1. **In your opinion, what is the seminal literature about teachers' learning and knowledge that should inform our lesson study research?**

1. D Ball

2. Formative assess literature from Gillingham Project - Dylan William, Shirley Clarke.

3. You have attended to the key sources already.

4. There is a state initiative in Illinois, the Standards-Aligned Classroom, that uses the lesson study format. It focuses on how teachers use formative assessments in the classroom to collect data on student learning, thereby increasing teacher assessment literacy and alignment between standards and instruction. I am doing my dissertation on this initiative and can provide contacts and more information if you are interested.

6. Too new to the field to know.

7. Ball - Teacher content knowledge (you obviously make heavy use already)

9. Linda Darling-Hammond's work. Teacher as researcher body of literature. Fuller - I would also think that understanding teacher's concerns depending on their level of development would inform teachers' work/focus in teacher lesson study groups (that are of a mixed levels of experience/development).

11. Research on professional development (NSDC) related to student achievement. Research on collaboration.

13. It suggests the necessity to consider teachers' content knowledge so that lesson study connects what they know and what they should know.

17. In elementary math, the work of Deborah Ball.

18. Shulman 1986, 1987. Recent work of Ball & Bass in math. Perhaps recent work of Schoenfeld on interplay among knowledge, beliefs, and goals.

19. Sociocultural approaches - activity systems, learning being mediated by language and other tools. Work on "conversation as professional development" such as Clark (2001). Tharp & Gallimore - Instructional conversations.

20. Teacher understanding of content and pedagogy - where are the gaps and how can lesson study fill those gaps in content/pedagogy?

21. I think we should take into account that teachers' learning is both individual and social. We also have goals in mind for teacher learning and knowledge, and

according to the literature, teachers are both agents and objects of change. How do we reconcile the two? Deborah Ball's work seems clearly related.

23. Cochran-Smith and Lytle - Knowledge in/of/for practice. Judith Little.

24. Liping Ma. Paul Goldenburg, Plus (of course) many of the sources you cite.

25. Work by Deborah Ball and Hyman Bass.

2. To what extent does our model represent your understanding of how teachers learn during lesson study? What revisions would you suggest?

1. All the models demonstrate change through a process and change taking place through collaboration.

2. In a way, the model from Ball's work complicated my understanding. Maybe some of Tufte's graphic representations would be helpful.

4. Need great emphasis/explanation on increasing teachers' use of appropriate, valid and reliable formative classroom assessments.

6. I see no change built into the diagram, no sense of before/after or development. This seems to be an interaction diagram showing opportunities for change, but not the change itself.

7. Is "the model" the complex graphic on p3 of the handout? Is 1) (teacher's own classroom contexts) embedded in 2), that is, is it the research lesson? Or is 1) past experience, or what?

8. I wonder if one could measure attitudinal change on the part of the teachers - Are there support structures for teachers to continue in using this approach.

9. Is the learning all context specific or is there any patterns/themes of teacher learning that are generalizable across research cases?

10. How does it differ from simply reflective teaching? I would like to hear more about interaction between teachers.

11. Totally - NSDC standards. Peruse research on adult learning.

13. This is what I think should happen during lesson study as a process for teacher professional development. I would like to see that in the model there is an expert, who is competent in interpreting math concepts (such as math professor).

14. The process nicely parallels the interaction between planning, instruction and assessment and captures the idea of using student assessment/evaluation data to improve instruction.

15. Good - Needs many longer longitudinal video cases and in class follow up of the teacher.

17. Handout shows changed stance (belief) of teachers about the possibility of teaching a concept.

19. Very well. I am new to lesson study but I'm very familiar with collaborative inquiry groups.

20. Your model is a good representation.

21. Excellent beginning model. The only suggestion I have is some way to indicate the influence of teacher's prior instructional or school organizational history. Pos (?) norms already established which may help or hinder lesson study. Very similar to the experience at our school.

23. Yes - I really appreciate the recursive, cyclical nature of your model. However, I'm not clear why/how teachers develop a "shared understanding" that Rebecca talked about - is it really "shared" if the teachers just discussed/argue about it?
Revisions: label #4 about state/district context isn't clear - does it indicate the largest circle? Maybe moving it would help.

24. I am still learning about lesson study, so my comments are just thoughts based on some prior experience. But I feel the need to try to spell out what " knowledge for teaching" involves. Some first thoughts below:
Knowledge of math as technique, process and habits of mind (e.g. the habit of examining strategies).
Knowledge of students (also many dimensions)
Knowledge of context
Knowledge of self as learning and thus as teacher.

We have presented three examples: <u>Example 1</u> – 3rd grade teachers studying problem solving; <u>Example 2</u> – A group of K teachers studying addition and subtraction; <u>Example 3</u> – A group of multi-grade teachers studying patterns. For one or more of these examples, please consider the following questions. (Please identify the example(s) you are commenting on.)

3. **How convincing was the evidence of teachers' learning? What is most problematic?**

1. The evidence is very convincing. Example 2 showed an attitude change as a result of teacher making sense of a confusing standard.

Example 3 was a great example of specific understanding of a concept acquired through a learner's success at manipulating and processing new knowledge.

2. In each case the "evidence" is tantalizingly close. I believe that it may be present in a combination of the script and some quantifiable information. I'd need to re read the material more closely.

3. I like the tracing of discussions (Example 1) and the video depictions. There are items that you have access to that would provide evidence of student outcomes that are linked to the lessons that teachers develop in lesson study. It is key that you consider this question as well in the current educational climate.

6. Example 1) too much verbal info in presentation, hard to recall the quality of quotes. Not enough info about changes in practice (that I recall, see above)
Example 3) I love the video evidence here. More than words, the gestures are an additional valid language to analyze. Problem of not knowing how teachers acted in class afterward, claims based on self-reported data always worry me. Too short for goal of question.
Example 2) Broad brushstrokes, hard to evaluate in such a short time.

7. Video evidence of teachers struggling with content and changing their process. When I see the details of their conversation I am confident of what's happening. Problematic because N=1 or 2 or 5 or whatever.... Making systemic claims is a challenge. But if I am not convinced in individual cases large N doesn't do any good.

8. It was a little hard to figure out the time scale - how fast these changes in the teachers were occurring in some instances. For instance - it seemed that in some examples - teachers were discussing interactions in the classroom - revision - back to classroom - etc. Are there different goals for lesson study that depend on time constraints. It would also be nice to see some finished products by the teachers.

10. It's hard for me to say, not seeing the transition.

11. Convincing - but did they all participate and get the same kind of learning from the discussion?

12. I'm concerned about the notion of "shared understanding". How much of this knowledge can be considered to "reside" within individual teachers and how much is knowledge which can only be considered to belong to the group as a whole? What does this mean for the practice of individual teachers? By focusing on situated data - discourse in the context of the practice itself - I wonder what is lost about what individual teachers take away from the practice.

13. The 3rd example is convincing in terms of teacher content knowledge development. The 1st example: more about P.C.K. The 2nd example: P.C.K. and teacher's belief and understanding of children.

14. Quite convincing... but what we need (hopefully this will be an outcome of lesson study) is evidence of student learning. It's easy for me to believe that teacher learning will positively impact student learning, but it will be important to provide evidence.

15. Not. Not enough detail. The problem is not represented quite well enough. Points of partial solutions not shown. Conclusion, summaries etc. missing in video.

16. In example 3 there was confusion about an equation in the case n+2 as an abstract symbolic representation of the concrete pattern. I am not convinced that the short video is enough evidence in demonstrating their development of this mathematical understanding. I do think lesson study helps teachers develop their knowledge. I think their reflections strengthen the video as evidence.

17. Video tape of initial teacher showing her new understanding. Problematic: showing how that new learning translates into helping students.

18. Example #3 - convinced about learning to facilitate the discussion, not convinced that the teachers understood the confusion of the 1 teacher. (re: +2 vs. +1), nor that she resolved the issue for herself (in part, I think this is due to there being a different interpretation for +2: # students = # desks +2, whereas she was asking why you didn't +2 more seats when you add another desk. I think she recognized that you lose one edge of the new desk but didn't see that you also lose 1 edge of a desk already there).

19. for Example 3: I was convinced that the teachers were learning about their process - e.g., that they needed a "more aggressive" facilitator - so they discussed it and agreed upon it. Also they reflected that the previous day they'd run into trouble when they didn't check to make sure everyone agreed - so they stopped and checked in.

20. The video from example 3 seemed more convincing because we could witness the conversation.

21. Learning equals change of some sort and the examples provided solid evidence in this area. It also seems to increase teaching sense of efficacy. Problematic: What are the connections to daily, ongoing long term practice?

22. RP - yes teaching learning by working on problem and having a chance to observe students in action. Very much – teachers' dialogue proved the changes in the way they first thought students would think or react.

23. Report of teacher reaction to standards (from "impossible" to "possible if set up right") changing over times does seem like evidence of teacher learning. Quotes from videotape of teachers conversations (especially with dates and researchers notes) can

also indicate evidence but it would have been more convincing if you had shown us the teachers who at first didn't get the "+2" concept later successfully explaining and/or teaching that concept to her students. One problem I see in the claim that teachers' beliefs about what students were capable of was changed by their witnessing students actually doing it. How does this help us understand cause of the students' ability and/ or of the teachers' beliefs? Wouldn't the teachers have to suspend or change their initial beliefs before the students could ever try the new task and succeed at it?

24. Fairly convincing - but how can we be sure this learning will over to other problems?

25. Problem solving - very convincing. Teachers seemed to learn more about the problem solving process and what they might focus on - understanding, development of strategies - in the future. Now need to know how this understanding is used in future lessons.

4. What additional types of evidence would convince you that teachers are learning through lesson study?

1. Observation of debriefing sessions is a powerful experience of watching teachers work through the lesson study process and move to new understandings. Teacher journals, portfolio of student work could link lesson study to learning.

2. I'd wonder about the long term shifts in thinking. The Private Universe tapes that show regression toward prior knowledge made me wonder about if this evidence shows learning.

4. As mentioned in the handout, the most convincing evidence will be an increase in student learning.

5. See the changes in their lessons after they have revised them. What are the long term changes in their teaching? What strategies did the teachers use for the lessons?

6. Using newly acquired (pedagogical, content, group interaction) ideas in a setting, or convincingly leading others to use the ideas. Some baseline data about pre-lesson study knowledge (pedagogical but mostly content) compared to use of newly learned ideas in classroom or teacher discussions.

7. Learning - I'm thinking mainly about content.
Showing how few can answer content questions correctly on the first try.
Showing teacher actually coming to understand particular content issues - the first video clips in example 3 ended before the teachers "got it". (although it showed her having gotten it later).

8. I am not sure if it is possible to provide more detail on where teachers start and where they end up after lesson study.
Maybe it is also possible to look at long term effects - do teachers keep on using this approach in their teaching.

9. Increased student achievement - measures of student learning. Teacher learning must result in improved student learning outcomes if it is to be powerful and worth the effort/time of lesson study.

10. How has their practice changed? How does their "new" knowledge react to new situations?

11. It has to be connected to achievement- use research done up to this point on the relationship between professional development and student achievement.

12. Interviews with individual teachers. (it might be useful to include examination of student work).. Changes in teachers' classroom assessment practices - is there transfer to other areas of mathematics?

13. How do teachers identify students problem or misconception of content?

14. What is the application of lesson study outside the domain of mathematics?

15. Longer video clips - structured toward the demonstration - or using a teacher reflections to guide our view of the video clips.

16. Their reflections aligned to their initial understanding and how lesson study provided an opportunity to continue developing their understanding.

17. Discussions of student work products.

18. It's less about types of evidence than amount (which I assume was limited only because of the nature of an AERA session).

19. Seeing changes in their actual teaching practice (I arrived late, so I may have missed an examples of this). Seeing them get better at making their own thinking visible while problem solving.

20. Is there any measure of learning gains for teachers - students - on both?

21. Connections to school improvement goads. Collection of classroom evidence over time.

22. The changes they made in the lesson.

24. 1) More of the same. I am sure there is a record of development over time in these tapes. *2) I would like to hear them (or read their journals?) talking about mathematics. 3) I would like to hear (or read) them discussing their learning of math.

25. The only learning that is valuable is that which produces increased student learning. Therefore, evidence that this type of professional development leads to student learning with greater gains then other types of professional development would be useful.

5. What are the strengths and shortcomings of the methods presented? What other research activities should be considered?

2. This form is a strength of your method. What a good way to capitalize on the participants knowledge and understanding - sort of a connecting thinking experience that shows the recursive process Dr. Perry talked about.

3. Example 3 - which evidence are well suited to what sort of arguments. For instance learning and developing norms for collegial interaction is important, but it seems to be foundational to the other 2 goals of knowledge for teaching and knowledge into practice.

5. Strengths - time for reflection. Shortcomings - given our structure of school day - time to accomplish it.
a) Does it transfer to other areas of the curriculum?
b) Long term changes in their teaching?
c) How does it effect student learning? Maybe this is in your research, but did not hear about it in your examples.

6. Too little info shown to answer this, I'm sure there's much more going on! I love detailed video analysis, evidence from classes would be phenomenal as well.

7. Video is a tremendous strength. That's as close as we get to being there; we are most enabled to form opinions ourselves so when your conclusions resonate with my observations it's very powerful.

9.Strengths - evidence captures teacher experience
Weaknesses - does not show how the student experience was impacted by the teacher learning through lesson study.

10. Maybe the categories are a bit too general. What if there are some specific questions - List the areas in which your teaching improved based on your work with lesson study.

11. Strengths - we observed - really understanding what they are going to teach. Follow NSDC standards for effective staff development.

Shortcomings - Long - lots of work for one lesson. How do you build interest and motivation over time?
Considerations - Need training. Trust - getting teachers to do it. Facilitation skills. Content knowledge.

12. I'm a little unclear about the methods used - analysis of transcripts? Presentations #2 and 3 seems to be quoting from lesson study practice - "before and after" - to show learning. Presentation #1 seemed to assume that learning occurs in an iterative process. This seems a shaky proposition.

14. Strengths - it seems like such an authentic natural activity of teachers.
Shortcomings - time, labor intensive (as in any high quality work).
What is the likelihood that teachers, once they have participated in lesson study research, will continue these types of professional interactions on their own? How might such on-going activity be supported? How does participation in lesson study impact teaching efficacy? To what degree does it improve teacher retention? How can the elements of lesson study be paralleled in pre-professional training?

15. Few. But to convince others, the others need differing materials. E.g. policy makers need different clips plus some cross case outcomes. Teachers need detailed examples of successful solutions - more than of problem solving.

17. Strengths - teacher focus, results of students shown. Shortcoming - not larger scale, teacher selection of student interviewees.

19. I'm afraid I missed too much of the session to offer a critique on this.

20. We've just begun to explore this at Boise State. Local teachers have just begun to use lesson study. Measuring impact is extremely difficult. Right now your methods are light-years ahead of ours.

21. By its very nature, lesson study concentrates on limited topics. Again, connections to large schools improvement projects could be helpful. Many strengths. Research on curricular materials (Ball).

22. None - but I'm not a researcher - I am teacher.

23. In the visual model on page 3 of your handout, I don't see the "motivation/ efficacy" factor you spoke of. I believe there's also a need to investigate teachers' preferences/competencies re: collaboration (Virginia Richardson's 2003 article brings up important points about U.S. professional/social norms for teachers).

24. There is a great deal of strength here, especially the emphasis on what the teachers are learning. Can one get a handle on what happens in schools after lesson study? - observe/video teachers, - anecdotal records, etc., - study of school culture.

6. Does the evidence fit the model? What changes to the model are suggested by the evidence?

1. Yes it fits

2. Yes - revisiting after time.

3. The evidence of "knowledge into practice" may be quite limited since teachers are developing and using single lessons. Developing ways to document how the knowledge from the research lesson is used in other lessons over the course of the year would be more powerful evidence. This may be a mismatch of the grain size of lesson study and the grain size of the desired result.

5. Appears to.

6. See answer to #2. I have a hard time answering this. There are changes shown, but I know too little about lesson study to comment yet.

9. How does the evidence show 1) teachers own classroom contexts? How can you show teachers' prior knowledge, experience, beliefs, classroom contexts effects the learning outcomes of lesson study?

11. Yes. Need to include training for teachers - teacher skills. Support structure from school/district to do this work.

14. Where are the textbooks and the content experts represented in the model? - Also unclear where outside admin/teacher /facilitator exists in the model.
The model should at least "point to" the ultimate goal of improved p-12 student learning. Teacher knowledge is only valuable if it translates into student learning.

15. Too much to ask. One missing piece is a list of the "pieces" that pass between the circle and the model #1 → #4. There are differing pieces or currencies of exchange.

17. Yes

18. The Teacher x Teacher <---> Student x Student part doesn't make sense to me. It seems to me that if the teachers are students, then they shouldn't appear twice, and perhaps the inner circle is just content <---> Teacher/student x Teacher/student

19. I think more evidence could be collected on how lesson study is affecting teacher's practice in the classroom.

20. It seems to fit fairly well.

21. I think the model is necessarily a work in progress and will be changed as L.S. principles are adapted to local situations.

22. Yes.

23. Adding the dimension of (change over) time would help.

24. I think it does - but could use more acquaintance with the data/evidence.
Thank you for organizing an interesting session that encouraged us to think and share.