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SUSTAINING LESSON STUDY: MATHEMATICS TEACHERS' CONCEPTIONS OF LESSON STUDY

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Introduction

Though lesson study shows promise as a vehicle for professional development (Stigler & Hiebert, 1999; Yoshida, 2012) and has been described as a sustainable form of professional development, little research exists on what would help support teachers in continuing lesson study after grants end (e.g. Gero, 2015; Lewis & Perry, 2014; Saito, Khong & Tsukui, 2012). In particular, no research examines conceptions of lesson study that lesson study teachers hold and how these conceptions shape their experiences with continuing lesson study. How do teachers view lesson study and its purpose? Researchers call for more research in lesson study (Fernandez, 2005; Lewis, Perry & Murata, 2006) and particularly on sustaining lesson study by “think[ing] in fundamentally new ways about the scaling-up of educational improvement” (Lewis & Perry, 2014, p. 36). To develop a better understanding of sustaining lesson study and other professional development efforts, I examine teachers’ conceptions of lesson study to show that these conceptions matter for sustaining lesson study.

Theoretical Perspective

The theoretical model that grounds this study is based on Japanese Lesson Study, which involves a small group of teachers collaboratively engaging in cycles of: (a) *investigating content* and *setting goals* for the research lesson, both content-focused and broader site based goals; (b) *studying curricular materials* and standards and *planning a research lesson* to inquire into how students learn a topic (or sets of topics); (c) *teaching* and *observing* a live research lesson while gathering student data; and (d) *debriefing* on what was learned from the lesson and in general about teaching and learning mathematics (Lewis, Perry, & Hurd, 2009). Optionally, teachers may modify their research lesson and teach it a second time, collecting data on student thinking and debriefing again. For this study, mathematics teachers from grades 3 through algebra participated in four cycles of lesson study a year (two cycles as full participants, two cycles as observers of another lesson study group’s research lesson and debrief) for three years as part of a partnership between a large university and two school districts aimed at improving algebraic instruction.

To understand mathematics teachers’ engagement in professional activities like lesson study requires understanding how teachers’ professions are situated within sites and districts. Consequently, this study is shaped by the perspective that teaching is embedded within institutional settings like classrooms, school sites, and districts with teachers as members of communities (Cobb, McClain, Lamberg & Dean, 2003). Supporting the work of teachers in complex institutional settings, particularly when engaging in resource intensive activities like lesson study, also requires attention to different types of resources (Gamoran et. al, 2003). These include *material* (physical objects or information like curriculum or activities), *human* (qualities of people that can be changed like training someone to be a math coach), and *social* resources (attributes of relationships, roles or modes of communication like connections to math coaches and other people). Importantly, the districts involved in the partnership were both committed to supporting lesson study past the end of the grant.

To study sustainability of lesson study after external funds ended, I used a modified version of Gamoran and colleagues' (2003) framework for conditions for sustainability. This framework focuses on social resources of groups to inform data collection and analyses. *Sustainability* is defined as maintaining generative practice, or to keep growing and learning in the practices of lesson study (Franke et al., 2001; Gamoran et al., 2003). Although there are four components to their framework, important for this study is *integration*, which refers to shared values, mutual expectations, levels of trust, and norms of a community (Gamoran et. al, 2003). Teachers' conceptions of lesson study can be viewed as integration since conceptions are part of the shared values, expectations, and norms that constitute the social ties of a group of teachers. I use the modified version of sustainability to focus on better understanding the institutional settings within which teachers work and what would support teachers in continuing lesson study.

Methodology

Data Collection and Analysis. Data collected and analyzed for this study came from a larger data set involving teacher, principal, and district administrator participants. Data were collected during the 2013-2014 school year, which was the first year following the end of a 3-year grant partnership among a large university and two school districts. Importantly, both districts involved were committed to providing support for teacher collaboration following the conclusion of the grant. I collected individual, semi-structured interviews, and survey data to uncover with whom teachers worked, the nature of collaborative activities, teachers' activities with lesson study, resources that supported their work, and their conceptions of lesson study. Questions particularly relevant for this analysis included teachers' definition of lesson study and their reported uses of lesson study.

Data were analyzed using grounded theory methods (Corbin & Strauss, 1990), with the methods of open coding and constant comparison used to derive themes in the data. Additionally, cases were determined from multi-case study analysis to show similarities and differences among ways teachers continued lesson study (Stake, 2006).

Participants. Though 32 teachers from grades 3 through algebra across two school districts, five principals, and three district administrators participated in the larger study, the focus of this report is on a subset of 11 teacher participants of grades 4 through 8. Participants were selected to represent four cases that demonstrate the different ways lesson study was reported to have continued after funding ended. Each case consisted of formally or informally arranged groups of teacher participants at a site. Four cases emerged: Case (a) consisted of one middle school teacher participant and represented not continuing lesson study, Case (b) consisted of three middle school teacher participants and represented continuing some practices of lesson study (but not an "official round" of lesson study), Case (c) consisted of five upper elementary teacher participants and represented continuing some practices of lesson study and engaging in a district-led lesson study effort, and Case (d) consisted of two upper elementary teacher participants and represented engaging in a teacher-led, site-wide lesson study.

Summary of Findings

Although teachers' conceptions on the structure of lesson study were similar, teachers' conceptions on the uses of lesson study varied in important ways. I will first describe results regarding participants' reports on the *structure* of lesson study, and then will describe results regarding participants' reports on the *uses* of lesson study.

Structure of lesson study. All participants across each of the four cases described the structure of lesson study to include: planning, teaching, observing and collecting data during the

research lesson, and debriefing about the research lesson (see Table 1). Ways in which the conceptions of structure varied were minor, and included whether participants described the optional second enactment of the lesson study process and the emphasis on investigating prior to planning the research lesson. In sum, teachers had robust conceptions on the structure of lesson study. A strong emphasis on student thinking was present in each case. These findings align with mathematics education literature on the structure of lesson study lesson study.

Table 1. Components of lesson study in participants’ reports of lesson study definitions, where a shaded cell represents the presence of an aspect of lesson study.

Case	(a)	(b)			(c)					(d)	
Aspect of Lesson Study	T	A	K	N	B	C	J	B	M	D	K
investigating											
planning											
teaching											
observing											
debriefing											
modify & reteach											
student thinking											

Uses of lesson study. Participants’ conceptions on the uses of lesson study varied in important ways that were connected to how lesson study continued in each case. Themes for uses of lesson study included: developing pedagogy, focusing on student thinking and learning, understanding the Common Core State Standards, learning mathematics, and creating good lessons (see Table 2). Some cases had evidence of several of these conceptions (e.g. Case (d)) while others reported limited conceptions (e.g. Case (a)). I will first elaborate each of these themes and provide examples. Then I will describe themes evidenced in each case.

Table 2. Conceptions on the uses of lesson study by case.

Case (a) Not continuing	Case (b) Particular practices	Case (c) District-led & particular practices	Case (d) Teacher-led, site-wide
Creating good lessons	Developing pedagogy	Developing pedagogy	Developing pedagogy
	Usefulness for CCSS	Usefulness for CCSS	Usefulness for CCSS
	Focusing on student thinking	Focusing on student thinking	Focusing on student thinking
		Learning mathematics	Improving lessons

Developing pedagogy signifies that lesson study was reported to be useful for developing pedagogical strategies, such as questioning and reflecting on content and the way that the content

was presented to students. Fifth-grade teacher Mia from Case (c) described lesson study as useful for “knowing what to do with what you're given.” Fellow fifth-grade teacher and mathematics coach Ben also from Case (c) described lesson study as useful because it provided, “a structure, a matrix, so to speak, on how to do things in the classroom with your colleagues.” Fifth-grade teacher Don from Case (d) believed that lesson study helped teachers to improve their instruction. “[Lesson studies] give you that opportunity to grow as a teacher, to become better, and to look for things that you normally would not.” Don also described lesson study as a collaborative activity that helps one improve their teaching, and “to become better and more confident in what we’re doing” by “taking the best of all of them [colleagues’ ideas] into a lesson.” In sum, these examples demonstrate the theme that lesson study is useful for improving a teachers’ practice.

Focusing on student thinking signifies that lesson study was reported to be useful for examining the way students reasoned mathematically and/or improving student learning. Fifth-grade teacher Jimmy from Case (c) stated that, “To me, the most important part is to, is to be an observer and watch the way kids learn, from, you know, a role that's outside of the typical teacher role.” Seventh-grade teacher Kamille from Case (b) stated that lesson study was useful for attending to student understanding, particularly, it allowed for “teacher growth to help student understanding.” Fourth-grade teacher Carmen from Case (c) stated that lesson study was a powerful way to focus and reflect on student learning. “And getting teachers to really question what they're teaching and why they're teaching it. And getting teachers to be really self-reflective. But not about the teaching. It’s really about the learning.” Thus, these examples demonstrate the theme that lesson study was useful for focusing on student thinking and their learning as a result of the lesson study.

Understanding the Common Core State Standards signifies that lesson study was reported to be useful for unpacking and reflecting on the content and practice standards of the Common Core State Standards and its implications for their teaching practice. All teacher participants except Tonya agreed that lesson study helps to better understand the new standards, oftentimes strongly agreeing with, “absolutely” or “definitely”.

Carmen from Case (c) agreed that lesson study would be useful for understanding the new standards. “Oh, absolutely! Yeah. I think that's the piece right now that's missing.” Fellow group member Bertha from Case (c) agreed that it would be helpful to better understand the new standards. “It would be very valuable, if not almost necessary. You can't just learn everything about Common Core just on your own, by going to trainings or doing this or that. You have to plan. You have to sit down and talk about the ideas and the big ideas and the little ideas and the connections and the vocabulary and the strategies and the possible things kids are going to do and say.” Fifth-grade teacher Don from Case (d) described that lesson study gave teachers direction on how to design instruction that aligned to Common Core standards, and his fellow teacher Kerry agreed, and gave a specific example of how lesson study helped her in providing opportunities to reason with number lines. Seventh-grade teacher Kamille from Case (b) believed lesson study would be useful for helping teachers to better understand the Common Core Standards for Mathematical Practice.

They’re [content standards and practice standards] all hand-in-hand. They’re all interrelated. You can’t say, ‘Understand the problem but don’t persevere in solving it.’ And with a lesson study, you’re teaching them, in my opinion,

you're teaching the kids to persevere, you're teaching teachers to teach them to persevere. And you're refining lessons as you go.

In sum, these examples help demonstrate that participants reported lesson study to be useful for better understanding teaching implications of the Common Core State Standards.

Learning mathematics signifies that lesson study was reported to be useful for better understanding mathematics content and ways that content connected to other mathematical ideas. For example, fourth-grade teacher Bertha from Case (c) reported better understanding multiplication through lesson study planning meetings, and provided an example that multiplication does not always result in a product that is greater than the multiplier or multiplicand. Bertha stated that she learned mathematics content through the mechanism of conversations with others. "In talking to people who knew way more math than me, I learned so much. Even if I wasn't part of the team, just listening to people talk about math. Like, oh my gosh, I had no idea!" Fifth-grade teacher Mia noted that she learned mathematics content from participating in lesson study, "just delving into the skeleton of math and what it means." She also described that learning mathematics more deeply with lesson study was useful for herself and also her students: "kids as a result are going to know because I know it [mathematics content] more." In sum, these examples demonstrate the theme of learning mathematics.

Creating good lessons signified that lesson study was reported to be useful for developing and disseminating exemplary lessons. Seventh-grade teacher Tonya from Case (a) described that lesson studies brought teachers together with different skill sets that could help to create good lessons with teachers' respective talents and share that knowledge. "That's the good part about lesson study. I think it helps everybody's, helps hone excellent lessons and then disseminating them a little better." She stated, though, that engaging in lesson study allowed her to have "one really good lesson", which was "one day out of a hundred eighty-five". Interestingly, this was the only use of lesson study reported by Tonya.

I now describe themes present within each case and across cases.

By Case. Teachers' conceptions on the purpose or usefulness of lesson study varied across the four cases (see Table 2). I now summarize the differences in uses of lesson study within and across cases.

Seventh-grade teacher Tonya in Case (a), which is the case that did not continue with lesson study, focused only on lesson study as useful for creating good lessons. She described needing to understand Common Core standards before being able to use lesson study. In Case (b), teachers reported the uses of lesson study as developing pedagogy, understanding the Common Core Standards, and focusing on student thinking. In Case (c), teachers saw lesson study as useful for developing pedagogy, understanding the Common Core Standards, focusing on student thinking, and learning about mathematics. In Case (d), teachers reported lesson study as useful for developing pedagogy, understanding the Common Core Standards, focusing on student learning, and improving lessons.

All cases but Case (a) reported that lesson study was useful for developing pedagogy, understanding the Common Core Standards, and focusing on student thinking. Teachers in Cases (b), (c), and (d) emphasized the role lesson study played with respect to revealing and better understanding student thinking. Case (c) emphasized the potential for learning mathematics by engaging in lesson study. Though both Cases (a) and (d) referred to lesson study as useful for developing instructional lessons, Case (a) participant saw the main purpose as *creating* good lessons whereas Don in Case (d) saw it as useful for *improving* lessons through the iterative process of observing, modifying, and revising, in addition to his other reported uses of lesson

study. Cases that were able to continue practices, engage in a district-led effort, or engage in a teacher-led effort held a variety of conceptions on the uses of lesson study, whereas the case that did not continue only evidenced one conception of lesson study.

Conclusion

Findings highlight a range in mathematics teachers' conceptions of what it means to engage in lesson study regarding the structure of lesson study and what lesson study is useful for. Although teachers' conceptions on the *structure* of lesson study were very similar, teachers' conceptions on the *uses* of lesson study varied in important ways. Teachers' conceptions of what lesson study afforded included: creating well-designed research lessons, lesson study as a vehicle for developing pedagogy, better understanding the Common Core Standards, learning mathematics, and focusing on students' thinking.

Findings also highlight that some conceptions of lesson study afforded teachers to continue lesson study while other conceptions hindered it. Cases with conceptions of lesson study that were connected to many practices of teaching (developing pedagogy, better understanding new standards, focusing on student thinking, learning mathematics, improving lessons) reported to continue lesson study in varying ways – continuing practices of lesson study, engaging in a district-led lesson study effort and some practices of lesson study, and engaging in a teacher-led, site-wide lesson study effort. Tonya in Case (a) with the conception of lesson study as creating good lessons did not engage in lesson study or practices of lesson study at her site. Cases (b) had different views as to the uses of lesson study that afforded them to engage in some practices of lesson study. Cases (c) and (d) had the most robust views of lesson study, that afforded them to engage in practices of lesson study, and either a district-led or site-wide lesson study.

Understanding different conceptions on uses of lesson study is significant for two reasons. First, it begins to categorize teachers' conceptions on lesson study, which previously has not been done. Second, it suggests the importance of teachers' conception of lesson study in continuing lesson study when funding ends. Well-developed conceptions of lesson study enabled visions of how lesson study could be usefully applied to teacher practice. If lesson study perceptions were more limited or extremely limited, such as creating 'perfect' lessons, it would be challenging to align or attract resources to continue lesson study practices due to its limited use.

Implications of this research inform professional developers, principals, districts, and teachers on the importance of aligning goals and conceptions among participants as to the purpose of engaging in professional development experiences. Better understanding social relations among teachers in professional development experiences might help in better understand issues of sustainability, such as whether teachers hold shared values and expectations on the use of lesson study. Studies attempting to further lesson study research indicate that institutional structures and practices are important for maximizing lesson study experiences (e.g. Takahashi & McDougal, 2015). Attending to structures and practices around lesson study, and examining how they may or may not fit with teachers' conceptions of lesson study, are important for continuing lesson study.

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