

Introduction: Conceptual Overview of Lesson Study

Aki Murata*

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). Lesson study attracted the attention of an international audience in the past decade, and in 2002 it was one of the foci for the Ninth Conference of the International Congress on Mathematics Education (ICME). It subsequently spread to many other countries and more than a dozen international conferences and workshops were held around the world in which people shared their experiences and progress with lesson study as they adopted this new form of professional development in their unique cultural contexts (e.g., Conference on Learning Study 2006; Fujita et al. 2004; Lo 2003; National College for Educational Leadership 2004; Shimizu et al. 2005).

When first introduced in the United States in the late 1990s, lesson study quickly gathered U.S. educators' attention. It was considered 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; Takahashi and Yoshida 2004; Wilms 2003). A decade later, over 400 schools are involved in lesson study in the United States (Lesson Study Research Group 2007).

Despite the rapid rate of interest in this approach to professional development, lesson study remains relatively new to countries outside of Japan, and most schools and teachers are at the early stages of adoption and implementation of the innovation. And, while there is an emerging body of lesson study literature, we do not yet have a coherent and shared understanding of how lesson study effectively works in different contexts and models of teacher learning. The purpose of this chapter is to give a conceptual overview of lesson study, including its common structure (and variations), and its history. The chapter will also present emerging research

* Parts of this chapter appeared previously in International Encyclopedia of Education, Teacher Education volume.

A. Murata (✉)
Stanford University, Stanford, CA, USA
e-mail: akimura@stanford.edu

literature on the topic, address challenges in the field, as well as identify promising avenues for future research in lesson study.

Lesson Study: Structures, History, and Variation

Lesson study incorporates many characteristics of effective 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 places teachers at the center of the professional activity with their interests and a desire to better understand student learning based on their own teaching experiences. The idea is simple: teachers organically come together with a shared question regarding their students' learning, plan a lesson to make student learning visible, and examine and discuss what they observe. Through multiple iterations of the process, teachers have many opportunities to discuss student learning and how their teaching affects it. Lesson study typically follows the steps outlined in Fig. 1, with a research lesson (live lesson observation) as the 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. The goals can be general at first (e.g., how students understand equivalent fractions), and are increasingly refined and focused throughout the lesson study process to become specific research questions by the end (e.g., strategies students use to compare $2/4$ and $3/6$). Teachers

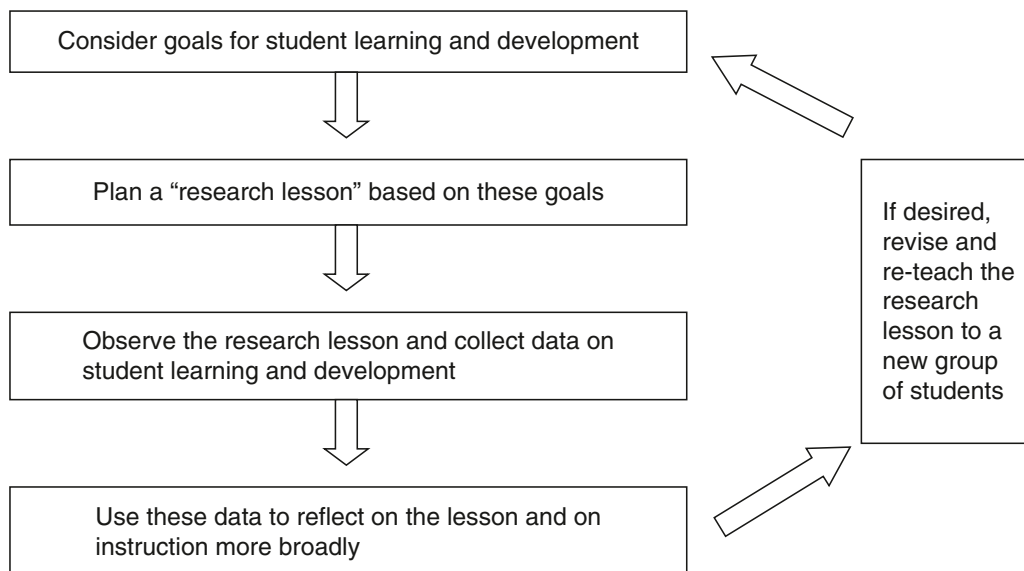


Fig. 1 Lesson study cycle

choose and/or design a teaching approach to make student learning visible, keeping their lesson goal in mind. The main purpose of this step is not to plan a perfect lesson but to test a teaching approach (or investigate a question about teaching) in a live context to study how students learn. As they plan, they anticipate students' possible responses and craft the details of the lesson. Teachers come to know the key aspects of the lesson, to anticipate how students may respond to these aspects, and to explore different thinking and reasoning that may lie behind the possible responses. During planning, teachers also have an opportunity to study curricular materials, which can help teachers' content knowledge development. During the lesson, teachers attend to student thinking and take notes on different student approaches. In the debriefing after the lesson, teachers discuss student learning based on the data they have collected during the observation.

There are other professional development programs that incorporate many of the characteristics of lesson study (e.g., action research, teacher research). However, what sets lesson study apart from those activities is the *live* research lesson. The live research lesson creates a unique learning opportunity for teachers. Shared classroom experiences expose teachers' professional knowledge that may otherwise not be shared: teachers notice certain aspects of teaching and learning. This implicit and organic noticing does not happen in artificially replicated professional development settings.

In Japan, lesson study has been widely used for over a century. Many Japanese educators attribute success in changing their teaching practice to participation in lesson study (Lewis et al. 2006; Murata and Takahashi 2002; Shimizu et al. 2005). As a foundational mechanism to support the improvement of teaching, lesson study is used to examine and better understand new educational approaches, curricular content, and instructional sequences introduced in Japan. In many cases, teachers play the central role in making new approaches adoptable and content accessible. Lesson study makes teaching approaches more practical and understandable to teachers through developing deeper understanding of content and student thinking. In this manner, lesson study works effectively to connect theory and practice in Japan.

While in the United States (and other parts of the world) lesson study is mainly known as a small, school-based collaboration, typically in the subject area of mathematics, it comes in many different shapes and sizes in Japan. There is small and school-based lesson study as well as large-scale, national-level lesson study (Murata and Takahashi 2002; Lewis and Tsuchida 1998; Shimizu et al. 2005). For a large-scale, national-level lesson study in Japan, teachers often travel long distances to participate, and hundreds of people can gather for one event. For mid-scale, district-level lesson study, teachers may come together for a district's professional development day where they have a menu of choices of lessons with different grade levels, subject areas¹, and topics to attend. The small-scale, in-school lesson study

¹ 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.

(often emulated outside of Japan) is effective for teachers to improve their teaching for students within a particular community where teachers share knowledge of the students and the community.

Large-scale lesson study is important when a new educational approach (e.g., problem-based math instruction, collaborative learning), new content, or a sequence of content instruction is introduced and teachers across different schools try to make sense of what it means in their respective classrooms. Lesson study provides an opportunity to present an example of a new educational idea and/or approach for teachers to discuss, to ask questions about, and to construct a shared understanding of the new idea. Different forms of lesson study provide different learning opportunities for teachers. Different formats for lesson study meet different needs and interests of the teachers. A typical Japanese teacher has multiple opportunities to participate in lesson study throughout his/her professional career.

Focus on Student Learning

In the United States and other parts of the world, the new focus in mathematics teaching and learning requires teachers to balance and juggle existing knowledge of students, content, curriculum, and pedagogy while incorporating new ideas to make the practice conceptually stronger and more student centered (e.g., see National Council of Teachers of Mathematics 2000). Teaching is viewed as an interactive process in which student learning and content come together through effective teacher facilitation. This interactive teaching requires teachers to know how students *typically think* and *express their understanding* so that teachers can effectively facilitate their learning by weaving together different ideas. Teachers subsequently use this knowledge to provide experiences for students that encourage building connections among concepts and ideas. The focus on student learning binds different parts of the lesson study cycle, 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, afterwards, discuss the student learning that occurred during the lesson. Teachers become increasingly knowledgeable about a particular topic (content) and student learning of the topic in the process. They learn to listen to their students' ideas and to see student development.

One critical outcome of teacher learning in the process of lesson study is a new way to see teaching as a series of activities of inquiry around student learning. Lesson study helps cultivate a new attitude toward teaching, namely that teaching is not a one-way and didactic path, but a two-way integration of student ideas and content exploration meaningfully facilitated by teachers, an endeavor that can be extremely challenging. The emphasis on student learning in the lesson study process continually reminds teachers how important it is for them to understand students' ideas and helps bring the visions of reform into their classrooms.

Research Lesson: Centerpiece of Lesson Study

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 growth. Through research lessons, teachers saw models of teaching and made sense of how the 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 for change, shaping national policy, and honoring the role of classroom teaching (Lewis and Tsuchida 1998).

Research lessons are observed in real time, and they provide a special learning opportunity within a developing professional community that teachers are not likely to find otherwise. Unlike watching a video segment of classroom teaching or reading teaching episodes in books, live lessons are experienced holistically. Events unfold as interactions among students and teacher(s) in the classroom develop. These events cannot be understood by independent analysis of each separate part (Davis and Summitt 2003; Herbst 2003). Classrooms are complex, and teachers/observers bring expert knowledge to understand this complexity. Through their unique lenses, 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 not be visible to observers who have not spent time in classrooms 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 the profession through participation.

In some research lessons, knowledgeable others from outside the lesson study group are often invited to observe the lesson and provide comments and make suggestions for the research lesson at the end of the post-lesson discussion (Watanabe 2002). These commentators may be university researchers who specialize in the subject area addressed in the research lesson, or they may be experienced teachers who are interested in the topic. The main expectation for these commentators is to highlight special 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 (or should not) do to make a particular lesson better, the research lesson commentator pulls 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 particular personal communication styles to be an effective outside commentator. With the short history of lesson study in countries other than Japan, this is an area that requires attention and development (Fernandez 2005; Lewis et al. 2006).

Research on Lesson Study

Teacher Learning

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 for us to understand how lesson study supports instructional improvement, we need to better understand what happens to teachers in its process. Initially in the United States, individuals interested in lesson study focused on the curricular resources (e.g., lesson plans) teachers produced as potential results of lesson study. While that was a reasonable expectation, after several years of lesson study effort, we are now in a better position to understand that in supporting instructional improvement, lesson study can produce much more than mere lesson plans. Murata et al. (2004) suggested three specific areas that develop and interact through the lesson study process to support teacher learning. The three broad areas, shown in the modified model in Fig. 2, are teachers' knowledge, teachers' commitment and community, and learning resources (see Lewis et al. 2006; Lewis et al. 2007).

Lesson study, according to Fernandez (2005), also provides opportunities for teachers to develop their pedagogical content knowledge. Different types of knowledge (e.g., knowledge of content, curricula, and student learning) come together and interact with one another during the lesson study cycle (Fig. 1). An ideal context is created in which teachers can integrate these types of knowledge and make content accessible to their students. Often in traditional professional development, these different types of knowledge are learned separately (e.g., attending a lecture on math content, reading a book on classroom management). In lesson study, they

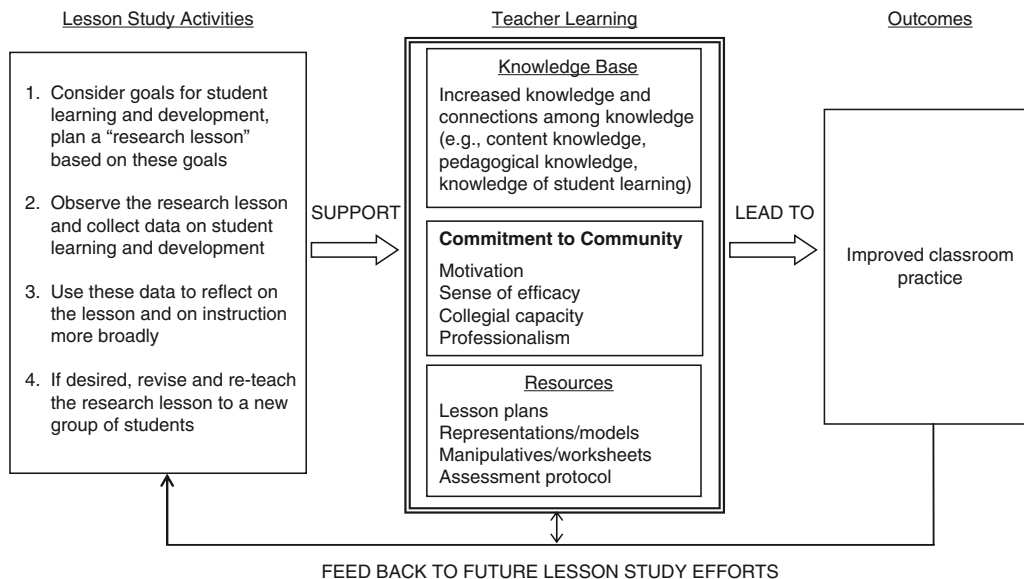


Fig. 2 Lesson study activities, teacher learning, and outcomes (modified by Murata et al. 2004)

come together and work interdependently to support student learning in the very practice of teaching, thus helping teachers experience different types of knowledge in a coherent and related whole.

The communities teachers create through lesson study support development of knowledge and connections among types of knowledge. While teaching is considered an independent and often isolated practice in many countries, lesson study brings teachers together to share goals, discuss ideas, and work collaboratively. It is likely that teachers who teach similar content to similar students 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 can strengthen teachers' commitment to their profession and motivate 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 an activity for which different events have clear purposes.

Obviously, the development and improvement of learning resources is a part of the lesson study process. Teachers' knowledge development and commitment to professional community growth interact with the development of learning 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 under discussion.

The three areas supported through lesson study for teacher learning (knowledge development, community development, and material development; Fig. 2) are essential for instructional improvement and for increasing student achievement. Many professional development programs aim only to help teachers develop knowledge for teaching. While the single-focus approach is effective in some cases, when considering the sustainability of professional growth and teacher motivation, the three-part teacher-learning model identifies and incorporates the interactive relationships among different areas of teacher professional development.

Adapting Lesson Study

The Columbia University Teachers College Lesson Study Group presented several U.S. lesson study cases and identified central characteristics of participation that limited teachers' learning. When working with Japanese colleagues, U.S. teachers were challenged to find a strong research focus and to stay with the research process needed for lesson study (Fernandez et al. 2003). The U.S. teachers struggled to develop a meaningful research hypothesis, to develop means to explore the hypothesis, to use evidence to make claims, and to generalize the findings. In another study for which U.S. and Japanese teachers were interviewed about their lesson study

experiences, the same group of researchers found that U.S. 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 U.S. teachers from taking full advantage of opportunities to learn. However, the author describes positive outcomes of 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' interests in the center of their learning process. In order for teachers to take full advantage of the opportunities of lesson study, they must be research-oriented and have inquisitive dispositions. However, if the teachers do not have these dispositions (as some research indicates), the dispositions can gradually be developed through participating in the lesson study process. Opportunities provided through lesson study support teachers as they develop knowledge and research skills and engage in future lesson study cycles in more effective and meaningful ways. While it may take longer for beginning lesson study participants to learn to hone in on the critical research process, in most cases, these teachers will become familiar and more adept with these expectations by their second or third lesson study experience. In the meantime, the sense of community and new professionalism will sustain their motivation to participate. Thus, these challenges found in the case studies mentioned earlier may be necessary learning steps for teachers who are for the first time considering teaching as a research process.

Issues from the Field

While the research on lesson study is in its early stages, there are numerous issues that have emerged from its implementation in the field. Many of these issues will be discussed in subsequent chapters of this book; four are worth mentioning here: (1) cost of implementation, (2) sustainability, (3) insufficient teacher content knowledge, and (4) connection to student learning. These four issues surface repeatedly in the literature on lesson study as an outcome of implementing lesson study in new cultural contexts. Frequently we lack the support and mechanisms required to handle the complexity of lesson study. As we become more adept with lesson study, the process through which we learn to handle these challenges needs to be documented and reflected on. Such an analysis will help expose strengths and weaknesses of our educational systems.

First, lesson study, as with any professional development, costs money to the districts and schools. While teachers may manage to find common planning time

outside of their instructional time within school hours (e.g., lunch hours), shared observation for research lessons requires release time for the teachers, usually by hiring substitute teachers. If lesson study groups invite outside lesson study supporters (for ongoing support throughout the cycle) and/or knowledgeable others (for debriefs), that also may require additional cost. While external small grants are available for teachers, teachers (or district/school staff) will need to find time to gather resources, synthesize ideas, and write a proposal for the grant, which means additional work hours and cost.

Second, in most cultures outside of Japan (such as in the United States), professional development is usually experienced as discrete and separate programs from one year to another, but lesson study in Japan operates as a sustained effort that continues from year to year. In the new culture, teachers new to the lesson study process may consider enough to engage in lesson study for one year and then to move on to their next professional development experience. To be effective, lesson study should be rooted in a new culture as an integral part of teachers' professional lives. This may take some time and can be a challenge, as it may require the shift in cultural view toward professional development.

Third, lack of sufficient teacher content knowledge has been discussed in the previous studies (e.g., Ball 1990; Borko et al. 1992, Hart and Carriere this book), and we are also finding it difficult to support rich learning experiences when teachers who lack sufficient knowledge come to lesson study (Choksi and Fernandez 2004). As discussed in a section above, other studies found lesson study as a potential context to support knowledge development (e.g., Fernandez 2005), and some chapters of this book will also discuss findings in this area. We will need to find ways to make lesson study especially supportive of teacher knowledge development because the knowledge will provide the fuel for future learning with lesson study.

Finally, there is a strong need to make connections between teachers' lesson study participation and their students' learning. As the effectiveness of professional development is ultimately evaluated through its influence on student learning, we need a mechanism to show the connection between lesson study and student learning. In Japan, where lesson study has been used for many decades, they have enough experiences and data to show how instruction has improved and student learning shifted over time through lesson study, but in these new environments, careful documentation and various and creative investigations of student learning through lesson study will be necessary. It will not only help others understand the effectiveness of lesson study but also add a meaning to teachers' effort and professionalism.

Learning About Lesson Study Together

The chapters in this book will provide pictures of current efforts in research and educational activities with lesson study in different parts of the world. While we independently work and try to understand how lesson study works in our own context,

it is likely that there are others who are having similar experiences. We need to find ways for us to communicate and share our emerging knowledge and understanding, so that we can better support our research and educational activities. This book is one such effort.

As the stories in this book unfold, we will examine how lesson study is used in different settings to support educational research and activities centered on teacher and student learning. We will have opportunities to learn what may or may not work well in new settings, and how different modifications and adjustments were made to better support the goals for each lesson study group. As teaching is a highly localized practice, modifications are expected and essential in order to adopt and use this new professional development approach effectively. Still, too many modifications may change the nature of lesson study, and teachers may find themselves participating in yet another ineffective professional development program with a new name. In order to avoid this, the key characteristics of lesson study should be maintained with care, while modifications are made. Some of these characteristics are listed below, however, I would caution the readers of this book that this is not an exhaustive list. In learning together about lesson study, I welcome others' ideas and input in expanding and modifying the list based on the localized knowledge gained through various contexts.

1. *Lesson study is centered around teachers' interests:* Teachers' interests are central to their professional development. Lesson study goals should be something teachers feel is important to investigate and relevant to their own classroom practice.
2. *Lesson study is student focused:* Lesson study is about student learning. At any part of the lesson study cycle (Fig. 1), the activities should focus teachers' attention to student learning and its connections to lessons/teaching.
3. *Lesson study has a research lesson:* Teachers have shared physical observation experiences (in some special cases, video may be used in place of the live lessons, but this is not recommended), that provide opportunities for teachers to be researchers.
4. *Lesson study is a reflective process:* Lesson study provides plenty of time and opportunities for teachers to reflect on their teaching practice and student learning, and the knowledge gained from and for the reflective practice should be shared in some format with the larger teaching and educational communities.
5. *Lesson study is collaborative:* Teachers work interdependently and collaboratively in lesson study.

By understanding how different aspects of lesson study may be modified while maintaining these key characteristics, we will better understand the existing educational system and cultural values and beliefs that support the system. When adding something new to an existing system, it often becomes clear what can and cannot be changed in the system to accommodate the new. That, in turn, helps us understand how different parts of the system work and what parts are more critical to the system than the others. Lesson study can provide that opportunity.

In the concluding chapter of this book, we will discuss possible next steps in our work with lesson study. We will reflect back on our work so far, identify common experiences and challenges, and present possible future paths and directions. What might have appeared to be discrete and unrelated experiences will hopefully begin to form a coherent picture with common purposes. The new understandings shared in this book will help drive our future work in this area with the goal of continuing to learn about lesson study together.

References

- Ball, D. (1990). The mathematical understandings that prospective teachers bring to teacher education. *Elementary School Journal*, *90*(4), 449–466.
- Bell, B., & Gilbert, J. (2004). A model for achieving teacher development. In J. Gilbert (Ed.), *The Routledge Falmer reader in science education* (pp. 258–278). New York: Routledge Falmer.
- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher*, *33*(8), 3–15.
- Borko, H., Eisenhart, M., Brown, C. A., Underhill, R. G., Jones, D., & Agard, P. C. (1992). Learning to teach hard mathematics: Do novice teachers and their instructors give up too easily? *Journal for Research in Mathematics Education*, *23*(3), 194–222.
- Cochran-Smith, M., & Lytle, S. (1999). The teacher research movement: A decade later. *Educational Researcher*, *28*(7), 15–25.
- Cochran-Smith, M., & Lytle, S. (2001). Beyond certainty: Taking an inquiry stance on practice. In A. Lieberman & L. Miller (Eds.), *Teachers caught in the action: Professional development in practice* (pp. 45–60). New York: Teachers College Press.
- Conference on Learning Study. (2006). *Programme*. <http://www.ied.edu.hk/cdspfe/lconference/programme.htm>. Accessed 19 Feb 2007. (The Hong Kong Institute of Education website).
- Choksi, S., & Fernandez, C. (2004). Challenges to improving Japanese lesson study: Concerns, misconceptions, and nuances. *Phi Delta Kappan*, *85*(7), 520–525.
- Darling-Hammond, L. (1994). Developing professional development schools: Early lessons, challenges, and promise. In L. Darling-Hammond (Ed.), *Professional development schools: Schools for developing a profession* (pp. 1–27). New York: Teachers College Press.
- Davis, B., & Summitt, E. (2003). Understanding learning systems: Mathematics education and complexity science. *Journal for Research in Mathematics Education*, *34*, 137–167.
- Fernandez, C. (2005). Lesson study: A means for elementary teachers to develop the knowledge of mathematics needed for reform-minded teaching? *Mathematical thinking and learning*, *7*(4), 265–289.
- Fernandez, C., & Cannon, J. (2005). What Japanese and U.S. teachers think about when constructing mathematics lessons: A preliminary investigation. *The Elementary School Journal*, *105*(5), 481–498.
- Fernandez, C., & Yoshida, M. (2004). Lesson study: A case of a Japanese approach to improving instruction through school-based teacher development. Mahwah: Lawrence Erlbaum.
- Fernandez, C., Cannon, J., & Choksi, S. (2003). A U.S.—Japan lesson study collaborative reveals critical lenses for examining practice. *Teaching and Teacher Education*, *19*, 171–185.
- Fujita, H., Hashimoto, Y., Hodgson, B. R., Lee, P. Y., Lerman, S., & Sawada, T. (2004). *Proceedings of the ninth International Congress on Mathematics Education*. Norwell: Kluwer.
- Grossman, P., Wineburg, S., & Woolworth, S. (2001). Toward a theory of teacher community. *Teachers College Record*, *103*(6), 942–1012.
- Herbst, P. (2003). Using novel tasks in teaching mathematics: Three tensions affecting the work of the teacher. *American Educational Research Journal*, *40*, 197–238.

- Hawley, W. D., & Valli, L. (1999). The essentials of effective professional development: A new consensus. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook for policy and practice* (pp. 127–150). San Francisco: Jossey-Bass.
- Lesson Study Research Group. (2007). *Timeline of U.S. lesson study*. <http://www.tc.edu/lesson-study/lsgroups.html>. Accessed 15 Feb 2007. (Teachers College, Columbia University web site).
- Lewis, C. (2002). *Lesson study: A handbook of teacher-led instructional change*. Philadelphia: Research for Better Schools.
- Lewis, C., & Tsuchida, I. (1998). A lesson is like a swiftly flowing river: Research lessons and the improvement of Japanese education. *American Educator*, (Winter), 14–17, 50–52.
- Lewis, C., Perry, R., & Hurd, J. (2004). Deeper look at lesson study. *Educational Leadership*, 61(5), 18–23.
- Lewis, C., Perry, R., & Murata, A. (2006). How should research contribute to instructional improvement: The case of lesson study. *Educational researcher*, 35(3), 3–14.
- Lewis, C., Perry, R., & Hurd, J. (2007). *Lesson study: A theoretical model and a North American case*. Paper in preparation.
- Little, J. W. (2001). Professional development in pursuit of school reform. In A. Lieberman & L. Miller (Eds.), *Teachers caught in the action: Professional development that matters* (pp. 28–44). New York: Teachers College Press.
- Lo, M. L. (2003). Lesson study and its impact on teacher development. *ISSP Newsletter*, 4–5.
- Murata, A. & Takahashi, A. (2002). *District-level lesson study: How Japanese teachers improve their teaching of elementary mathematics*. Paper presented at a research pre-session of the annual meeting of the National Council of Teachers of Mathematics, Las Vegas, NV, USA.
- Murata, A., Lewis, C., & Perry, R. (2004). Teacher learning and lesson study: Developing efficacy through experiencing student learning. In D. McDougall. (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: ERIC Clearinghouse for Science, Mathematics, and Environmental Education.
- National College for School Leadership. (2004). Research lesson study: Experimenting with collaborative learning. *Networked Learning Group Publication*, 6, 30–31.
- National Council of Teachers of Mathematics. (2000). *Principles and standards of school mathematics*. Reston: Author.
- National Research Council. (2002). Studying classroom teaching as a medium for professional development: Proceedings of a U.S.—Japan Workshop. Washington: National Academy Press.
- North Regional Educational Laboratory. (2002). *Teacher to teacher: Reshaping instruction through lesson study*. Naperville: North Central Regional Educational Laboratory.
- Richardson, J. (2004). Lesson study: Teachers learn how to improve instruction. In *Tools for Schools* (pp. 1–3). Oxford, OH: National Staff Development Council.
- Shimizu, S., Isoda, M., Okubo, K., & Baba, T. (Eds.). (2005). *Mathematics lesson study in Japan through diagrams*. Tokyo: Meiji Tosho.
- Stepanek, J. (2001). A new view of professional development. *Northwest Teacher*, 2(2), 2–5.
- Stepanek, J. (2003). A lesson study team steps into the spotlight. *Northwest Teacher*, 4(3), 9–11.
- Stigler, J. W. & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom*. New York: Summit Books.
- Takahashi, A., & Yoshida, M. (2004, May). Ideas for establishing lesson study communities. *Teaching Children Mathematics*, 436–443.
- Wang, J., & O'Dell, S. J. (2002). Mentored learning to teach according to standards-based reform: A critical review. *Review of Educational Research*, 72(3), 481–546.
- Wang-Iverson, P., & Yoshida, M. (2005). *Building our understanding of lesson study*. Philadelphia: Research for Better Schools.
- Watanabe, T. (2002). Learning from Japanese lesson study. *Educational Leadership*, 59(6), 36–39.
- Wilms, W. W. (2003). Altering the structure and culture of American public schools. *Phi Delta Kappan*, 85(8), 606–613.
- Wilson, S. M., & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. *Review of Research in Education*, 24, 173–209.