Chapter 10

Using Lesson Study to Develop Effective Blackboard Practices

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In Japan, lesson study has brought about several specific changes in teaching practices. One such change relates to the way teachers use the blackboard. Carefully planned and well-organized blackboard use during a lesson has developed into one of the most important teaching skills that fosters student understanding. This chapter describes a typical lesson process in Japan and how the use of the blackboard fits into that process.

In Japan, carefully planned and well-organized blackboard use during a lesson is considered one of the most important teaching skills that fosters student understanding of the topic they learn during a lesson. Japanese teachers generally believe that well-organized and coherently presented blackboard writing helps students see the progression of the lesson, the discussion of the various solutions, and how the class as a whole reached the conclusion of the lesson. In addition, it is said that a well-ordered blackboard helps students learn to organize their thinking and their notes (Yanase, 1990). For these reasons, Japanese teachers often discuss how they use or organize the blackboard when they develop a research lesson through lesson study.

A well-ordered blackboard helps students learn to organize their thinking and their notes.

When we teach a lesson, how often do we think carefully about how we organize the blackboard so students can organize their thoughts, see the connections, understand the material being studied, and organize their notes better? Professional development models that provide collaborative discussion based on observation of actual teaching in classrooms, such as lesson study, can help teachers think about this type of detailed teaching practice that enhances student thinking and understanding. For further discussion see "How Is Lesson Study Different from Learning to Teach in a Japanese Style?" on p. 98.

What Does Research Say about Use of the Blackboard in Japan?

Before I describe how Japanese teachers use or organize the blackboard, I would like to share some interesting research related to the topic of blackboard use. The 1995 Third International Mathematics and Science Study (TIMSS) Videotape Classroom Study (Stigler et al., 1999) investigated the percentage of use of the chalkboard versus overhead projector in classrooms in three countries: the United States, Germany, and Japan (see Figure 10.1). According to the study, Japanese teachers use the chalkboard all the time and rarely use an overhead projector in the classroom. On the other hand, U.S. teachers use the chalkboard and the overhead projector almost equally. TIMSS also reported that Japanese teachers tend to keep what they write on the blackboard until the end of the lesson (see Figure 10.2). In

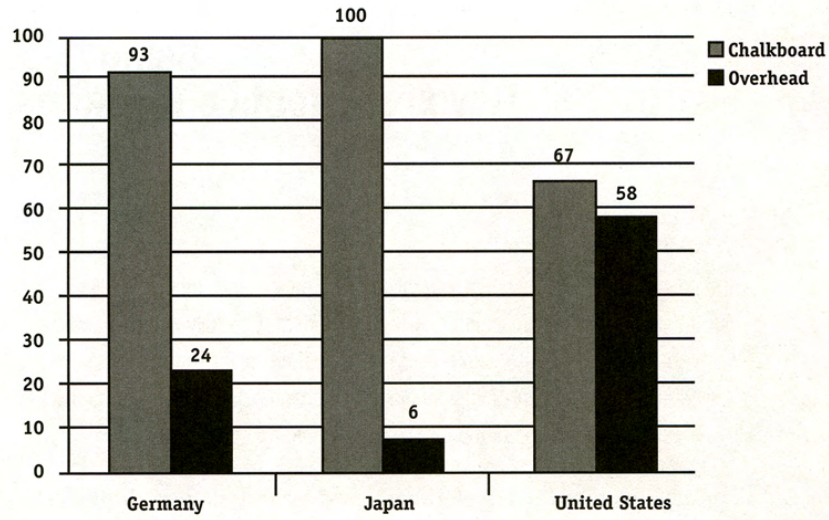

Figure 10.1: Percentage of lessons in which blackboards and overhead projectors are used. (Source: U.S. Department of Education, National Center for Education Statistics. Third International Mathematics and Science Study, Videotape Classroom Study, 1994–95.)

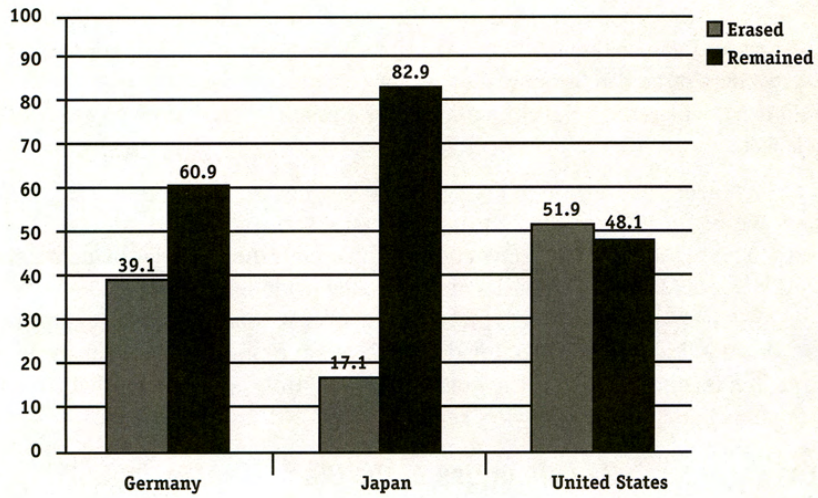

Figure 10.2: Percentage of tasks, situations, and PPDs (principles/properties/definitions) written on the blackboard that either were erased or remained on the blackboard at the end of the lesson. (Source: U.S. Department of Education, National Center for Education Statistics. Third International Mathematics and Science Study, Videotape Classroom Study, 1994–95.)

the case of U.S. classrooms, over half of what is written on the blackboard is erased by the end of the lesson.

What do these graphs tell us? Why are there differences in the way the two groups of teachers use the blackboard? The researchers who conducted the Videotape Classroom Study, James Stigler and James Hiebert (1999), talk about it in their book *The Teaching Gap*.

First of all, they conclude that the typical use of an overhead projector and blackboard differs between the United States and Japan. In the United States, the blackboard or overhead projector is used for one of the following: (1) to focus students' attention and (2) to display information in written or graphic form. In Japan, however, teachers use the blackboard to provide a record of the problems, solution methods, and principles that are discussed during the lesson.

I report similar characteristics of Japanese teachers' use of the blackboard in the classroom in my ethnographical research on lesson study in Japan, entitled *Lesson Study: A Case Study of a Japanese Approach to Improving Instruction Through School-Based Teacher Development* (Yoshida 1999). I describe that the "Japanese teachers rarely erase what they write on the blackboard. Everything they choose to record has a meaning and purpose, as it has been carefully planned in advance." In addition, I record an interview with a teacher who talked about what she was told by senior teachers about use of the blackboard. This teacher told me that "my senior teachers told me 'you should not erase what you write if you write on the blackboard and you should not write on the board if you are going to erase it.'" Another teacher said, "I try to organize the blackboard in such a way that my students and I can see and understand how the lesson progressed, what was talked about during the lesson and at the end of the lesson."

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Lesson Coherence

Stigler and Hiebert (1999) talk about the importance of the connectedness of mathematics across the lesson and how vital it is in helping students develop a clear understanding of the topic taught in the lesson. They call this "lesson coherence." They liken a coherent lesson to a well-formed story that helps students make sense of what is going on in the lesson. A well-formed story, according to Stigler and Hiebert, is a sequence of events that fits together to reach the final conclusion, making it easier to comprehend than a disjointed story.

Becker et al. (1990) and Stevenson and Stigler (1992) also write about the lesson processes that Japanese teachers follow during mathematics lessons. About half of the open-ended Japanese lessons start with the teacher posing a rich problem, followed by the students struggling with the problem on their own. Next, the students typically present their ideas for solutions and discuss them. Finally the teacher concludes the lesson. This lesson process pattern is also reflected in the lesson plan that the Japanese teachers develop during lesson study.

The open-ended lesson process follows this sequence:

1. introduction to the problem
2. understanding and solving the problem
3. development (includes presentation of solutions by students and comparing and discussing the solutions)
4. conclusion or summary of the lesson.

When Japanese teachers follow this process and plan a lesson, they spend a lot of time thinking about:

- what is a focused mathematical idea
- how each section of the lesson can be coherently organized in order to develop students' conceptual understanding of the concept taught
- how they can facilitate the discussion of the student ideas being presented
- how they can build on the things the class discussed to lead students to understanding.

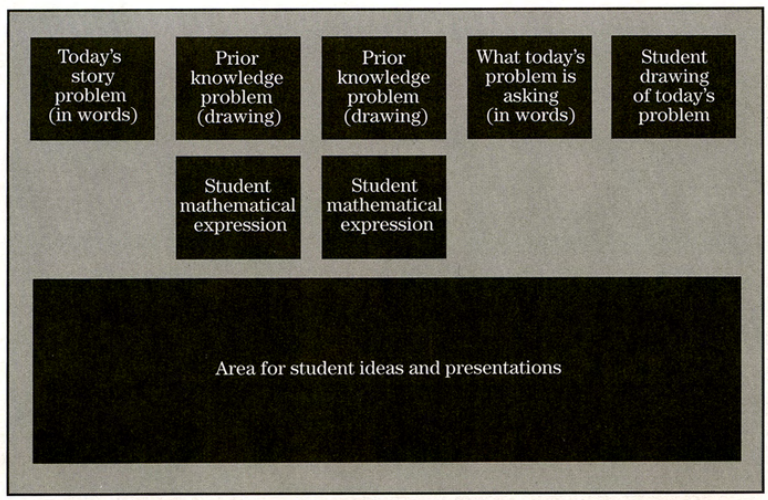

Figure 10.3: A blackboard plan the teacher discussed before implementing a research lesson.

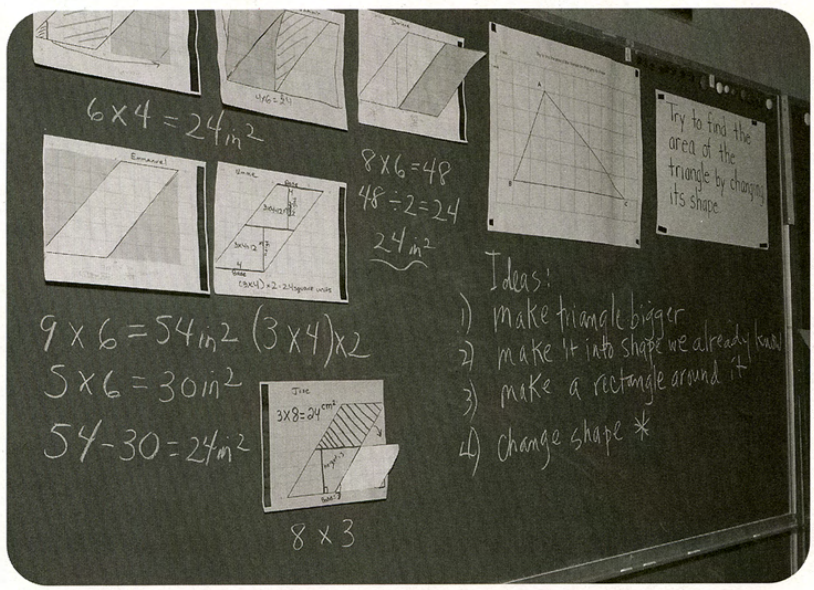

Figure 10.4: A blackboard from a research lesson conducted at Paterson School No. 2, Paterson NJ

What teachers focus on when planning a lesson is also reflected in the way they use the blackboard to enhance student understanding. Blackboard planning is called *bansho-keikaku* in Japanese. Japanese teachers strongly believe that a well-organized lesson plan and blackboard plan lead to a well-constructed and focused lesson, which in turn helps student understanding. At left are an example of blackboard planning (Figure 10.3) and a picture of a blackboard from a lesson that I observed (Figure 10.4). When the lesson was completed, the blackboard provided a visual summary of the concepts learned during the lesson.

Table 10.1

How Japanese teachers use the blackboard

- To keep a record of the lesson
- To help students remember what they need to do and think about
- To help students see the connection between different parts of the lesson and the progression of the lesson
- To compare, contrast, and discuss ideas students present
- To help to organize student thinking and discover new ideas
- To foster organized student note-taking skills by modeling good organization

How Do Japanese Teachers Use the Blackboard?

It is clear from the description above that Japanese teachers think about and use the blackboard very differently from their U.S. counterparts. It is important to examine closely how Japanese teachers use the blackboard during their lessons. Table 10.1 lists six important functions of blackboard use in Japan.

Keeping a Record of the Lesson

As TIMSS research indicated (Stigler et al., 1999) the blackboard is used for keeping a record of the lesson. This record would include the actual story problem the class worked on during the lesson; the main questions that provoked student thinking; student voices, opinions, and things noticed; various solutions determined by the students; questions and decisions resulting from student discussions; and important mathematical ideas generated by discussions. Keeping a record of the lesson is very useful when the teacher wants to refer to something that happened or was discussed earlier in the lesson. By looking at the blackboard during and after the lesson, students can gain a lot of information, which will go a long way to help them make sense of what they are learning.

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Helping Students Remember What They Need to Do and Think About

Keeping the story problem, directions, tasks, and questions on the blackboard provides a place for students to check what they are supposed to do. If students forget what to do or what to answer while they are engaged in the learning activity, they can simply look at the blackboard to obtain necessary information to get back on track. Students can also refer each other to what is on the blackboard to help each other.

Building Our Understanding

How Is Lesson Study Different from Learning to Teach in a Japanese Style?

Clea Fernandez

If we want to build a common understanding of lesson study, we need to realize that doing lesson study is not synonymous with learning to teach like the Japanese. My contact with lesson study groups has led me to realize that, for many, the answer to the question "Are we doing lesson study yet?" is whether they are teaching the way Japanese teachers do.

Conflating these ideas is not surprising, given the history of how lesson study was introduced to and popularized in the United States. Despite some wonderful earlier scholarly work, most people learned about lesson study through *The Teaching Gap* (Stigler & Hiebert, 1999), a book that described lesson study and also reported the results of the TIMSS study (*http://nces.ed.gov/timss/*), where Japanese teaching practices were a great focus. As a result, in the minds of many in the United States, lesson study and Japanese-style teaching have been considered one and the same.

However, thinking of lesson study in these terms could lead us astray in several important ways. It gives us tunnel vision, in that we look only to Japan for ideas about good teaching practices. No doubt Japanese teachers provide us with great ideas to ponder and to try out in our classrooms, but so might teachers in lots of corners of the world, or even in our own back yard. In equating lesson study with Japanese-style teaching, we severely limit the scope of what we consider possible models of good teaching, and it seems that we do not yet understand enough about teaching and learning to be able to afford to become so narrow in our views.

Instead, we need to use lesson study to question, challenge, and evaluate even those practices that are not in vogue today, to ensure that in our desire to improve teaching we do not throw out the baby with the bath water. Thinking of lesson study as a way to teach Japanese style focuses on producing a particular type of practice, rather than the real goal—learning how to put in place a process for the continual evaluation and renewal of teaching. In the worst-case scenario, trying to emulate the Japanese can lead to mimicry that is devoid of deep thinking and a sense of purpose. In the best-case scenario, it can help teachers to think about and explore interesting and often very novel teaching ideas.

However, I am certain that in 20 years Japanese teaching will look very different from how it looks today. And that is precisely because they are doing lesson study. It is impossible for us here in the United States to know what will be the needs and the dispositions of future generations of children to come through our schools. We certainly should not assume that what we do today is what we will need to do tomorrow to serve children well. Lesson study is a tool for bridging our changing needs across time, but not if we see it merely as a way to learn about a particular way of teaching.

Helping Students See the Connection Between Different Parts of the Lesson and the Progression of the Lesson

A well-organized blackboard documents coherence of the lesson. At the end of the lesson, it shows a coherent flow of the lesson, which in turn helps students to see the logical connections among all parts of the lesson. It also shows how the lesson progressed, how student ideas were incorporated into the lesson, and how the conclusion of the lesson was reached.

Contrasting and Discussing Ideas Students Present

Since various student ideas are presented on the blackboard during Japanese mathematics lessons, it becomes a place for students to discuss the presented ideas. The presented ideas are discussed and the similarities and differences in ideas are determined. In addition, the merits of using a certain method to solve the problems are also discussed. Through those discussions, the students might develop new ideas or questions they want to investigate. I call this type of blackboard use a "collective think-pad" because a whole class discussion is carried out based on the ideas presented on the blackboard.

Helping to Organize Student Thinking and Discover New Ideas

The blackboard can also be used for manipulating presented materials to help organize student thinking and discover new ideas. I also call this type of use a "collective think-pad." For example, sorting, lining up, categorizing, and moving directions can be helpful for students to think about, discover, and discuss new ideas. Teachers can facilitate the discussion and help students think about important mathematical ideas. Such use of the blackboard, combined with the discussion on the similarity and differences of the presented students' ideas, is critical for Japanese teachers to skillfully carry out child-centered or discovery-oriented lessons.

Fostering Organized Student Note Taking Skills by Modeling Good Organization

The way teachers organize the blackboard can also be a model for students to take notes during the lesson. Students do not intuitively have good note taking skills, so having a good example to learn from is very important. In this way students can see what is considered good note taking.

Conclusion

In the age of integration of technology in the classroom, many people may think that the blackboard is an old-fashioned instructional tool that has no impact on student learning. However, the innovative use of the blackboard, as is common in Japan, can have a profound effect on student learning in the classroom. Moreover, professional learning through lesson study can provide important opportunities for teachers to explore new and effective ways to use the blackboard to enhance student thinking and understanding.

References

Becker, J. P., Silver, E. A., Kantowski, M. G., Travers, K. J., & Wilson, J. W. (1990). Some observations of mathematics teaching in Japanese elementary and junior high schools. *Arithmetic Teacher*, 38, 12–21.

Stevenson, H. W., & Stigler, J. W. (1992). *The learning gap: Why our schools are failing and what we can learn from Japanese and Chinese education.* New York: Summit Books.

Stigler, J. W., & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom.* New York: The Free Press.

Stigler, J. W., Gonzales, P. A., Kawanka, T., Knoll, S., & Serrano, S. (1999). *The TIMSS videotape classroom study: Methods and findings from an exploratory research project on eighth-grade mathematics instruction in Germany, Japan, and the United States.* Washington, DC: U.S. Department of Education. Available at *http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=1999074*

Stigler, J. W., & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom.* New York: The Free Press.

Yanase, O. (1990). *Sansu: Tanoshii bansho no giho* [Mathematics: Techniques for enjoyable blackboard use]. Tokyo: Nihonshoseki.

Yoshida, M. (1999). *Lesson study: A case study of a Japanese approach to improving instruction through school-based teacher development.* Doctoral dissertation, The University of Chicago.