

Implementing a New National Curriculum: A Japanese Public School's Two-Year Lesson-Study Project

Akihiko Takahashi, *DePaul University, Chicago, Illinois*
Thomas McDougal, *Lesson Study Alliance, Chicago, Illinois*

The Common Core State Standards for Mathematics (National Governors Association Center for Best Practices [NGA Center] and Council of Chief State School Officers [CCSSO] 2010) present significant implementation challenges. In particular, the Standards for Mathematical Practice will require substantial changes in how most teachers teach. In Japan, where the national curriculum is revised approximately every eight years, teachers use lesson study to understand and implement the changing standards (Lewis 2010; Takahashi 2011), as well as to implement ideas from the latest research. Because Japanese educators have been successful in the past at implementing significant changes in teaching based on shifts in the standards (Lewis and Tsuchida 1997; Watanabe in press; Yoshida 1999b), it may be useful for U.S. educators to consider what Japanese schools do to support such changes. This article describes a two-year research program undertaken by the faculty and staff of a public elementary school in Tokyo. They used lesson study to implement recent revisions of the national curriculum and to investigate ways to improve student learning through the process.

■ The Role of Lesson Study in Implementing New Ideas and Curriculum

To support teachers in improving teaching and learning, the Japanese school system uses lesson study as the primary mechanism of professional development (Lewis 2000; Lewis and Tsuchida 1998; Murata and Takahashi 2002; Takahashi 2000; Takahashi and Yoshida 2004; Yoshida 1999a). In lesson study, teachers study the standards, read relevant research articles, examine available curricula and other materials, and work together to design a lesson focused on a problematic topic while also addressing a broader research theme related to

teaching and learning. That lesson, called a *research lesson* (*kenkyu jugyuu*), is taught by one teacher from the planning team while others observe. The planning team and observers then conduct a postlesson discussion focusing on how students responded to the lesson so the teachers can gain insight into the teaching-learning process.

Lesson study affords teachers the opportunity to look closely at teaching practices and judge, based on student learning, whether those practices properly support students in learning mathematics. Researchers credit Japanese lesson study with enabling a national shift from didactic, teacher-centered mathematics instruction to a student-centered approach based on problem solving (Lewis, 2002; Lewis and Tsuchida 1998; Stigler and Hiebert 1999; Yoshida 1999b).

Although lesson study is commonly used as a medium of professional development that focuses on teachers and schools improving their teaching and learning, it can also be used to implement new curricula and research findings (Murata and Takahashi 2002).

■ The Case

The school we examine in this article is a public elementary school in Tokyo with about 760 students in grades 1 through 6 and sixty-four teachers and staff members. In 2008, the Japanese Ministry of Education released a revision to the national standards, known as the Course of Study. The teachers at the school decided to focus their lesson-study work over the next two years on the new standards and their effective implementation. Schools in Japan often do this, especially when the new standards include unfamiliar material. Sometimes, schools apply for a small grant from their district to support their implementation work, especially to pay for outside experts and publication of their findings. The school gives back to the district through a written report and an open house to share the learning with other schools. The school in this case study applied for and received such a grant.

The *Elementary School Teaching Guide for the Japanese Course of Study: Mathematics*, a document published by the Ministry of Education as a companion to the 2008 Course of Study (Asia-Pacific Math and Science Education Collaborative 2008), explicitly linked student thinking with expression:

In this revision, the phrase “to express” was added. The ability to think and the ability to express are considered to be complementary. In the process of expressing their thoughts, students may realize their own good points or errors in their ideas. By expressing thoughts, they become better able to organize logical steps and produce better ideas. In class, they can express various ideas and they can learn from each other. For this reason, thinking and expressing are mentioned in parallel. (p. 7)

Inspired by this text, the teachers at the school decided to spend two years seeking ways to encourage all students to think mathematically and to communicate their thinking with each other.

■ The School Research Organization and the Research Steering Committee

During the two years of the school research program, all full-time teachers at the school worked within a structure based on existing grade-level groups (see fig. 2.1). Grade-level groups in Japanese elementary schools typically facilitate sharing responsibilities for running school events and for academic activities. Most public schools have time for grade meetings in their weekly schedule,

typically about one hour, and teachers have desks in a common work area so they can collaborate regularly. For this research project, each grade-level group was responsible for crafting a plan for a research lesson, conducting their research lesson in front of the rest of the faculty, serving as panelists during the postlesson discussion, and supporting the other teams' research lessons.

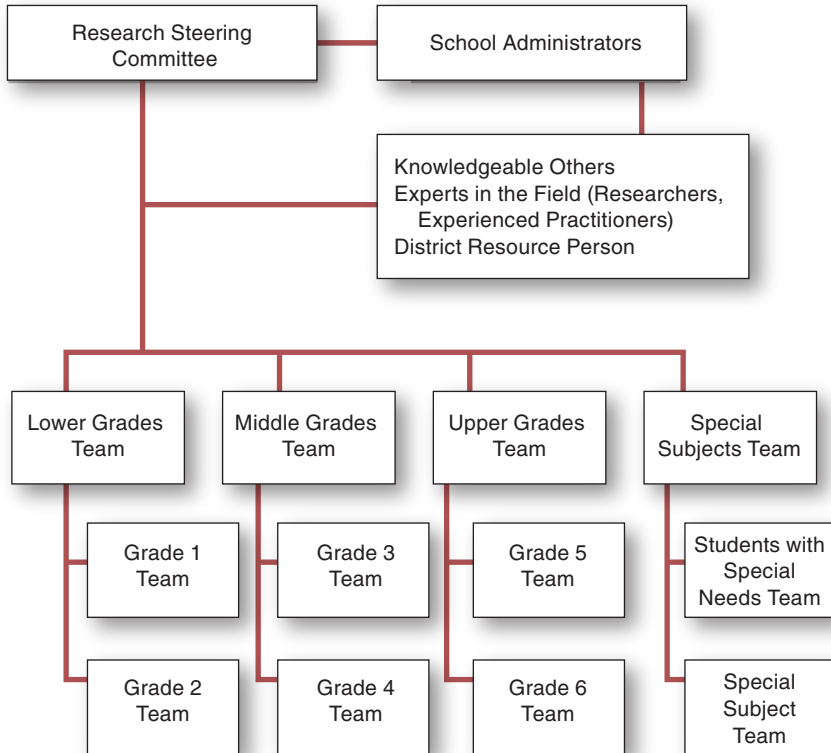


Fig. 2.1. Structure of the school research program

The school also had grade-band teams, which consisted of all the teachers from adjacent grades, such as grade 1 and grade 2. Although the responsibility for lesson planning belonged to each grade group, most of the lesson planning was done in grade-band meetings, since the teachers felt that the single grade-level groups, comprising only three or four teachers, were too small on their own to generate enough variety of ideas to lead to high-quality research lessons. Also, the grade-band meetings helped the teachers develop a shared view not only of their students but also of the scope and sequence of the curriculum in adjacent grades. This is important since Japanese elementary school teachers typically teach the same students for two consecutive years. Finally, the grade-band meetings allowed additional opportunities to participate in research lesson planning, a valuable experience, especially for novice teachers. The grade-band meetings allow these new teachers not only to learn how to design lessons but also to deepen their understanding of the topics they teach (Takahashi et al. 2005; Takahashi and Yoshida 2004; Watanabe, Takahashi, and Yoshida 2008).

Following common practice, the school organized a research steering committee, which consisted of representatives of each grade level and the lead teacher for mathematics, who was

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appointed chairperson of the committee by the principal on the basis of his leadership ability and knowledge of mathematics teaching and learning. (Typically, the lead teacher has his or her own self-contained class but also has responsibility for providing support for the upper-grade teachers and for preparing curriculum materials for the school. The lead teacher at this school taught mathematics to upper-grade students.) The committee led the school's efforts and maintained the cohesiveness of ideas across the grades. Among other things, the research steering committee was responsible for the following:

- Developing a master plan for the school research
- Scheduling and leading monthly meetings to find strategies to address the school's research theme based on the ideas of the teachers
- Publishing a monthly internal newsletter to record the findings from each research lesson
- Planning, editing, and publishing the school research reports, including those for the research open house
- Arranging for knowledgeable others to present lectures, teach demonstration lessons, and give final comments at research lessons

The first task of the research steering committee was to propose a focus for the school's research. That proposal was discussed by the full faculty at their first faculty meeting of the 2010 school year, and the faculty approved the following research theme and focus of study:

- Research theme: The development of individual thinking and the expression of these thoughts
- Focus of study: Seeking effective ways to support students' individual problem-solving skills and better facilitation of whole-class discussion in teaching through problem solving

The research theme articulated a goal for students, inspired by the *Teaching Guide*, while the focus of study expressed the faculty's idea about a path to accomplish the goal.

During year one, each grade-level team developed a lesson plan for a research lesson and conducted the research lesson and postlesson discussion to address the theme. All full-time teachers observed the lessons and participated in the discussions, so each full-time teacher had the opportunity to be a part of eight research lessons during the school year. The school also invited two distinguished mathematics educators to give lectures, one in the first month of the school year (April) and another during the summer break, about the issues and trends in mathematics education and implementing the new Course of Study.

The teachers at the school shared many responsibilities for making the research lessons and discussions go smoothly. For example, for the research lesson held in June, the grade 1 team planned and taught the lesson. During the postlesson discussion, the grade 4 team facilitated the discussion while the team of teachers of students with special needs took notes for the school's official record.

At the first faculty meeting of year two, the research steering committee proposed a change in the research theme based on their reflections on the first year's activities. The first year's theme had emphasized developing individual students' ability to think and express their thoughts. Having made some gains with respect to this theme—for example, teachers were observing that students

were more often able to solve problems independently—the teachers were now concerned that students were not appreciating the benefits of learning from others’ ideas and developing better ideas by exchanging and combining ideas. This led to the following new research theme:

- Research theme: Mathematics teaching that helps students explain their ideas to each other and learn from each other—learning through problem solving.

The faculty also approved the schedule of activities for year two, which included a public open house near the end of the school year in December. To meet the deadline for this event, the teachers in the school had to complete all research lessons by the middle of the fall and compile their findings prior to the open house. Six research lessons and two invited experts’ lectures on the theme topic occurred during the second year.

Throughout the two years of the project, the research steering committee met between the research lessons to summarize the ideas that had been proposed by each lesson planning team and addressed during the postlesson discussion. They published their summaries as a school research newsletter each month. These newsletters documented the process of this long-term collaborative effort, and more important, they allowed the teachers to share what was discussed and helped other teams build on the results of previous research lessons.

■ Lesson Plans and Their Development

In each stage of lesson plan development, members of the research steering committee reviewed the lesson plan and provided feedback to the team. Through this process, committee members tried to ensure that all the lesson plans developed by the school were of sufficient quality to merit discussion by the entire faculty and contributed to the school’s effective implementation of the revised standards. But the steering committee and the school administrators found that the quality of the research lesson plans in year one was not satisfactory. So the committee distributed to each teacher at the beginning of year two a list of questions to guide them toward higher-quality lesson plans:

- Does the lesson plan provide sufficient information for the teacher to understand the task and the flow of the lesson?
- Does the lesson plan provide sufficient information about how the planning team decided to teach the lesson as described by the plan?
- Do the objectives of the lesson plan clearly address the Course of Study?
- Are the tasks appropriate for the students given the date of the lesson?
- Are the key questions clear? Will they encourage students to think mathematically and help them complete the task independently?
- Does the lesson plan include reasonable anticipated student responses and indicate how the teacher will help students overcome any misunderstandings?
- Does the lesson plan include a plan for formative assessment and a plan to accommodate individual student differences during the lesson?

The list seemed to be helpful; according to the principal, the research lesson plans in year two reflected much deeper thought compared to those from the previous year.

■ Disseminating the Results of the School Research

Toward the end of year two, the school faculty and staff hosted a half-day public open house to share their findings. All the district content specialists and principals of other area schools were invited, and many other schools sent their teachers. In all, a total of 612 participants attended, including teachers, administrators, educators, and parents.

The public open house consisted of three major parts: public research lessons, research presentations by the school's research steering committee, and a panel discussion by experts in the field of mathematics education who had been involved with the school's research project. Twenty-eight mathematics lessons, based on twenty-five different lesson plans, were conducted simultaneously for the participants to observe at the beginning of the open house. All twenty-five lesson plans were in a booklet given to each participant on arrival at the school. The participants were thus able to witness strategies for the effective implementation of the Course of Study in live lessons and were able bring these ideas back to their school as a set of lesson plans. The presentation given by the members of the steering committee informed participants about the philosophy and the rationale behind the strategies being used at the school. The presentation also provided educators from other schools an opportunity to learn how the school conducted its research using lesson study and what the faculty at the school had learned.

Two sets of research reports, from year one and year two, were also made available for teachers and administrators of other schools as summaries of the school research effort. Since the school used a district grant to produce them, all the research reports were made available free. In the second year, the school compiled a report covering the entire two-year study. The report was produced as four booklets: three of them were distributed at the public open house and the last was sent to all the schools in the district at the end of the school year. An English translation of one of these booklets is available at <http://www.impuls-tgu.org/en/resource/readings/page-26.html>.

■ Discussion

The Japanese national standards released in 2008 contained a new emphasis on having students learn to express their ideas and learn from each other as a way to help students with their own thinking. The teachers at this school chose to spend two years working through lesson study to research changes in practice that would address this new emphasis. Some of what they learned—and what they put into practice—is evident in the booklet they published for the open house. Here are a few points from that booklet:

- Students were able to express their ideas by using not only words but also mathematical expressions and diagrams. Because of the cohesive use of diagrams, such as tape diagrams, area diagrams, and number line diagrams, and of expressions and equations throughout the grades, whole-class discussions became deeper and productive. Moreover, students were able to express their ideas in similar ways regardless of who was teaching the lessons.
- By crystallizing what was expected of students in each stage of problem solving (e.g., understanding the problem, solving the problem, reflecting upon the solution) and at the major points of teacher instruction, students were able to learn independently.
- By preparing effective key questions for each stage of problem solving, students were able to express their ideas in various ways and talk to each other, clearly focusing on what should be discussed.

- By planning blackboard writing, the flow of the lessons became more coherent. Students became able to look back at what they learned by looking at the board. Then they could use it to put the various ideas together in integrated and expanded ways, and to evaluate their learning during the lessons by themselves (Matsuzawa Elementary School 2012, p. 19).

Although the school made use of outside experts—either to teach demonstration lessons, give lectures, or provide final comments at the research lessons—it is through lesson study that teachers made the changes described above.

Each teacher was deeply involved in planning only one research lesson per year, which may not seem like enough to support such profound growth. But the school's work over the two years was carefully organized to support teacher learning in various ways. Each teacher at the school had at least two opportunities to critique lesson plans from another team during the planning process through the grade-band meetings. Teachers observed and discussed the lessons of all the other grades at the school. And the newsletters published by the research steering committee helped each successive team build on what was learned before.

■ Conclusion

Implementing new standards and implementing findings from research share a common challenge: teachers must determine what the necessary changes will look like in their own classrooms, with their own students. To figure out these changes, teachers need to conduct their own research, and lesson study provides an organized way to do so. Because lesson study is tied to teachers' practice, there is no gap between research and practice.

In the United States, many lesson-study projects have been conducted by a few volunteers within a school with support from outside the school. Individual teachers can certainly improve their own teaching by participating in such volunteer groups. But in Japan, as this case study illustrates, improving teaching is the responsibility of all teachers at a school, to be worked on together.

Meeting the challenges of implementing the Common Core State Standards, especially the challenges of the Standards for Mathematical Practice, requires fundamental changes in teaching, although the exact nature of those changes is not clear. Lesson study is a way for teachers to simultaneously investigate and implement changes in curriculum and practice, if a school faculty can work together in a coordinated way. Based on this case study, the following features of whole-school lesson study appear to be important:

- A clear research focus (the research theme and focus of study)
- A structure to support collaboration (grade-level teams and grade-band teams)
- Distributed leadership in the form of a research steering committee that comprises teachers from multiple grades
- Guidelines to help teams create high-quality lesson plans
- A conscious effort to extend what is learned in the research lessons to later research lessons (through the monthly newsletter published by the research steering committee)
- Support from knowledgeable others outside the school

None of these components is commonplace in U.S. schools. Implementing school-based lesson study in the United States would require a significant change in how school leaders view professional development—from viewing it as something that is done *to* teachers by experts from outside, to viewing it as something that is done *by* teachers. Such a change in thinking about professional development is likely to be important to successfully implement the Common Core standards.

This chapter summarizes key findings from a study supported by Project IMPULS at Tokyo Gakugei University. The full report from that study has been published as “Supporting the Effective Implementation of a New Mathematics Curriculum: A Case Study of School-Based Lesson Study at a Japanese Public Elementary School” (Takahashi 2014).

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