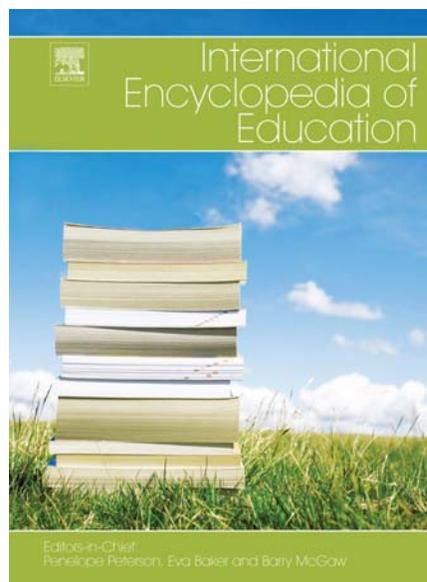


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Murata A (2010), Teacher Learning with Lesson Study. In: Penelope Peterson, Eva Baker, Barry McGaw, (Editors), *International Encyclopedia of Education*, volume 7, pp. 575-581. Oxford: Elsevier.

Teacher Learning with Lesson Study

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Introduction

Lesson study is a collaboration-based teacher professional development approach that originated in Japan (Fernandez and Yoshida, 2004; Lewis and Tsuchida, 1998; Stigler and Hiebert, 1999). When it was first introduced in the United States in the late 1990s, it quickly gathered the attention of the US educators as it was thought to be an adoptable and effective innovation (Choksi and Fernandez, 2004; Lesson Study Research Group, 2007; Lewis *et al.*, 2004; National Research Council, 2002; North Regional Educational Laboratory, 2002; Richardson, 2004; Stepanek, 2001, 2003; Wilms, 2003). Lesson study incorporates effective characteristics of other professional development programs identified in prior research. It is site based, practice oriented, focused on student learning, collaboration based, and research oriented (Bell and Gilbert, 2004; Borko, 2004; Cochran-Smith and Lytle, 1999, 2001; Darling-Hammond, 1994; Wang and O'Dell, 2002; Little, 2001; Hawley and Valli, 1999; Wilson and Berne, 1999). Lesson study was also one of the foci for the International Congress on Mathematics Education (ICME) Ninth Conference in 2002 and has spread in many other countries (Fujita *et al.*, 2004; Lo, 2003; National College for School Leadership, 2004; Shimizu *et al.*, 2005). Despite the rapid rate of adoption, this form of professional development is still new in countries other than Japan, and thus schools and teachers in these countries are still at the early stage of adopting the innovation to their existing systems. There is an emerging body of lesson study literature, but we do not yet have a coherent and shared understanding and model of teacher learning with lesson study. The purpose of this article is to give an overview of lesson study with its structure (and variation), its history, and emerging lesson study research literature, in order to explicate teacher learning models in lesson study as well as to identify future research agenda with lesson study.

Lesson Study: History, Structure, and Variation

Lesson study is an instructional improvement approach that places teachers in the center of professional activity, with their interests and desire to better understand student learning. The idea is simple: teachers come together with a shared question regarding their students' learning, plan a lesson to make this student learning visible in

practice, and examine and discuss what they observe. Through the process, teachers have multiple opportunities to discuss student learning and how their teaching affects it. Lesson study typically follows the steps outlined in Figure 1, with a research lesson (live lesson observation) as a centerpiece of the study process (Fernandez and Yoshida, 2004; Lewis, 2002; Lewis and Tsuchida, 1998; Murata and Takahashi, 2002; Wang-Iverson and Yoshida, 2005).

After identifying a lesson goal, teachers plan a lesson. They will take a certain teaching approach to make student learning visible, keeping their lesson goal in mind. The main purpose of this step is not to design a perfect lesson but to test out a teaching approach in the lesson context to investigate how students learn. As they anticipate students' possible responses and craft the details of the lesson in a certain way, teachers learn the key aspects of the lesson, how students may possibly respond to these aspects, and the different thinking and reasoning behind the possible responses. Teachers will then focus on the particular student thinking in the lesson, take notes on different student approaches, and, after the lesson, discuss the data they have collected in a debriefing. While there are other professional development programs that incorporate many of the characteristics of lesson study (e.g., action research and teacher research), what sets it apart from others is the live research lesson. As discussed in the section below, research lessons create unique learning opportunities for teachers compared to other forms of professional development.

In Japan, lesson study has been widely used in schools for over a century, and many Japanese educators attribute success in changing their teaching practice to lesson study (Lewis *et al.*, 2006; Shimizu *et al.*, 2005). Any new educational approaches introduced in Japan are examined by teachers using lesson study as a foundational mechanism to support the improvement of teaching and better understand in practice. In many cases, teachers assume the main role in making the new approaches adoptable, and thus the approaches become more practical and understandable. Thus, lesson study works effectively to connect theory and practice in Japan. After the Third International Mathematics and Science Study, Stigler and Hiebert (1999) introduced lesson study to the US audience. Since then, lesson study has spread throughout the United States, and now over 400 schools are currently involved in lesson study (Lesson Study Research Group, 2007). It has also attracted the attention of an international audience, and there have been more than a dozen international

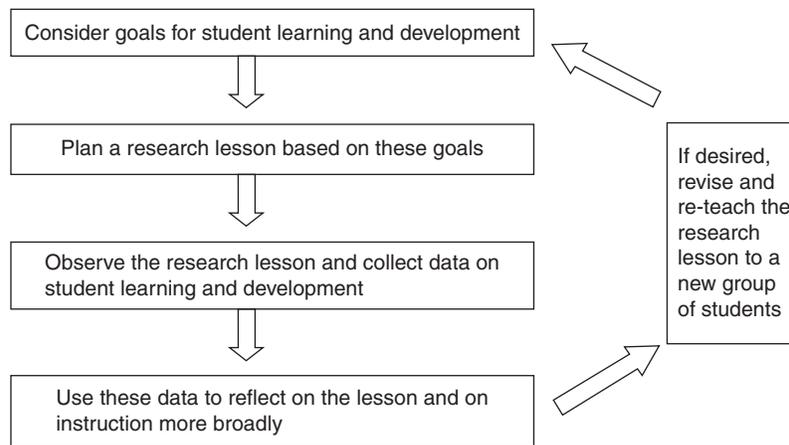


Figure 1 Lesson study cycle.

conferences and workshops around the world for people to share their experiences and progress with lesson study (Fujita *et al.*, 2004; Conference on Learning Study, 2006).

While lesson study is known in the United States (and other parts of the world) for a small, school-based collaboration typically in the subject area of mathematics, lesson study comes in many different shapes and sizes in Japan. There is a small, school-based lesson study as well as a larger-scale national-level lesson study (Murata and Takahashi, 2002; Lewis and Tsuchida, 1998; Shimizu *et al.*, 2005). For a large-scale and national-level lesson study in Japan, teachers often travel long distances to participate, and hundreds of people gather for one event. For a middle-scale and district-level lesson study, teachers may come together for a district's professional development day for which they have a list of choices of lessons with different grade levels, subject areas (Lesson study research conducted outside of Japan has primarily been focused on mathematics so far, therefore the chapter reports findings from these studies on mathematics instruction, however, lesson study may be used for all subject areas.), and topics to attend. These different kinds of lesson study meet different needs and interests of the teachers. While a small-scale and in-school lesson study is effective for teachers to improve their teaching for students of a particular community, where teachers share knowledge of the students and the community, a large-scale lesson study is important when a new educational approach (e.g., problem-based math instruction and collaborative learning) is introduced, and teachers across different schools are trying to make sense of what that means in their classrooms. Lesson study provides an opportunity to present a visible example of a new idea for teachers to discuss, ask questions, and come to construct a shared understanding of the new idea. Different forms of lesson study provide different learning opportunities for teachers.

Teacher Learning Models with Lesson Study

Teacher Learning

For decades, educational researchers have sought to understand what teachers learn and how teachers' learning translates into improvement of their teaching (e.g., Cohen, 1990; Franke *et al.*, 2001; Fuller, 1969; Fuller and Bown, 1975; Sherin, 2002; Shulman, 1987, 1996; Wood *et al.*, 1991). These questions are enormously challenging because of the intricate dynamics among teaching practices, beliefs, and knowledge (Sherin, 2002; Smith, 2000; Thompson, 1984), the many types of knowledge (of content, students, and curriculum, pedagogy) entailed in teaching (Shulman, 1987; Ball and Bass, 2000), and the limited transfer from many traditional forms of teacher education (e.g., lectures on content) to one's own practice (Ball and Bass, 2000; Ball and Cohen, 1996; Remillard, 2000). Teaching is a system, and changing one part of the system may not change the whole in the long run, since other parts will work to maintain the original function of the system (Stigler and Hiebert, 1999). Research and theory suggest that changes in teaching practice may be facilitated by opportunities for teachers to analyze familiar teaching practices in depth, make connections between familiar and new practices, and understand the changes needed in each part of the system of teaching in order to create an overall change (Franke *et al.*, 2001; Sherin, 2002; Smith, 2000). Professional development contexts that enable reexamination and reorganization of existing ideas – rather than simple acquisition of new ideas – may be most effective in changing teaching practice.

In considering the helpful context for learning of mathematics for teaching, Ball and Bass (2000) discuss a big challenge for which teachers are required to integrate across many kinds of knowledge, with this integration occurring in the context of particular teaching situations.

Since situations are classroom specific, the unpredictability makes it difficult for teachers to act on the spot. Focusing on student ideas in lessons and flexibly understanding what they mean, where they come from, and how to guide them to the goals set for the lesson requires the integration of the knowledge of students, content, and pedagogy. Curricular materials themselves do not readily present the richness of the mathematical ideas behind topics, nor do they help teachers gain the sufficient mathematical content knowledge necessary to teach the topic (Ball *et al.*, 2005; Remillard, 2000). Helping teachers learn the mathematics they need to know, and supporting them in understanding the connections between the particular knowledge with student learning and pedagogy, is key to teachers' learning and development. Lesson study allows teachers to focus on a specific topic and classroom context so that they can make sense of the meaning of the experience in their everyday teaching. However, their learning does not end there. What teachers learn in lesson study extends further than their immediate professional development context.

Teacher Learning with Lesson Study

Three-part teacher learning model

In examining the development and adaptation process of lesson study in the United States, Lewis *et al.* (2006) identified critical research needs, one being explication of the innovation mechanism. In order to understand how

lesson study supports instructional improvement, we need to better understand what happens with teachers in its process. Initially in the United States, people were interested in the curricular resources (e.g. lesson plans) teachers produce as results of lesson study to improve instruction. While that was a reasonable expectation, after several years of lesson study effort, we are now in a better position to understand that in the area of supporting instructional improvement, lesson study helps produce a lot more than mere lesson plans. Murata *et al.* (2004) suggest areas that develop and interact to support teacher learning in lesson study, and the modified model is shown in Figure 2. The three broad areas are teachers' knowledge, teachers' commitment and community, and learning resources (see also Lewis *et al.*, 2006).

As Fernandez (2005) also mentions in her study, lesson study provides opportunities for teachers to develop their pedagogical content knowledge. As different types of knowledge (e.g., knowledge of content, curricula, and student learning) essentially come together and interact with one another in the lesson study cycle (Figure 1), it creates an ideal context for which teachers combine these types of knowledge to make content accessible to their students. While different types of knowledge are typically learned in different settings by teachers in traditional professional development approaches (e.g., attending a lecture on math content and reading a book on classroom management), lesson study requires them to come together and work interdependently to support student learning in

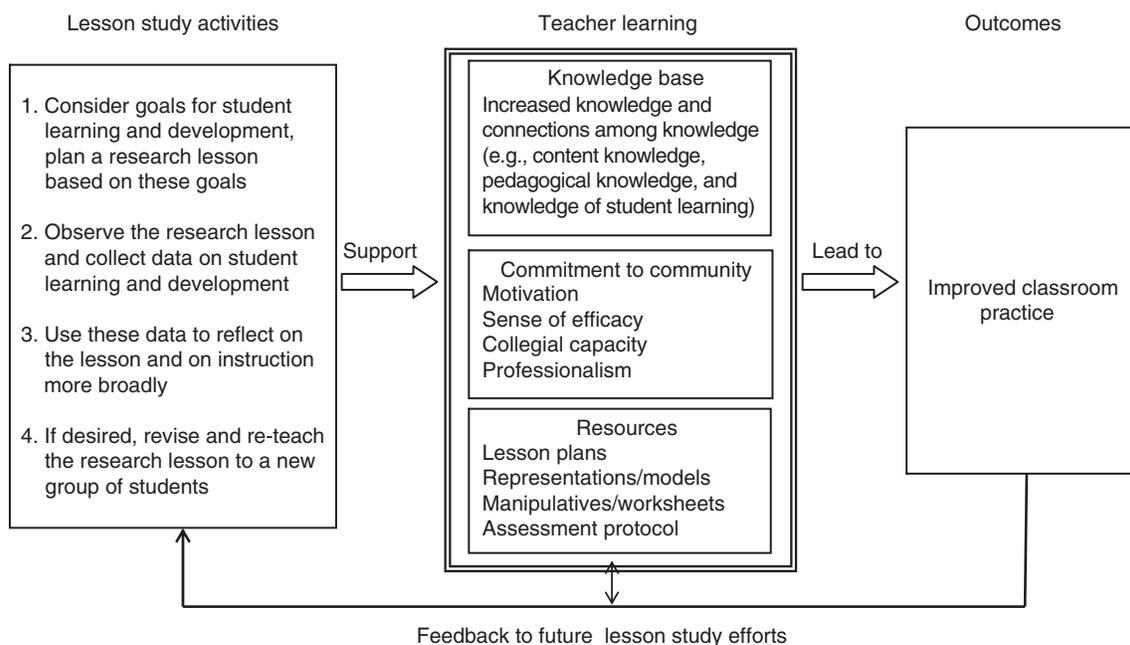


Figure 2 Lesson study activities, teacher learning, and outcomes. Modified from Murata, A., Lewis, C., and Perry, R. (2004). Teacher learning and lesson study: Developing efficacy through experiencing student learning. In McDougall, D. (ed.) *Proceedings of the Twenty-Sixth Annual Meeting of North American Chapter of the International Group of the Psychology of Mathematics Education*, pp. 985–992. Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education.

the very practice of teaching, thus helping teachers experience different types of knowledge in a coherent and related whole.

Development of knowledge and connections among different types of knowledge support, and are supported by, the communities teachers create through lesson study. While teaching is considered as an independent practice in the United States and elsewhere, lesson study brings teachers who are otherwise isolated in their school structure to come together and work collaboratively. It is likely that teachers who teach similar content to similar students will have similar questions and issues about teaching. When these teachers gather and share their ideas and resources, a meaningful learning community is created, and the sense of belonging and professionalism developed in the community helps teachers to commit to their profession and motivates them to continually improve their practice (Grossman *et al.*, 2001). For the teachers who collaboratively plan a research lesson, the process helps to add purpose to their everyday work. Their everyday life is experienced as a part of the larger professional endeavor among colleagues and a purposeful activity for which different events in the process have reasons for happening.

Most obviously, the development and improvement of learning resources is a part of the lesson study process. Teachers' knowledge development and professional community growth interact with the development of resources (e.g., lesson plans), and as the resources are refined and improved, they provide a meaningful context for teachers to discuss student learning and to focus on the lesson. Just as young students find it helpful to have hands-on manipulatives to develop mathematical concepts, lesson plans become concrete scaffolds for teachers to focus their attention and learn about the specific content area in discussion.

The three areas (knowledge development, community development, and material development; **Figure 2**) are essential for instructional improvement with lesson study to support teacher learning. Many professional development programs aim only to help teachers develop knowledge for teaching. While the single-focus approach is effective in certain ways, when considering the sustainability of professional growth and teacher motivation, the three-part teacher-learning model identifies the interactive relationships among different areas of the model.

Focus on student learning

When it comes to mathematics teaching and learning, the new reform requires teachers, as they practice in classrooms, to balance and juggle existing knowledge of students, content, curriculum, and pedagogy while incorporating new ideas to make the practice more conceptually strong and student centered (National Council of Teachers of Mathematics, 2000). Teaching is viewed as an interactive process for which student learning and mathematics content

come together through effective teacher facilitation. The interactive teaching requires teachers to know how students typically think and express their understanding so that teachers can effectively facilitate their learning by weaving different ideas and providing experiences that encourage connection building among concepts and ideas. What binds different parts of the lesson study cycle is student learning, as teachers identify goals in terms of student learning of a topic, investigate curricular materials that teach the topic, plan a lesson to make student learning visible in the classroom with the topic, gather data in the lesson, and, afterward, discuss the student learning that occurred during the lesson. Teachers typically become increasingly knowledgeable about the particular topic (content) and student learning of the topic in the process, and learn to listen to their students' ideas.

One of the most important aspects of teacher learning that emerges from the lesson study process is the new way to see teaching as a series of activities of inquiry around student learning. It helps cultivate the new attitude toward teaching, that teaching is not a one-way and didactic path, but a two-way integration of student ideas and content in a meaningful manner facilitated by teachers, and that can be challenging. The strong focus on student learning in the lesson study process continually reminds teachers how important it is for them to understand students' ideas in good teaching and helps bring the visions of reform closer to their actual classroom practices.

Overcoming the challenges of adapting lesson study

The Columbia University Teachers College Lesson Study Group presented several US lesson study cases and identified central characteristics of the participation that limited teachers' learning. When working with Japanese colleagues, the US teachers were challenged to find a strong research focus and to stay with the research process with lesson study (Fernandez *et al.*, 2003). The US teachers also struggled with developing a meaningful research hypothesis, developing means to explore the hypothesis, using evidence to make claims, and generalizing the findings. In another study for which the US and Japanese teachers were interviewed about their lesson study experiences, the researchers found that the US teachers were more likely to describe content goals (e.g., learning how to add fractions) in disconnect to other goals (e.g., student disposition) and focused heavily on what teachers do in lessons and not on student discovery and autonomy (Fernandez and Cannon, 2005). Fernandez also investigated how teachers took advantage of learning opportunities that were created by lesson study (Fernandez, 2005), and, in the study, the lack of strong mathematics content knowledge and reasoning skills kept the teachers from taking full advantage of the opportunities to learn. However, the author also describes how the teachers in the

study collaboratively anticipated and discussed their students' thinking, revised and taught a lesson multiple times, and reflected on particular aspects of student thinking of mathematics that supported their learning as teachers.

One of the strengths of lesson study is that it places teachers in the middle of their learning process. In order for teachers to take full advantage of the opportunities, it requires them to have a research-oriented and inquisitive disposition. However, if the teachers do not have the prerequisite, the disposition can be gradually developed through participating in the lesson study process. Opportunities provided through lesson study support teachers to develop knowledge and research skills and engage in their future lesson study in more effective and meaningful ways. While it will take longer for beginning lesson study participants to learn to refine the critical research process, in most cases, these teachers will become familiar with the expectations by their second or third lesson study experiences. In the meantime, the sense of community and new professionalism will keep the teachers motivated. Thus, these challenges found in the case studies mentioned above should be considered the necessary learning steps for teachers who are beginning to see teaching as a research process for the first time.

Research Lesson: Centerpiece of Lesson Study

As mentioned previously, the research lesson is central to the lesson study process. In surveying 125 Japanese teachers, [Murata and Takahashi \(2002\)](#) found that teachers identified the research lesson as the most important element of lesson study that helped their professional development. Through research lessons, teachers could see models of teaching and make sense of how these models affected student learning. The research lesson works to improve classroom practice, spread new content and approaches, connect classroom practice to broader educational goals, and explore conflicting ideas, thus creating demand, shaping national policy, and honoring the role of classroom teaching ([Lewis and Tsuchida, 1998](#)).

Research lessons are observed live, and they provide a special learning opportunity that teachers would not find otherwise. Unlike watching a video segment of classroom teaching or reading teaching episodes in books, live lessons are experienced as a whole. Different events unfold as the lesson flows with interactions among people in the classroom. These events cannot be understood by the analysis of separate parts of the whole alone ([Davis and Summitt, 2003](#); [Herbst, 2003](#)). Classrooms are complex, and teachers have their own unique expert knowledge to understand this complexity. With their knowledge, they notice aspects of classroom experiences in their own ways and understand them as parts of a complex whole. They

see relationships between small events that may be invisible for people who have not spent time in classrooms before as teachers. When experienced teachers come together and observe a live lesson, their expert knowledge comes to the surface as they interpret the effectiveness of the lesson and discuss it in the debriefing. The novice teachers who experience the lesson with experienced teachers are apprenticed into their knowledge through participation.

In research lessons, outside commentators are typically invited to share their ideas at the end of the debriefing sessions ([Watanabe, 2002](#)). These commentators can be university researchers who specialize in the very subject areas that are addressed in the research lessons, or other experienced teachers who are interested in the topics. The main expectation for these commentators is to bring out the characteristics of the observed research lesson, tie them to research or theories of teaching–learning and/or conceptual development of students, and present a bigger picture of what their observations mean in the field of education. Unlike typical school consultants who observe and give feedback on aspects of teaching, focusing on what teachers should do to make the particular lesson better, the research lesson commentators pull together the different ideas and data shared in the debriefing to present a coherent picture of student learning. It requires good knowledge of the addressed topic, experiences in classrooms, and certain personal communication styles to be an effective outside commentator, and with the short history of lesson study in countries other than Japan, this is an area that requires attention and development.

Summary and Future Research on Teacher Learning with Lesson Study

This article attempted to give an overview of lesson study and research conducted in terms of teacher learning with lesson study thus far. As mentioned, we are still at a very early stage of understanding how teachers learn with lesson study, and there are several key research possibilities for the future.

Since the lesson study process, especially the research lesson context, makes the teaching process and teachers' thinking visible, teachers' knowledge and its development can be studied in the settings. It is yet unclear what teachers' expert knowledge consists of and how different parts of this knowledge interact in effective teaching. Lesson study creates an ideal research setting for the investigation. Especially when experienced and novice teachers engage in lesson study together, the characteristics of the expert knowledge may surface in their work and discussions. Since lesson study activities focus primarily on student learning, we suspect that the expert knowledge includes a deep understanding of how students think

about particular topics or subjects at hand. The way teachers understand it and how teachers see their understanding as helpful for the planning and teaching of lessons will be important for educational researchers and teacher educators to know, so that we can effectively support all teachers' learning in lesson study as well as in other settings.

When schools and teachers face challenges in adopting lesson study to the existing school and classroom systems, these challenges should be carefully examined, explained, and understood locally. For any innovation, initial challenges are expected, and they provide a way for us to better understand the existing system as well as the innovation. If a challenge is due to a structural incompatibility (e.g., teachers do not have common planning time in their school day), administrative intervention may be sufficient to overcome the difficulty. If a challenge is due to societal difference (e.g., teachers are not familiar with the inquiry process), the lesson study structure may be modified to support teachers to learn about the research process to participate in meaningful ways for their own professional development and instructional improvement. As Lewis *et al.* (2006) discuss, we do not want lesson study to be considered ineffective after just a few years' implementation with mismatched program evaluations. In order to nurture lesson study in different contexts, we need to take time to understand the emerging challenges and carefully adjust and modify parts of the existing innovation while it continues to support teacher learning. Understanding various challenges with an innovation would illuminate aspects of teacher learning that would never come to light in original contexts alone.

In the twenty-first century, we have virtual and electronic means to connect lesson study groups across a nation or globally. There are virtual lesson study LIST-SERV that connect people across the United States, providing a context for them to ask questions, share progress they make with one another, and invite each other to research lesson events (e.g., Lesson Study Research Group, 2007). Some lesson study groups are connected electronically to collaborate together (e.g., Math Star, 2007). With lesson study being a new innovation, the regular flow of new information is essential for teachers' work and collaboration to be successful. This also provides an ideal research context for which we can investigate the challenges from teachers' points of view. We may also evaluate the effectiveness of electronic community and technology use for adopting innovation and understand the role they play in professional community development and learning. How well a certain virtual community is used and kinds of information exchanged will not only help identify the effectiveness of the virtual means of community but also aspects of lesson study, its challenges, and teacher learning in the process.

As we try to come to a shared model of teacher learning with lesson study, we need research that synergistically investigates different aspects of teacher learning as well as the aspects of lesson study to understand the learning process better. International collaboration may be the next step in establishing a research community, as we need to understand what we know at this point as a community that will inform what we need to know next.

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