

The nature of lesson study in Ontario Schools – a close examination of the lesson study cycle

A paper presented at the annual meeting of the Canadian Society for the Study of Education

May 2009

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This research was funded by the Ontario Ministry of Education. Views expressed in the paper are not necessarily those of the Ministry. This paper has been recently submitted to Springer as a chapter for book publication on Lesson Study.

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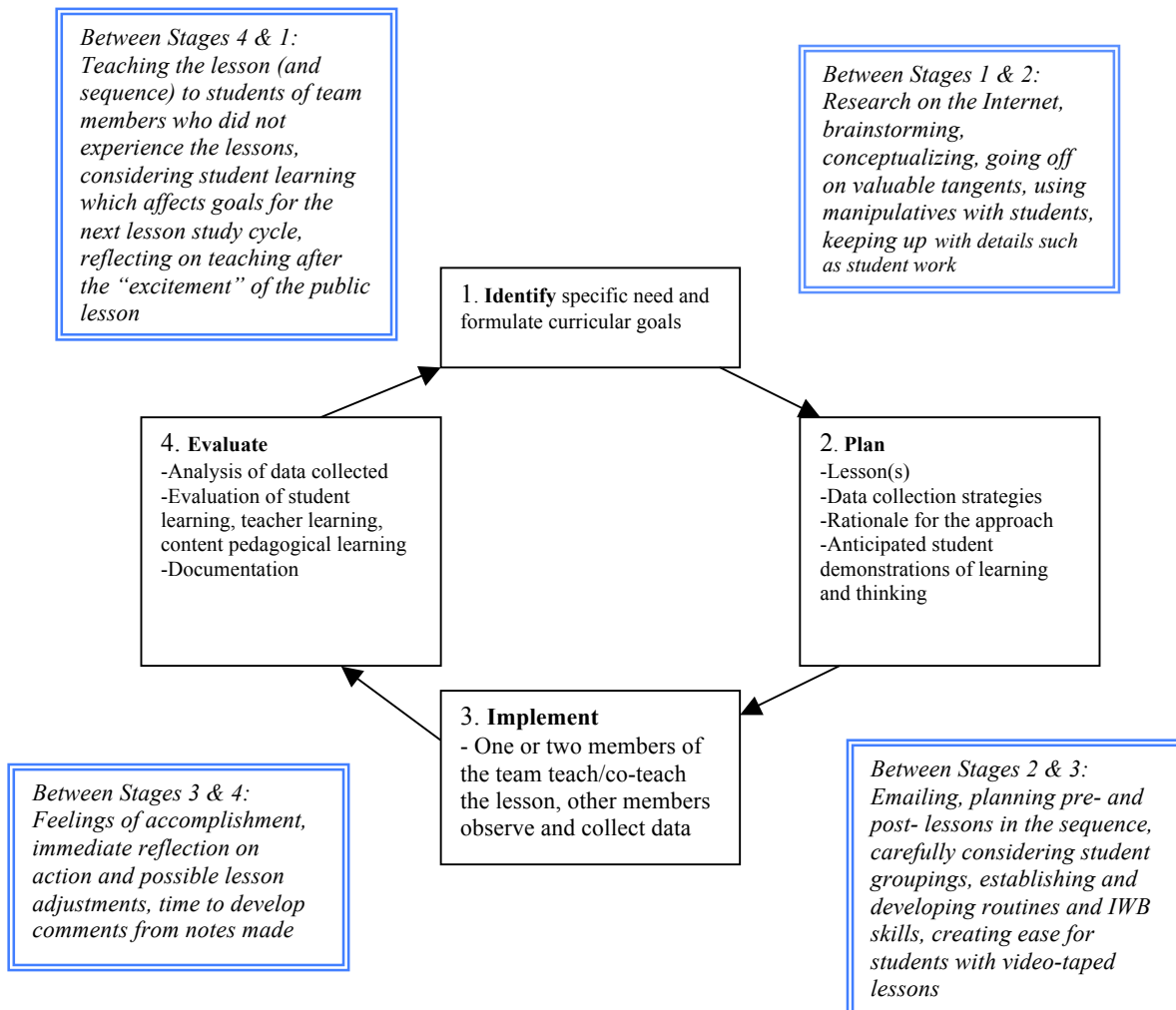
In their seminal 2006 lesson study article, Lewis, Perry & Murata highlighted the four key stages of the Japanese Lesson Study cycle (goal setting, planning, lesson implementation and reflection) and, using excerpts culled from field notes and transcripts, provided evidence of teacher activity at each stage in the cycle. Researchers, such as those in the PME-NA Lesson Study Working Group, and participating teachers have found this model to be critically important in guiding the lesson study process. As lesson study moves into its adolescence in North America, our understanding of the subtleties of each stage is increasing. In this chapter, we explore some of the less documented activity - what we are calling the “backstage work” - identified by mathematics teachers in our Japanese Lesson Study as they moved between and from stage to stage. In our project twelve teachers, who ranged in experience levels from novice to over twenty years, in four Canadian schools engaged in Japanese Lesson Study cycles. Their focus was on the use of interactive whiteboards and manipulatives as supports to student learning in mathematics classes. Three of school sites were secondary schools (one rural and two urban) and the fourth site was an urban elementary school. All schools had predominantly English first language students.

During focus group interviews which occurred on three occasions, researchers asked the twelve mathematics teachers to describe the informal activities that took place between the formal stages of the cycle. Further, in video recorded and transcribed whole group discussions, teachers built a new model illustrating their activities beyond the

explicit four stages of lesson study (see figure 1). This chapter highlights the backstage work of the Lesson Study cycle, contributing to an enhanced, more nuanced understanding of Lesson Study activity. Participant voices are featured in this chapter based on transcripts of the interviews and meetings in order to illustrate the backstage work from the perspective of those deeply engaged in the lesson study process.

In the first formal step of the Japanese Lesson Study cycle, teachers work together to establish curricular goals for their mathematics lesson planning. This goal often stems from data that the teachers have previously gathered. For example, the elementary teacher team in our study used PRIME diagnostic materials (2005) to assess which curricular areas in mathematics students were struggling with the most. In this instance, it was understanding growing patterns. One of the secondary teacher teams decided to select a curricular area that their students had struggled with from year to year and that they determined could be more effectively introduced with attention to lesson design. In this case, the problem identified related to solving linear systems. The second formal stage is to plan the lesson based on the curricular goals. Between goal setting and formal planning, many ‘backstage activities’ occurred.

Figure 1. Revealing the backstage work of the Lesson Study cycle



Between Stages 1 and 2

These mathematics teachers identified four main backstage activities between stage 1 (goal setting) and stage 2 (planning) of the lesson study cycle. These are: 1) searching - researching the internet, data-bases, and teacher resources about the topic in focus; 2) conceptualizing - brainstorming, self talk and informal conversations, exploring valuable tangents; 3) investigating – exploring the use of manipulatives and technological

tools with students to expand the teacher and students' repertoire; and, 4) monitoring - keeping up with details such as on-going student assessment which provided insights into student learning and assisted in the planning of lessons.

Between stages 1 and 2, teachers frequently emailed one another to clarify thinking and to question one another.

I guess we could phrase it as focused homework, in the sense that we would meet together, get so far and say okay, where do we need to be before we meet again? So you do that [email], you do that [make notes], you do that [find a resource], and we'd go away and bring the pieces back together.

Further, teachers began establishing and developing routines with students preparing them for the focus lesson, as well as the use of the interactive whiteboard. This preparation also included familiarizing students with video-taping in the classroom.

We had to spend time developing some routines. When they come into the classroom for this activity, what routine are they going into to make sure that everything flows well? Picking up the laptops, putting them away, warm up...

The preparation also involved teachers determining how to use manipulatives for maximum student learning given their lesson goals:

We also spent time, and actually, once we made the decision about solving the equation lesson, how were we going to use concrete manipulatives and what concrete manipulatives we were going to use? And then we had to play to figure it out.

The teachers explained that this stage of "playing" and "figuring out" was deeply connected to their own understanding of math concepts and how those concepts could be represented and investigated by students: "*When we were at Trent, that whole session on math was just, was just ourselves understanding... getting into the math.*"

Between stages 2 and 3

Teachers identified ongoing backstage activities from the first stages that carried on between stage 2 (planning) and stage 3 (lesson implementation). These included emailing one another with questions and suggestions (one team used Wiki space for this, for example), further experimenting with manipulatives and interactive whiteboard use, and acclimatizing students to video use in the classroom. But in addition to these ongoing activities, the teachers also described the significant amount of time they dedicated to developing lessons that would precede and follow the focus lesson for the public research lesson.

The teachers spent many sessions together planning key lessons leading up to the focus lesson and key lessons that would follow the focus lesson, which in essence became a sequence of lessons over several mathematics classes. Teachers agreed that the planning of the lesson sequences felt slow, almost painfully so, but that it was absolutely necessary:

We did a three-lesson sequence, so... we had to plan for those pre-lessons too, which, actually, we did a lot of planning on those. So that's a huge use of time. But you need it - we really needed that.

The teachers were committed to documenting the full lesson sequence because one of their primary goals was to provide students with multiple opportunities to learn and understand complex mathematical ideas. Teachers included the entire lesson sequence they had developed in the lesson study packages for distribution on the day of the public research lesson. This gave participants significant information about what students had experienced prior to the research public lesson. Also of note is how teachers described their deliberations over optimal student groupings for the specific tasks being

planned: *“We didn't just throw the kids together in groups. We sat and decided which students we should put together to optimize the outcome.”*

Between stages 3 and 4

The research public lesson (stage 3) days were high energy, intensive activities involving all teachers from the lesson study planning activity as well as invited guests and school administration. After the public lesson, teachers agreed that together they experienced a collective of accomplishment: a sense of *“we did it!”* All participating teachers commented on how important it was for each of them to share this sense of accomplishment with their team members after the public lesson.

And there was... a sigh of relief that kind of implies, thank god it's over, but also and I think more importantly, it was thank god I did that! There are people who will teach forever and never have an opportunity to be a part of that. Thank goodness I was a part of that.

This sense of accomplishment was inextricably coupled with teacher thoughts about the *“I should-haves and I wish I had and the oops...”* which are key instances illustrating reflection-on-action (Shoen, 1983). As Garcia, Sanchez & Esquadero (2006) point out:

Mathematics teachers' reflection on teaching situations is an important process providing information that contributes to our understanding of their professional knowledge. This kind of reflection can be generated in many different ways: (i) spontaneously with the help of researchers (Jaworski, 1998), (ii) included in mathematics teacher education programmes and professional development through the use of narratives (Ponte et al., 1997; Schifter, 1996) or (iii) in research projects where teachers and researchers collaborate (Garcia and Llinares, 1999; Llinares, 1999). (p2)

The immediate reflection-on-action teachers engaged in included thoughts about: a) what the teacher might have done differently to meet the needs of students even more explicitly, b) how the lesson could have been modified to solicit other particular kinds of thinking and representations of understanding from the students, and c) how to solve

logistical issues such as optimal student groupings, ease of distribution of materials, pacing of the lesson.

Directly following the research public lesson, the observers of the lesson were given 15 minutes to organize their notes. Each observer (including all members of the teacher planning team) made summary notes based on their observations so that they had a coherent set of comments to make during the debriefing. The teachers explained that they appreciated this time to “gather their thoughts quietly” before launching into the debriefing. These reflections-on-action were then shared coherently in the debriefing (stage 4).

Between stages 4 and 1

After the formal debriefing session where the teachers discussed the lesson and observers made comments about the lesson, the planning teachers regrouped informally as a small team. One teacher expressed how valuable it was to have these opportunities for “small group talk” during which the teachers agreed to designing follow-up lessons, which were found to be “invaluable”.

The teachers immediately began planning the follow-up lessons based on the observations of the research public lesson. This included revising plans that the teachers had already developed and finding ways to ensure that all students (beyond those involved in the research public lesson) had the opportunity to participate in the lesson. In some cases, the teachers asked students who had participated in the research public lesson to teach their same grade peers who were not part of the public lesson activity. A number

of participants described these situations as opportunities for students to consolidate and demonstrate their understanding:

The interactive whiteboard screen came up, they remembered what we'd done [as] it had just been the day before or two days earlier and they taught it to their peers. That was interesting. A lot of them soaked it up.

Finally, teachers described how they reflected on the research public lesson more deeply over time. For example, in one case, the teacher who delivered the public lesson sat down with the researchers to watch the video-taped lesson (see Lerman, 2001 for more information on this research method). The researchers asked the teacher to “think aloud” as she was watching the video and then they audio-recorded the teacher’s comments. Afterward the researchers asked the teacher what value there was in watching the video-taped public lesson. The teacher replied as follows:

I feel like you don't really get a huge chance to digest everything in that time afterward [during the debrief] ... you're on a timeline too, you have to all get back to class and everything. I guess this [watching the video] offered another chance to talk about it. And you [researcher] pulling questions out the way that you did really made me think about it differently and probably better than I would have on my own, more deeply. So it almost added to that sense of the debrief. It gives you a little time to digest when you really see it, I mean, that's pretty neat. Because you're not watching everything that's going on when you're teaching right? So it's adding on to that. And seeing the kids too, being able to do that, step back, and watching them – remembering what the lesson was about, and definitely talking about that – but watching them in action too, and just having that different perspective.

Researchers were able to conclude that there were three significant positive outcomes to the Lesson Study process: 1. Teachers developed a sense of agency through teacher-directed decision making; 2. Teachers increased their mathematics knowledge and related pedagogy through expanded opportunities for teacher collaboration; 3. For students, improved attitudes toward learning mathematics, including sustained effort and

persistence, and modest conceptual understanding gains were evidenced through the student surveys and achievement tests (see Ross & Bruce, 2008).

Teachers and researchers recognized the ‘in-between activities’ as essential building blocks of a successful Lesson Study cycle and that these more informal backstage activities represented significant work and commitment of the teacher teams in supporting one another. These teachers of mathematics frequently cited their incidental planning meetings over lunches, during recesses, and after school hours (in addition to formal facilitated meetings with release time) as being an important feature in the successful deployment of Lesson Study cycle during which the majority of these backstage activities took place. More research needs to be done to further our understanding of how these backstage activities relate to the nuanced dynamics of a successful Lesson Study team as described in Chapter One, particularly in relation to mathematics learning. For example, do teams that work together well, both with one another but also with their administrators and researchers, engage more frequently in backstage activities than teams who have greater difficulty in achieving their Lesson Study goals? Are successful teams provided more opportunities to meet face-to-face in small group meetings or do they employ other means of communication and support? And finally, what can researchers do to help facilitate these important backstage activities among school teams? The very act of acknowledging that backstage activities occur and that these activities require attention is a crucial first step. We believe that making these backstage activities more explicit for those undertaking Lesson Study may contribute to a deeper understanding of the types of work required for high quality learning for all participants in Lesson Study.

References

- Garcia, M., Sanchez, V, & Escudero, I. (2006). Learning through reflection in mathematics teacher education. *Educational Studies in Mathematics*, 64: 1–17
- Lerman, S. (2001). A review of research perspectives on mathematics teacher education. In Fou-Lai Lin and Thomas Cooney (eds), *Making sense of Mathematics Teacher Education* (pp. 33-52). Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Lewis, C., Perry, R., & Murata, A. (2006). How should research contribute to instructional improvement? The case of Lesson Study. *Educational Researcher*. 35(3).
- PRIME (Professional Resources and Instruction for Mathematics Educators). (2005). *Number and Operations Diagnostic Tests*. Toronto: Thomson Nelson.
- Ross, J.A. & Bruce, C. (2008). *Quantitative Report on Lesson Study GAINS Initiative*. Report to the Ministry of Education, Ontario. (To access report, contact: Dr. John A. Ross, Professor & Field Centre Head, OISE/UT Trent Valley Centre, PO Box 7190, 1994 Fisher Dr., Peterborough, ON K9J 7A1.)
- Schon, D. (1983). *The Reflective Practitioner*. London: Temple Smith.