
  - ITBS
  - Problem Solving Probes
  - Behavior Rating Scales

Promising ITBS Data

From a Title I school in downtown Dubuque with 82% free and reduced lunch. Almost all teachers in the building have worked with us at one time or another.
Lesson Study: Lesson Learned
Daniel Willis, Loras College, Dubuque, Iowa

Michigan (LMT) Test
• Liping Ma:
  – Elementary School Math
  – Compares US and China
  – Teacher Knowledge
  – Professional Development

Michigan Test Results
Year 1: Number & Operations

<table>
<thead>
<tr>
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Year 2: Geometry & Measurement

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<th>Content Class</th>
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<tbody>
<tr>
<td>Pre-test</td>
<td>z = -.1</td>
<td>z = +.6</td>
</tr>
<tr>
<td>Post-test</td>
<td>z = +.3</td>
<td>z = +1.8</td>
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Assessing Teachers:
Meeting Minutes

Amount of time spent:
• Planning a lesson
• Looking at curriculum
• Reflecting on the lesson
• Organizational details
Anonymous Feedback from Teachers

• This was so eye-opening
• It has been a great experience
• It has been wonderful
• Well worth the effort it took

Lessons Learned: Problem-Based Instruction

Problem-Based Instructional Task

• Introduction
• Launch
• Explore
• Discuss (Lifting)
• Extensions

Learning Through Problem Solving: Issues (Takahashi et al)

• Problem vs. Exercise
• Problem vs. Task
• New tool vs. New concept
• Neriage/Lifting vs. Show & Tell
• One solution vs. Multiple solutions
• One representation vs. Multiple representations

Lesson Study: Lesson Learned
Daniel Willis, Loras College, Dubuque, Iowa
Lesson Study: Lesson Learned
Daniel Willis, Loras College, Dubuque, Iowa

Learning Through Problem Solving: Issues (Takahashi et al)
• Application vs. Focus on Math
• Worthwhile problems vs. Engaging problems
• Wordy vs. Simple
• Helping problems vs. Learning from problems
• End of chapter vs. Helping a lot
• Help individuals vs. Neriage/Lifting

Math Wars: Recent Developments
• Liping Ma
• CBMS MET
• PMET
• Adding It Up
• Common Ground
• Focal Points
• Lesson Study

Lessons Learned: Curricula & Textbooks

Things We Have Learned About Textbooks & Curricula
• Curriculum Standards
• Focused & Coherent Curriculum
• Teaching to Mastery
• Standard Algorithms
• Technology
• Representations (e.g., Drawings)
Issues / Questions

- Fidelity of Implementation
- Knowledgeable Other
- Geographical Issues
- Math Content
- Sustainability

Lesson Study: New Frontiers

- Other Subject Areas
- Other Grade Levels
- Higher Education

Project Web Site

http://myweb.loras.edu/lessonstudy

- More Information
- Resources
- Links
- Talks