IMPLEMENTING LESSON STUDY
IN NORTH AMERICAN SCHOOLS AND SCHOOL DISTRICTS

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Because no professional development practice similar to lesson study exists in North America, it is often challenging for North American teachers and schools to implement lesson study. Lesson study has, however, become highly visible in many state, national, and international conferences, open houses, high-profile policy reports, and special journal issues in North America. Moreover, numerous schools and school districts in the United States have attempted to use it to change their practices and to impact student learning. This paper is intended to provide some ideas about how to conduct lesson study for the educators who are interested in implementing lesson study in their schools and school districts.

JAPANESE LESSON STUDY MODEL

The practice of lesson study originated in Japan. Widely viewed in Japan as the foremost professional development program for teachers, lesson study is credited with dramatic success in improving classroom practices in the Japanese elementary school system (Fernandez, Chokshi, Cannon, & Yoshida, 2001; Lewis, 2000; Lewis & Tsuchida, 1998; Shimahara, 1999; Stigler & Hiebert, 1999; A. Takahashi, 2000; Yoshida, 1999).

A particularly noticeable accomplishment in the past 20 years of lesson study in Japan has been the transformation from teacher-directed instruction to student-centered instruction in mathematics and science (Lewis & Tsuchida, 1998; Takahashi, 2000; Yoshida, 1999). The success of lesson study can be found in two primary aspects: improvements in teacher practice and the promotion of collaboration among teachers.

First, lesson study embodies many features that researchers have noted are effective in changing teacher practice, such as using concrete practical materials to focus on meaningful problems, taking explicit account of the contexts of teaching and the experiences of teachers, and providing on-site teacher support within a collegial network. It also avoids many features noted as shortcomings of typical professional development, e.g., that it is short-term, fragmented, and externally administered (Firestone, 1996; Huberman & Guskey, 1994; Little, 1993; Miller & Lord, 1994; Pennel & Firestone, 1996). In other words, lesson study provides Japanese teachers with opportunities to make sense of educational ideas within their practice, to change their perspectives about teaching and learning, and to learn to see their practice from children's perspectives. For example, a Japanese teacher said, "It is hard to incorporate new instructional ideas and materials in classrooms unless we see how they actually look. In lesson study, we see what goes on in

the lesson more objectively, and that helps us understand the important ideas without being overly concerned about other issues in our own classrooms" (Murata & Takahashi, 2002).

Second, lesson study promotes and maintains collaborative work among teachers while giving them systematic intervention and support. During lesson study, teachers collaborate to: 1) formulate long-term goals for student learning and development; 2) plan and conduct lessons based on research and observation in order to apply these long-terms goals to actual classroom practices for particular academic contents; 3) carefully observe the level of students' learning, their engagement, and their behaviors during the lesson; and 4) hold post-lesson discussions with their collaborative groups to discuss and revise the lesson accordingly (Lewis, 2002). One of the key components in these collaborative efforts is "the research lesson," in which, typically, a group of instructors prepares a single lesson, which is then observed in the classroom by the lesson study group and other practitioners, and afterwards analyzed during the group's post-lesson discussion. Through the research lesson, teachers become more observant and attentive to the process by which lessons unfold in their class, and they gather data from the actual teaching based on the lesson plan that the lesson study group has prepared. The research lesson is followed by further collaboration in the post-lesson discussion, in which teachers review the data together in order to: 1) make sense of educational ideas within their practice; 2) challenge their individual and shared perspectives about teaching and learning; 3) learn to see their practice from the student's perspective; and 4) enjoy collaborative support among colleagues (Akihiko Takahashi & Yoshida, 2004).

Lynn Liptak, a principal who is pioneering lesson study in the U.S., argues that because lesson study is a teacher-led approach to professional development, teachers can be actively involved in the process of instructional change, in contrast with traditional professional development methods.

Contrasting methods of professional development

Traditional	Lesson Study
Begins with answer	Begins with question
Driven by outside "expert"	Driven by participants
Communication flow: trainer to teachers	Communication flow: among teachers
Hierarchical relations between trainer & learners	Reciprocal relations among learners
Research informs practice	Practice is research

(Reprinted from Lewis, 2002, p.12)

Lesson study also has played an important role in improving curricula, textbooks, and teaching and learning materials in Japan. In fact, most Japanese mathematics textbook

publishers employ as authors classroom teachers who are deeply involved in lesson study, and their materials are in some manner examined through the process of lesson study.

The process of lesson study

Lesson study does not follow a uniform system in Japan. It is more like a cultural activity. As a result, lesson study takes many different forms, including school-based lesson study, district-wide lesson study, and cross-district lesson study. Therefore, there are neither clear definitions nor specified criteria of lesson study in Japan. Its process differs across schools, districts and types of lesson study. Lesson study groups can be formed by all the members in a school building, or by study-group members in a district, or by teachers who are interested in specific subject matter.

Although the types of groups differ, the lesson study process usually begins with identifying a long-term goal or goals or a research question or set of questions as a theme. Since lesson study is a way to bring educational goals and standards to life in the classroom (Lewis, 2002), this process usually involves all the members of the lesson study group. After a lesson study group establishes a theme, the cycles lesson study begin. A typical lesson study group activity involves several lesson study cycles in a year. A lesson study group usually divides into two or more sub groups each containing four to six teachers sharing a particular interest or teaching the same or similar grade levels. One of the sub groups, called the "lesson planning team," develops a lesson plan and conducts a research lesson. The other sub-group members who are not involved in planning the lesson but who observe the lesson, are called "research lesson participants." In each lesson study cycle, a different sub-group becomes the lesson planning team. A lesson study group sometimes invites teachers and university professors from outside the group as lesson study participants. Both lesson planning team members and lesson study participants play important roles and contribute differently to the lesson study project.

A major role of the lesson planning team is to develop a lesson plan. Based on this lesson plan, one of the teachers from the team teaches his or her class. This lesson is called the "research lesson" (*Kenkyuu-jugyou*) and is observed by all the members of the lesson study group. To develop a lesson plan, the group usually meets three to five times for sessions of two to three hours. The team members also prepare teaching and learning materials such as manipulatives and student worksheets for the lesson.

Following the research lesson, the lesson planning team and all the research lesson participants discuss whether the students in the class accomplish the goal or goals of the lesson. This is called post-lesson discussion (*Kenkyu-kyogikai*). A major role of the research lesson participants is to study the impact of the lesson in order to improve the lesson plan. To do this they need to collect data during the research lesson to support their arguments. Participants might collect various types of data, such as how many students actually solved the problem and how many different solution methods were discussed in the class, how particular students solved the problem during the lesson and how the class

discussion helped these students to improve their solution methods, or how particular students summarized the class discussion in their notes. Participants may collect data differently depending on their interests and experiences. They may also interpret the data differently. As a result, a wide variety of data can be expected for a post-lesson discussion and will contribute to the richness of the post-lesson discussion and greatly help to improve the lesson plan. In this way each research lesson participant is expected to be like a researcher who collects data to examine whether the lesson plan facilitates student learning and whether the lesson plan need to be improved. The lesson planning team also plays an important role during the post-lesson discussion. They are expected to explain the discussion and rationale behind the lesson plan. This information helps participants better understand the lesson.

The activities of lesson study -- reading a lesson plan, observing a class, and examining the class in terms of student learning -- all benefit the research lesson participants in their larger roles as classroom teachers when they develop their own lesson plans and work to improve their own instruction.

Outside specialists (*Koshi*), so-called knowledgeable others, may also play an important role in lesson study. The knowledgeable other is typically invited as an advisor for the lesson planning team and as an outside commentator who summarizes the post-lesson discussion. Some schools and school districts engage the same knowledgeable others to continuously support their lesson study over a number of years. A lesson study group usually invites a person who has experience in the process of lesson study, and both pedagogical and content expertise, such as an experienced teacher, a university professor, or a district specialist. A knowledgeable other is expected not only to summarize the participants' discussion about the research lesson and draw out its important implications (Watanabe, 2002) but also to bring new perspectives to the lesson study group.

Throughout the lesson study process, teachers have opportunities to clarify how to apply particular educational ideas in their practice, to refine their perspectives on teaching and learning, to view their practices from the students' perspective, and to enjoy the collaborative support of their colleagues.

LESSON STUDY IN NORTH AMERICA

Many U.S. educators have recently become interested in lesson study as a promising source of ideas for improving education (Stigler & Hiebert, 1999). Within the last several years lesson study has become highly visible in many state, national, and international conferences, open-houses, high-profile policy reports, and special journal issues in North America. Moreover, some school districts in the United States have attempted to use it to change their practices and to impact student learning (Council for Basic Education, 2000; Germain-McCarthy, 2001; Research for Better Schools Currents Newsletter, 2000; Stepanek, 2001; Weeks, 2001).

As of September 2, 2003 at least 29 states, 140 lesson study clusters/groups, 245 schools, 80 school districts, and 1100 teachers across the United States were involved in lesson study. (Lesson Study Research Group). The following map, figure 1, shows some lesson study groups in North America.

Figure 1

Chicago Lesson Study Group

One of many lesson study groups in North America, the Chicago Lesson Study Group has become well known among lesson study researchers and practitioners as one of the few groups that conduct public research lessons.

To explore the possibilities for replicating the success of Japanese lesson study in a U.S. setting, the Chicago lesson study group was launched in November of 2002, with volunteer school administrators and classroom teachers who have had university student teachers in their classrooms as a part of their field experiences. About twenty members are active and another thirty follow the group's activities on an email list Although the most popular form of lesson study in Japan takes place within a single school as a school-based professional development program (Yoshida, 1999), the Chicago Lesson Study Group adopted a cross-school volunteer model for its lesson study group. The reasons for this adaptation are twofold. First of all, an effective model of lesson study is often one that is started as a grassroots movement of enthusiastic teachers rather than as a top-down formation (Lewis 2002; Takahashi & Yoshida, 2004; Yoshida, 1999). For this reason, starting a lesson study group as a cross-school volunteer group was thought to be appropriate. Furthermore, it is sometimes difficult to establish a school-based lesson-study group in the U.S. because many teachers do not have experience working with other teachers in the same school as a group to accomplish a shared goal. Secondly, in order to have a sufficient number of enthusiastic elementary and middle school teachers who are interested in lesson study

focusing on mathematics, a cross-school model was found to be more appropriate in the U.S. setting.

The program of activities for a volunteer lesson study group usually consists of two components: (1) a series of study groups concerned with improving the teaching and learning of mathematics (the group usually meets after school regularly throughout the year), and (2) several public research lesson opportunities each year to examine the work of the study group by inviting a wide variety of individuals to participate in its sessions. Since its inception, this study group has met twice a month to discuss ways to implement the ideas of reform mathematics in order to improve the teaching and learning of mathematics.

In order to find a way to implement the ideas of reform mathematics, the Chicago lesson study group has conducted five lesson-study conferences with ten public research lessons in the past four years. In each conference, the group has invited teachers and educators from not only the Chicago area but also from other states to discuss how to implement student-centered classrooms in mathematics. About one hundred participants from various U.S. states and Canada have attended the conferences each year and discussed how to help students develop algebraic thinking skills through problem solving.

HOW CAN WE BEGIN LESSON STUDY?

Because no professional development program similar to lesson study exists in the North America, it is often challenging for North American teachers and schools to implement lesson study. In order for teachers and schools to overcome the hesitation to become a part of lesson study, the following suggestions are usually given to the North American teachers and schools who are interested in exploring the possibility for implementing lesson study.

Begin with an informal study group

Since lesson study is a form of teacher-led professional development, any teacher can begin lesson study by connecting with another teacher. This means that lesson study is a grassroots movement among teachers rather than a top-down formation. Forming informal study groups focused on improving mathematics teaching and learning can be a step toward developing a lesson study group. If you are not already part of such group, you might share what happened in your math class during a grade level meeting. You do not have to begin lesson study with all the teachers in a school building at once. Forming a comfortable collaborative group is the most desirable step toward developing a lesson study.

Experience lesson study

The idea of lesson study is simple: collaborating with fellow teachers to plan, observe and reflect on lessons. Developing a lesson study, however, is a more complex process (Lewis, 2002). Because lesson study is a cultural activity, an ideal way to learn about lesson study is to experience it as a research lesson participant. In so doing, you will learn such things as how a lesson plan for lesson study is different from a lesson plan that you are familiar with, why such a detailed lesson plan is needed, what type of data experienced lesson study

participants collect, and what issues are discussed during a post-lesson discussion. The following websites are excellent for exploration of the lesson study topics:

Chicago Lesson Study Group (http://www.lessonstudygroup.net)

Global Education Resources (http://www.globaledresources.com)

Lesson Study Group at Mills College (http://www.lessonresearch.net)

National Council of Teachers of Mathematics (http://nctm.org)

Identifying your research theme

Since lesson study is teacher-led professional development, the participants determine the group's theme or topic. For example, the Chicago Lesson Study Group chose measurement as their theme because measurement was the worst area of mathematics for their students as reflected in standardized test scores, and because measurement was the most difficult topic for them to teach. This theme emerged from a discussion about which topics teachers found difficult to teach.

Investigate a variety of materials to develop a lesson plan for a research lesson

Even though a group has identified its theme, it is still too early to develop a lesson plan. Some groundwork is needed. For example, if a group decides to explore how to teach measurement of the area of a rectangle for fourth grade students, the group needs to know how this topic relates to the other topics in the same grade, what prior knowledge students should have, and how this topic will help students learn mathematics in their future classes. Moreover, teachers need to know what kind of materials various textbooks use to teach this topic to students, and what research suggests (if anything) about various methods for teaching the topic. This investigation, called '*Kyouzai-kenkyuu*' in Japanese, means studying. Kyouzai-kenkyuu typically investigates the following areas:

- a variety of teaching and learning materials, such as curricula, textbooks, worksheets, and manipulatives
- a variety of teaching methods
- the process of student learning including students' typical misunderstandings and mistakes
- research related to the topic

Japanese teachers often begin *Kyozai-kenkyu* by comparing various teacher's guides published by textbook companies. Thus, U.S. teachers start using the English translation of the Japanese mathematics textbook series (Global Education Resources[1], 2006) and teaching guides for the Japanese Course of Study as resources to conduct *Kyozai-kenkyu*.

[1] http://www.globaledresources.com

Developing a lesson plan

There are many different types of lesson plans in Japan. Although no single universal form is available, any lesson plan is expected to provide enough information for lesson study participants to learn why the lesson-planning group decided to use a certain problem for the students, why the group chose a particular manipulative for the class, and why the group used particular wording for the key questions. To explain these rationales, a typical lesson plan includes the title of the lesson, the goal of the lesson, the relationship of the lesson to the standards or curriculum, the "about the lesson", the expected learning process, and the evaluation. Use of a simplified lesson plan might be a good idea for a novice lesson study group. One of the most difficult sections for teachers to develop in a lesson plan is the section describing the rationale of the lesson. Experienced participants often read this section very carefully because they believe that it is the essence of Kyozai-kenkyu. If this section cannot tell participants enough information about the lesson, the group's Kyozai-kenkyu might not be deep enough. Usually, the lesson plan rationale includes discussion of the following:

a. Concepts or skills that the students need to learn in the lesson or unit according to the standards and/or curriculum
b. Concepts or skills that the students have already learned
c. The major focus (theme) of this lesson or unit by comparing (a) and (b) (the objective of this lesson should be clearly stated)
d. The way to help students accomplish the above objective as a hypothesis for the research lesson

Lesson study groups might be able to test their draft lessons plan prior to the research lesson in another member's class as a pilot lesson. By using the data collected during the pilot lesson, the group might revise the lesson plan in preparing the research lesson.

The following shows a typical schedule for developing a lesson plan by a lesson planning team.

- The first meeting (five weeks before)
  Identifying the team's research goal/theme
  Deciding on a topic to investigate
- The second meeting (four weeks before)
  Investigate a variety of resources and teaching materials to develop a lesson plan (*Kyozai Kenkyu*)
- The third meeting (three weeks before)
  Developing a research lesson and writing the lesson plan for the lesson
- The fourth meeting (second weeks before)
  Completing the first draft of the lesson plan
- <Option: Teaching a class based on the first draft>
- The Fifth Meeting (a weeks before)

Completing the final draft and prepare for the lesson

Conduct a research lesson and a post-lesson discussion

Respecting the natural atmosphere of the class is always a priority during a research lesson, so ideally a research lesson should be held in the instructor's regular classroom. However, if the regular classroom cannot hold enough participants, a research lesson might be taught in a larger classroom. Further, out of respect for maintaining the natural environment, neither members of the lesson planning group nor participants should give any advice or comments to the students, because the instructor is the only person who can teach the students.

A post-lesson discussion is usually held right after the research lesson. It might be a good idea to have a post-lesson discussion in the classroom where the research lesson was held because participants can see all the blackboard writing and materials that the students used during the class. Customarily the post-lesson discussion session begins with an instructor's short comment on his or her teaching. An explanation of the lesson plan by a member of the lesson-planning group follows. Next, data collected by the participants may be discussed, followed by a more general discussion, which is sometimes focused on topics identified in advance. Although any critique and comments should be welcomed, a facilitator often keeps the discussion focused on the issues of interest to the planning group, rather than having a "free-for-all." At the end of the session, an outside specialist (Koshi) is given an opportunity to make a final comment as a summary of the session. The post-lesson discussion session should be recorded by a note taker. More guidelines for lesson observations and post-lesson discussions are available in *Lesson Study: A Handbook of Teacher-Led Instructional Change* (Lewis, 2002) and *Currents*, spring/ summer 2002 (Research for Better Schools, 2002).

LET'S BEGIN LESSON STUDY

Research suggests that mathematics class should be shifted from traditional teacher-led instruction to student-centered instruction. As a result, many schools and teachers are working hard to change their classrooms. However, most professional development programs are still done in a traditional way. The lesson study approach permits teachers involved in professional development to become as active in their learning as they expect their students to be.

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