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LEARNING FROM JAPANESE APPROACHES TO PROFESSIONAL DEVELOPMENT

THE CASE OF LESSON STUDY

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This article first describes the Japanese professional development practice of lesson study and its articulation within the Japanese educational system. Next, insights gained from an empirical study that explored the feasibility of lesson study in a U.S. setting are discussed. More specifically, challenges to lesson study practice are highlighted, with particular attention paid to the difficulties faced by American teachers in trying to adopt the research focus that is inherent in lesson study. The article concludes with reflections about what the study of lesson study can teach us about efforts to improve teaching, which, like lesson study, center on having teachers examine their practice or that of others.

Today, many would agree with the idea that grounding professional development in actual classroom practice is a highly powerful means of fostering effective teachers (Lieberman, 1996). Certainly, the growing number of professional development efforts that center on teachers carefully examining and analyzing classroom practice is a testimony to this consensus (e.g., Cochran-Smith & Lytle, 1993; Lampert & Ball, 1998; Stein, Silver, & Smith, 1998). However, there is less clarity about how best to design these types of learning experiences for teachers (Ball, 1996; Lampert, 1999; Shulman, 1992). What are powerful ways for teachers to examine, discuss, and learn from their daily work? What are productive questions for teachers to ponder with respect to their practice? Which tasks support a beneficial examination of one's practice, and which do not?

This article provides insights about such questions by focusing on lesson study, a well-established Japanese approach to examining practice, the origins of which can be traced back to the early 1900s. Lesson study brings together

groups of teachers to discuss lessons that they have first jointly planned in great detail and then observed as they unfolded in actual classrooms. A number of American educators (Lewis & Tsuchida, 1998; Stigler & Hiebert, 1999; Yoshida, 1999) have seen great promise in lesson study as a form of professional development that could be adopted in the United States. Indeed, in many respects, lesson study represents an example of a systemic and well-articulated process for examining practice that has no equally well-developed counterpart in the United States. Thus, learning more about lesson study may very well help inform U.S. efforts to understand how best to engage teachers in an examination of their own practice.

The first part of this article provides a detailed description of how lesson study is actually conducted by Japanese teachers and presents a systemic view of lesson study. In the second part, empirical data collected in the United States by the author and her research team are drawn on to highlight challenges to lesson study practice in this country. Implications of

these challenges for both U.S.-based lesson study activities and for other forms of practice-focused professional development are discussed in a concluding section.

AN INTRODUCTION TO JAPANESE LESSON STUDY

The expression *lesson study* is a literal translation for the Japanese word *Jugyokenkyu*—*jugyo* means *lesson* and *kenkyu* means *study* or *research*. This translation can be misleading in the sense that lesson study is more than the study of lessons; it is rather a systematic inquiry into teaching practice much more broadly defined, which happens to be carried out by examining lessons. These lessons are known as *kenkyujugyo*, which the reader will note is simply a reversal of the term *Jugyokenkyu*, and which literally means *study* or *research lessons*. How do Japanese teachers examine their practice by focusing on study lessons? In what follows, a description of this process is provided.

The Lesson Study Process

Selecting a Lesson Study Goal

Teachers begin their lesson study process by setting a goal for their students that they want to address through their instruction. For example, they might decide that they want to have children become more involved in learning mathematics from each other, not just the teacher. Teachers then move to working on study lessons that serve as concrete explorations of instructional strategies that might lead to the achievement of their goal.

Working on Study Lessons

Work on every study lesson begins by teachers coming together to meticulously plan the lesson as a group. The actual product of this collaborative planning is a written lesson plan that describes in detail the design of the lesson. Next, one of the teachers in the group will teach the lesson to his or her students while the other group members observe the lesson unfold and take careful notes, usually onto a copy of the lesson plan. After this public teaching, the group reconvenes for teachers to share their observa-

tions and reactions to the lesson. In some cases, the group will stop its work on a study lesson after this debriefing. However, in other cases, the teachers will choose to revise and reteach the lesson. To this end, the teachers will create a modified version of the lesson plan that reflects all the changes that, based on their classroom observations, they have decided to make to the design of their lesson. Then a second member of the group will teach the new version of the study lesson to his or her students while other group members again come to observe. After the lesson, the teachers meet again to share their observations, comments, and suggestions. Work on a typical study lesson generally entails 10 to 15 hours of group meetings spread over a 3- to 4-week period, with the two teachings separated by only a few days.¹

Lesson study groups that have more than a handful of members will often break into subgroups of four to six teachers, each responsible for planning its own study lessons. In a large group, these subgroups may be constituted to bring together teachers who teach the same grade level. In smaller groups, teachers from similar grades might come together to form one of these subgroups (e.g., the first- through third-grade teachers).

Despite this subgroup structure, lesson study generally remains a whole-group activity because subgroups not only work under the same goal but stay abreast of each other's progress by sharing and commenting on their respective lesson plans as these evolve. Moreover, when the study lessons are actually taught, teachers from all the subgroups try to attend both the lesson and the follow-up discussion. This allows for ideas that represent the perspectives of all members of the group to emerge and gives the teachers an opportunity to compare and connect what is being learned from the various study lessons conducted by the group.

Writing a Lesson Study Report

Periodically, study groups stop to take stock of their lesson study activities and redirect them accordingly. Eventually these reflections culminate with the production of a written lesson study report. The focus of these reports, which are called "Summary of the Study" or "Research

Bulletins" (*Kenkyu no Matome*), is on providing a record of the work carried out by the group and the insights gained along the way. The creation of these reports is often timed to coincide with the group's deciding to move on to a new lesson study goal. Such a switch usually happens after at least a few years of working under a given goal, either when the group feels it may be reaching diminishing returns in exploring its current goal or when perhaps a more pressing goal has emerged for the group.

It is not surprising that Japanese teachers consider engaging in the lesson study process a very beneficial activity and one they would have trouble imagining not taking part in (Inagaki, 1988). In the words of one of the Japanese teachers involved in the research project that will be described herein,

In my experience lesson study is the most important thing for me to improve my teaching method or teaching techniques. Many teachers have observed me during my lessons and I have asked them to give me comments and to criticize my lessons. . . . Through these experiences, I believe that my teaching method has improved, I believe so.

It is also important to point out that key educational innovations and improvements have been linked to lesson study. For example, Lewis and Tsuchida (1997) have documented the important role played by lesson study in transforming the traditional science lessons of the 1950s into today's very prevalent inquiry-based approach to science teaching. A systemic view of lesson study is provided below to help the reader understand why lesson study has been able to have such a strong impact on Japanese education.

A Systemic View of Lesson Study

It is important to realize that what makes lesson study a truly powerful continuous-improvement agent is that it is articulated within the Japanese educational landscape to allow for an entire nation of teachers to regularly learn from each other's lesson study experiences. There are various key ways in which this articulation is achieved.

An Activity That Is Sanctioned and Supported

First, although lesson study in Japan started out as a grassroots activity, and even today, lesson study groups come together on a voluntary basis—though sometimes teachers participate because it is expected of them—lesson study is both sanctioned and supported by the ministry of education and its regional offices. In fact, there are pockets of money that lesson study groups can apply for to support their activities. It is also not uncommon for a regional education office to put out proposals and provide funds to encourage groups to tackle certain lesson study goals that seem to be of regional or national importance. Schools working with this type of support and directives are known as designated research schools (*Kenkyushiteiko*). This system of designated research schools provides an avenue for top-down influence on lesson study while also giving teachers the opportunity to influence national education policy.

An Activity That Is Prevalent

Official sanctioning of lesson study and the intrinsic value that most Japanese teachers see in this activity have helped make lesson study very prevalent in Japan. Indeed, a vast majority of Japanese elementary school teachers and many middle school teachers participate in lesson study (Nakatome, 1984) through one of several venues.² For example, teachers are often involved in lesson study as part of the training they receive through government-sponsored professional development activities. Preservice teachers also very often conduct lesson study during student teaching. They will prepare a study lesson in collaboration with their university-based mentors and the teacher with whom they have been assigned to work at their school site. They will then teach the lesson in this school, and all the teachers in the building, the university mentors, and other student teachers will come observe. Similarly, 1st-year teachers are often assigned a school-based mentor with whom they choose to do lesson study. It is also quite common for groups of teachers from across schools to come together in regional study groups or special interest clubs to develop

ideas about teaching and professional knowledge through the conduct of lesson study.

Many teachers also carry out lesson study within their schools as a schoolwide undertaking. This school-based lesson study is generally conducted in the context of an activity called *Konaikenshu*. The term *Konaikenshu* literally means *in school (konai) training (kenshu)* and refers to a form of school-run in-service that brings together all the teachers in a building to work on a schoolwide improvement goal. Teachers begin *Konaikenshu* by identifying any troubling and widespread gaps that they perceive between the qualities they want to foster in students and the actual outcomes they are seeing in their students. The *Konaikenshu* goal is then selected to represent an effort to narrow one of these gaps. For example, teachers who notice that they are falling short of their aspiration to help foster children who enjoy and see the importance of history might select as their *Konaikenshu* goal to foster children's love and interest in history. A very common approach then becomes to conduct lesson study as a way to work on this *Konaikenshu* goal. In other words, the *Konaikenshu* goal selected becomes the goal that fuels lesson study activity at the school.³

It is not uncommon for a single teacher to be involved in lesson study through several different venues. For example, a teacher might be doing school-based lesson study through *Konaikenshu* and might also be a member of a regional lesson study group. This allows for the work of one group to be enriched by that of another through the multiple lesson study experiences that individual teachers in the group might be having.

An Activity Enriched by Outside Advisors

Another factor that enriches and elevates the work of lesson study groups is the common practice of involving an outside advisor in the lesson study process. This advisor is usually invited to key meetings and in particular will observe and comment on study lessons planned by the group. In fact, at the prefecture and regional levels (more or less the equivalent of

U.S. school districts), there are individuals hired as "instructional superintendents." The role of these individuals is to support the schools to which they are assigned, somewhat akin to U.S. district staff developers. They often deliver support to a school by taking on the role of a lesson study advisor if the school happens to be conducting lesson study, something that, as already mentioned, is actually quite common at the elementary and middle school levels. Working with a lesson study group allows instructional superintendents to deliver professional development that connects to the everyday efforts and preoccupations of teachers.

Advisors to lesson study groups are chosen because they have strong content, pedagogical, and/or curricular knowledge that they can bring to the group. These experts are also instrumental in expediting a group's access to information, particularly theoretical information or recent research findings, which might otherwise be too time-consuming or difficult for teachers to access on their own. Additionally, an advisor's feedback to a group is often based on recounting observations made while visiting other lesson study groups. Thus, the advisor can serve as a vehicle for helping lesson study groups learn from each other's efforts. Interestingly, however, the role of an advisor is not to take over the work of a group, which is meant to always remain teacher-led and responsive to the needs of the particular children served by the teachers in the group.

An Activity Enhanced by Multiple Means of Dissemination

Holding lesson study open houses is another practice that allows lesson study groups to learn from each other's work. During an open house (*Kokai jugyo* or *Kokai kenkyu jugyo*), or what is sometimes referred to as a "research learning presentation meeting" (*Gakushu kenkyu happyokai*), teachers and other educators are invited to come see and discuss a set of study lessons prepared by the group hosting the event. Generally, this is done after a group has been working on its lesson study goal for a while and has ideas and issues it wants to discuss with its guests. These open houses vary tre-

mendously in size and scope. In particular, schools with good reputations can draw large numbers of teachers when they host these events. Open houses held at national schools can attract hundreds of teachers from all over the country. Open houses are also often held in conjunction with regional or national conferences of professional teacher organizations (e.g., the Japanese council of science teachers). These latter open houses, which are held at schools in the area where these conferences are held, also draw large crowds.

Written lesson study reports also allow groups to learn from each other. These reports are circulated by instructional superintendents and teachers when they visit each other during open houses or other events they might attend. In fact, some groups, most often but not exclusively those at national schools or designated research schools, even pursue publishing their lesson study work. These writings are then distributed nationwide through major bookstores, where teachers can find a wide selection of lesson study-based publications written by teachers from all over Japan.⁴

Finally, lesson study groups remain dynamic in their thinking through the common practice of teacher rotation, by which teachers are reassigned to different schools on a regular basis, thus providing a natural means for the work of lesson study groups to be disseminated from one school to the next.

The systemic view of lesson study painted above clearly must stay in the forefront of our minds if we want to build lesson study practice in the United States that deeply impacts our teachers and our students. However, the experience of the author and her research team in bringing lesson study to American teachers also suggests that this vision must be complemented by an understanding of how to help teachers engage in powerful lesson study at the level of individual lesson study groups. It is important to ask what it will take for our implementation of lesson study to be well articulated in conjunction with what is required for this practice to be feasible and worthwhile for any of the individual groups that engage in it? The remainder of this article focuses on describing the challenges

that individual lesson study groups need to overcome and the implications of the challenges.

CHALLENGES TO LESSON STUDY IN THE UNITED STATES

The challenges to lesson study described in this section were uncovered in the course of a research project designed to explore lesson study in the United States (Fernandez, Chokshi, Cannon, & Yoshida, in press). In the past 3 years, this project has involved two separate groups of teachers engaged in lesson study in the area of mathematics. The first was a group of 14 K-8 teachers in a school in a highly urban and diverse school district in New Jersey. This school was part of this project during the 1999-2000 academic year. The second is a group of 19 middle school lead teachers and staff developers from one of the community school districts in New York City. They have been part of this project since the 2000-2001 academic year.

Both groups of teachers were provided on an ongoing basis with tools (e.g., a lesson planning format or a protocol for how to discuss a study lesson in their group) and information about lesson study (e.g., directions about how to select a lesson study goal and the purpose of such a goal). However, the teachers in both groups were allowed to engage freely in lesson study and to discuss the lessons they were planning in any way that they saw fit.

A unique aspect of the work of the first group was that a dozen Japanese teachers living in the United States were enlisted to serve as lesson study coaches to the American teachers. As a result, it was mainly the Japanese teachers who taught the first group about lesson study, whereas the second group has been learning about lesson study from the author and her research team. In both cases, the lesson study activities of these groups were studied and documented through videotaping all their meetings and lessons, keeping extensive field notes of the research team's observations, interviewing participants, and collecting all artifacts related to this work (e.g., the lesson plans produced).

Expected Challenges to Lesson Study Adoption in the United States

At first glance, there are a number of challenges one would naturally expect lesson study to pose to U.S. teachers, all of which, to a certain extent, have been encountered in the course of the project described herein. For example, lesson study requires time for teachers to meet and flexible scheduling strategies that allow teachers to watch each other teach. Lesson study asks American teachers, for whom working in independent isolation is most often the norm, to work collaboratively and to open up their classrooms for observation and candid discussion with peers. In addition, whereas in Japan there is a national curriculum to which teachers strictly abide, American teachers often have much leeway in what they choose to cover with their students and when. This lack of curricular common ground is likely to make collaborative lesson planning difficult for American teachers to engage in. Finally, and perhaps most important, teachers in the United States may have weak content area knowledge, particularly in areas like mathematics. These deficiencies are likely to lead to the planning of lessons that are unsound, perpetuate misconceptions in both teachers and students, and call into question why teachers should do lesson study in the first place. As discussed below, although the above litany of challenges may sound daunting, it appears that we are well poised to tackle each of these challenges.

Finding Time and Interest for Lesson Study

The fact that we are witnessing a fast-growing number of lesson study initiatives take hold all over the country is an indication that teachers and administrators see the importance, and are finding the time for, the sustained conversations about teaching that lesson study supports.⁵ Indeed, many districts are now heeding the calls that have been made for a move toward increased time for professional development and teacher collaborations (Elmore, Peterson, & McCarthey, 1996; Stein et al., 1998). These emerging dispositions, which were present in

the two lesson study sites described above, no doubt create a welcoming environment for lesson study.

Overcoming the Fear of Making One's Teaching Public

It is true that every teacher introduced to lesson study through the research project described herein has been nervous about teaching in front of others and the follow-up discussions that ensue after this public teaching. In the words of one of these teachers, "Before sharing my lesson, I was feeling sick to my stomach. Very nervous." However, these teachers, like many of their counterparts across the country who are exploring lesson study, have found the will and motivation to engage in this sharing of lessons. It seems that these lesson study pioneers are not unique or exceptional but rather reflect a climate change that is gradually taking place in our schools. There has been a strong call for breaking the pervasive isolation that teachers have endured thus far, and we are seeing a slow but certain move in this direction (Little, 1982). The fast growth of lesson study in the United States, as well as the increasing number of other professional development efforts that have teachers working collaboratively in and around each other's classrooms, is a clear indication that the culture of schools, and the teachers who work in them, are becoming more welcoming of activities like lesson study.

Finding Ways of Creating a Curricular Common Ground for Joint Lesson Planning

The impact of not having an agreed-on curriculum was clearly felt at the New Jersey site of this research project. For example, on a number of occasions, teachers had difficulty agreeing about what content to teach children, as exemplified by the excerpt below from a discussion one group had while planning a study lesson on the area of triangles:

Teacher 1 (T1): What do we want students to bring home here? Isn't it the formula of right triangles?

T2: It's the relationship to area of a rectangle.

T1: If our goal is the relationship between triangle and rectangle, then we shouldn't give them the easy shape.

T3: We should show them the relationship and then teach the formula the next day.

- T2: What is the relationship? What are we asking them to find? . . . The relationship is the formula.
 T1: They'll say the relationship is that area of a triangle is one half area of a rectangle.
 T2: So we want them to find area of triangle and we need them to find area of a rectangle first.
 T1: But we're going to tell them about area of a rectangle beforehand so they can apply it. That's the goal.

Similarly, when this same group was deciding how to approach their lesson, the teachers had to first learn what content had been taught to the children in the two classrooms that would take part in the lesson because there were no set expectations about what children should be learning. For example, at one point, the teachers were debating whether to express the formula for area of triangle as one half base times height, base times height divided by two, or both. One of the group members asked one of the teachers who was to teach this lesson if her kids were "coming out of fractions." This teacher explained, "Mine are, not multiplication of fractions. That they couldn't really understand, they understand division more, they would see it better with division." In contrast, the other teacher teaching the lesson had to explain that that her students had had a different grounding thus far and that they would be able to clearly see the meaning of the first formula.

These difficulties are in sharp contrast to what was evidenced at the New York City site that had undergone a wholehearted adoption of standards-based curricular materials a few years prior to beginning lesson study. This situation allowed the teachers in the second group to plan lessons together without talking across each other. In fact, a great deal of their discussions focused on sharing how each of them in the past had approached a particular lesson and the responses he or she had seen from students. This allowed for these teachers to focus their conversation not on what they should teach but rather on how to teach an agreed-on lesson, which they could plan by building on their collective past experiences with this lesson. Moreover, their commitment to following this common curriculum created few discrepancies in what children were learning across classrooms, even when these were in different

schools. These observations suggest that although we do not have a national curriculum, lesson study can be married rather effectively with the movement toward adoption of standards-based curricula. As more schools use these materials, one could even envision networks of teachers nationwide exchanging lesson study products.

Overcoming the Knowledge
 Limitation Many Groups
 Are Likely to Encounter

At the New Jersey site, teachers often had large gaps in their content knowledge as well as in their understanding of how children might engage with particular content. In response, the Japanese teachers often took on the role of outside advisors by providing comments and suggestions aimed at enriching how their American counterparts thought about content and children's learning of it (Fernandez, Cannon, & Chokshi, in press). Below is an illustrative excerpt from one of the many conversations in which one of the Japanese teachers took on the role of more knowledgeable other:

- T1: You need area of a triangle to learn area of a parallelogram.
 T2: Not really.
 T3: Yes you do.
 T4: We always see it that way in books. We decided it should come after triangle.
 T1: We really just took it as a given that the order should be rectangle, triangle, then parallelogram. Maybe it doesn't have to be that way.
 T5: It would be easier to explore the concept of height that way.
 Japanese teacher: In Japan, we do parallelograms after triangle. I think we do it that way because in very slanted parallelograms, the height is outside the triangle. This is a very difficult idea: You can't cut the figure and put it together. So this really builds on students' understanding of triangles. Also, in Japanese, the words for the formula of parallelogram (base and height) are the same words we use for formula of a triangle.

Clearly, issues about how to overcome the limitations of individual lesson study groups seem much less disheartening when one evokes the systemic view of lesson study painted earlier and, in particular, when one includes in this vision the presence of effective outside advisors.⁶

Revealed Challenges to Lesson Study Adoption in the United States

Unfortunately, the optimism expressed above fades in the face of the much more fundamental challenge to lesson study uncovered in the course of the research project on which this article reports. More specifically, this work has revealed that what is most difficult about lesson study is for teachers to move beyond simply looking at their teaching to actually seeing what is of value in this teaching to them as learners. Of course, when teachers have the opportunity to observe in each other's classrooms, much incidental learning will naturally happen simply by virtue of seeing another engage in the act that one carries out day in and day out.⁷ However, the power of lesson study lies in bringing teachers together to make their lesson study learning purposeful and directed.

The Skills Needed to Make Lesson Study Purposeful by Adopting a Research Stance

Japanese teachers' lesson study activities have a great deal of direction because these teachers see lesson study as a form of research that centers on conducting classroom experiments. Through these experiments, data are gathered and interpreted with the ultimate purpose of generalizing findings to everyday teaching contexts. To this end, Japanese teachers carry out their lesson study work in ways that require a number of basic research skills.

Posing rich, researchable questions. First, Japanese teachers have a good sense of what are productive questions for them to explore together. As already described above, some of the central questions that Japanese teachers strive to answer stem from their lesson study goals. In turn, as one of the Japanese teachers who worked with the New Jersey teachers explained, "These goals focus what you talk about in your meetings and how you evaluate your lesson study practice." However, for this focusing to take place, Japanese teachers transform the general questions they start out with into concretely researchable ones. For example, a group interested in the question, "How do we foster students who are independent learners?" might

choose to explore how to design classroom tasks that encourage students to talk to each other about their ideas.

Designing a classroom experiment. Japanese teachers are also good at knowing how to design aspects of their study lessons to help them explore the questions in which they are interested. In particular, they are skillful at honing in on an issue, like student tasks, and identifying particular parameters of these tasks that they might want to focus on. For example, in the course of several study lessons, they might weigh the pros and cons of various options for the phrasing and format of student word problems.

Specifying the type of evidence to be collected. Moreover, because the evaluation of the classroom experiments created through lesson study is meant to be data-driven, it is not surprising that Japanese teachers also pay careful attention to what they look for in their lessons. These teachers clearly understand the importance of articulating for themselves, and others, exactly what they want to look for to make their observations productive. One of the Japanese teachers involved in this project articulated this principle in describing how to draw up a lesson plan for a study lesson:

This [pointing to a certain section of a sample lesson plan being presented] is where you tell your observers what they should keep in mind when looking at the lesson. When writing this part, you should think about the objectives and goals you described earlier in the plan. In order to achieve these goals, what do you want people to look at to see if these goals were achieved?

Interpreting and generalizing results. Finally, Japanese teachers are also careful to interpret and move beyond the data they gather so that they can refine their research questions, uncover new ones, and distill from these data key principles about how best to teach. In other words, they engage in theorizing and generalizing, much like any good researcher would. For example, after observing at the New Jersey school a study lesson that centered on having students discuss their solutions to two problems, one of the Japanese teachers who attended the lesson pushed the group to think about an important

broader issue raised by this lesson. He suggested that it was critical to establish the various reasons why a second problem might be posed to students after a teacher has first had a class work together on an initial problem. He argued that making clear and explicit these various purposes (e.g., to review or practice something that was learned, to assess learning, or to push children's thinking further) would be essential for helping teachers determine how follow-up problems should be designed and presented to students. In essence, he was encouraging the group to engage in an exploration of principles by which teachers might design and sequence lesson tasks.

Similarly, during another study lesson debriefing conducted at the New Jersey site, a Japanese teacher reacted to the study lesson by sharing principles he applied in his practice and that he felt others might want to think about. He explained,

When I teach, I always look to see the solution method that the majority of students use. I believe this method is probably what they have learned from their mathematics education up to that point. Since most students in this lesson counted the boxes on the grid paper, that's probably their level of understanding of area. That may be something you need to approach differently for students to learn better skills to solve this problem.

Challenges Faced by U.S. Teachers Trying to Adopt a Research Stance During Lesson Study

Development of the research skills described above is what the New Jersey and New York City lesson study neophytes struggled with and is the roadblock to powerful lesson study practice about which we should be most concerned. Not only is learning how to carry out lesson study as a form of research a subtler challenge than those one immediately thinks of when trying to imagine this practice in the United States, but quite likely it will be a significantly more difficult challenge to overcome. The rest of this article focuses on these issues by examining the work of 5 of the New York City teachers.

It is important to point out that these teachers are being focused on not because they were par-

ticularly deficient in their ability to provide lesson study with a research focus; quite to the contrary, the other teachers had similar, if not greater, difficulties maintaining a research focus during lesson study (Fernandez et al., 2002). This group was chosen because its struggle was particularly poignant because its members were genuinely and staunchly committed to exploring their research question despite the numerous difficulties they encountered along the way.

The lesson study group of which these teachers were part had selected for its lesson study goal the promotion of critical thinking in students. In particular, the group had decided to plan study lessons to help them think about how to encourage rich student questions. They wanted children to ask questions of each other as well as of their teachers and of the problems they were asked to work on because they saw questioning as one important indication of critical thinking. The group had broken into three separate planning subgroups, one of which is represented by the 5 teachers whose work is described below.

Posing Rich, Researchable Questions

The 5 teachers began their work on their first study lesson very much with their group's lesson study goal in mind, probably in great part because in teaching them about lesson study, the author and her research team strongly emphasized the importance of this goal. The first signs of struggle quickly emerged as they tried to think about how to use this goal to identify a specific question for them to research through the design and implementation of their study lesson. Their dilemma seemed to lie in not knowing how to articulate for themselves what exactly they wanted to examine with respect to student questions and which aspect of the lesson to focus on in conducting this examination. Below are several excerpts from their discussions as they planned the lesson that illustrate these difficulties:

T4: Do we think it happened [students posing questions] from the visuals, do we think it was a problem that promoted the question or do we think it was a teacher question?

T5: Do you want to go at it from either or focus?

T4: Isn't that what we are trying to distinguish? We are trying to separate these. We want to know . . .

T1: You can't separate it all out.

T4: But that's our study. We can't come to a conclusion that visuals, real-world problems and teacher questioning enhance student questions, we know that. The question is which one of these enhances these more.

T1: I disagree, I don't know.

T5: How do you measure it?

T1: How do you know for one kid it's the visual and for another kid the actual problem?

T1: Then my interest would be to look at what questions kids ask when they're doing their problem in their groups.

T4: But we want to look at the effect of something.

T5: What generated those questions is what we have to look at.

T2: Maybe what generates questions in the classroom.

T5: That's pretty broad.

T1: My theory is that it depends on how you present the whole thing to start out with.

T4: So that's intertwined with this. Because questions teachers ask as they're introducing the problem can also have an effect.

T1: It's hard to separate out all this.

After more debate like that exemplified above, the teachers ultimately settled on just focusing on the effects of visuals on student questions because the lesson, which had students enlarging a poster and thinking about scale factors, was going to rely heavily on the use of visuals, so it made sense to focus on visuals. They even developed specific reasons for why they were looking at visuals, which they expressed in the following terms and included in their lesson plan:

Our lesson study focuses on the effect that visuals have on student questions. Student questions are an important part of students' overall learning. Visuals are an essential link in making a connection between the language of the problem and its conceptualization. The use of visuals for many students offers an entry point into the problem, providing clarity to the concepts and allowing for the formulation of questions. The use of visuals can provide motivation for students to become engaged in the lesson.

Designing a Classroom Experiment

Despite this chosen focus, the teachers had a great deal of difficulty figuring out exactly how to look at the effect of visuals in their study lesson. This difficulty stemmed from a number of issues. First, throughout their work, they continued to feel that because visuals are accompa-

nied by teacher questions and teacher actions, which often promote student questions, it would be impossible to separate the effect of these various elements. The conversation below is typical of many of the exchanges they had with respect to this issue:

T1: I wonder if you could just come in and put up two things and say, "What's going on here?" But that's a question. Without giving them a question just showing them and saying, "Any comments?"

T5: What do you see?

T4: That's a question in the visual, and the visual will be sparking as well. So that's a combination.

In a sense, these teachers were having trouble seeing that in their research, they could hold certain variables constant (e.g. teacher questions) to study the effect of a specific one, in this case visuals. To study the effects of visuals in this manner, the teachers would have needed to identify characteristics of visuals for them to somehow manipulate and look at. For example, they could have chosen to vary across their lessons aspects of the design for their visuals to compare and contrast the results obtained with respect to student questions. This idea, however, never came up as an option. Indeed, throughout their work, these teachers never became specific about what it was about visuals that they wanted to study. They simply kept stating and reminding each other that "we are interested in the effect of visuals on students' questions." In fact, the view that the visuals did not need to be designed but simply presented to students and then "studied" was quite prevalent in their discussions, as illustrated by the excerpts below:

T5: No, we don't need to design visuals.

T2: Provide visuals.

T4: Our goal is to see the effect visuals have on student questions

T2: We're focusing on visuals, so I think you need the visuals. How visuals affect student questioning, so we want to present as many visuals as possible and to see how many questions were generated.

T2: The only thing I'm concerned about again, we're going to see how visuals affect student questions. I'm afraid we haven't set that up enough for the kids. Really it could be such a clean lesson that they might not have too many questions. Does that make sense?

T4: That's what we study. When we go back and forth between your lesson and S's lesson, these are the visuals we set up, we set up the whomps, and then we

set up for them to potentially create their own visuals. Those are the things we are setting up in the room. We look at that. We come back and we talk about it, and it's like their questions were not good, or we don't feel that these visuals have stimulated their questions. That is the purpose of lesson study, so how do we change it for the next lesson.

At one point, one of the teachers became so frustrated with their discussions about studying the visuals that she actually exclaimed, "This has nothing to do with teaching." She argued that instead, what they needed to do was focus on just planning the lesson and worry about the effects of visuals later, a position toward which she was able to sway the others. This was striking because it meant that the teachers were losing sight of the idea that they were engaged in designing a teaching experiment.

It is also noteworthy that these teachers ultimately devoted a large proportion of their time to designing the visuals for their lesson. However, this designing was done with the goal of creating materials that would help the children understand and eventually solve the problem they would be working on, not on affecting student questions.

Specifying the Type of Evidence to Be Collected

Not surprisingly, the difficulties described above carried over into the teachers' discussions about how to conduct their lesson observation. Part of the problem also seemed to lie in their ill-defined sense of what might constitute useful data, an issue they debated with little success on a number of occasions, as exemplified by the conversation below:

- T1: I want to look at their questions from beginning to end.
T4: But what are you studying?
T5: What about their questions?
T3: What aspect are you studying?

Their difficulties in defining what they were going to try to "measure" with respect to student questions ultimately resulted in their willingness to remain very vague about the information they would be collecting. In fact, they seemed more preoccupied with how to structure their observation than with specifying it. Below are examples of some of their discussions:

- T4: But my question is we need to make a system of how we're going to gather data.
T3: Perhaps the questions will be while they're working and we will be going around.
T5: But we are not supposed to interfere.
T4: You hear, and we have to make a checklist.

- T1: Yes, so do we have to have some questions in the back of our minds that we hope to see some kids ask?
T4: We could, but either way we are going to have to come up with a way that we're going to generate data that just looks at the questions that kids ask and make some reference to what sparked the question.

- T4: The question is how do we gather this data?
T5: There is only one way to gather data about it.
T1: Listen to what they're asking and what they're doing and what they're saying.
T4: So let's take me for example, I'm going to go in and I'm going to take two kids. . . . Say M. and I are looking at the same two kids, and we're writing the questions we hear and what we think sparks it. We can have a conversation about that pair of kids and we can bring it back to the whole group.
T5: Even more interesting would be pairs of kids that represent a spectrum of the class.

In the end, these teachers did design an observation protocol for themselves and all those who attended their study lesson. The idea was for all the observers to focus on a small group of students and to record every question these children asked and whether it was stimulated by the lesson visuals. Having this tool resulted in observers' being able to report extensively during the debriefing on the questions that they heard and speculating about how these had been affected by visuals. However, because the teachers had not really designed the visuals to test any particular idea about what makes a visual stimulating, it was hard for them to know what to make of the observations shared. Alternatively, the data collected could have been used to identify interesting issues for teachers to explore more systematically the next time around. However, the hypothesis generating value of the data collected was also overlooked.

Interpreting and Generalizing Results

Instead, the teachers' interpretation of what occurred was that they had taken too narrow a stance. In their words,

T4: I think maybe our data collection could be more broad. I think that when we planned the lesson it wasn't just focused on the visuals, it was focused so it could be the whole lesson, including the visuals.
T2: I think the visuals narrowed us too much.

Convinced by this argument, the teachers chose to replace their focus on visuals with a broader focus that, in essence, translated into a failure to select any specific alternative research question for them to explore. In so doing, the idea of lesson study as a form of classroom inquiry was summarily abandoned by these teachers as they worked on revising and reteaching their lesson.

REFLECTIONS ABOUT IMPLICATIONS AND NEXT STEPS

The struggle experienced by these teachers is eye-opening. Clearly, helping teachers see what examining their practice can offer to them as learners and, more important, helping them learn how to maximize this learning, will be critical challenges for instituting lesson study in this country. Moreover, these challenges must be met as we work concomitantly to institute a systemic implementation of lesson study designed to help overcome some of the inherent limitations that disconnected groups are likely to encounter. In fact, it may very well be that in the long run, only a systemic approach to lesson study will allow us to create a rich enough learning environment to support teachers in acquiring the research skills needed to carry out powerful lesson study work.

Furthermore, the challenge of making teachers' examinations of practice purposeful should not be seen as exclusive to lesson study. All efforts that aim to have teachers learn from their daily work must face similar hurdles. Of course, in lesson study, this challenge seems particularly daunting because teachers need to structure and organize their learning; whereas in other efforts, this focus is often created by a coach who selects case materials and guides the activities that teachers engage in as they examine these materials. Yet ultimately, the self-generated inquiry required of teachers during lesson study is, in many respects, what gives power and appeal to this activity. Moreover, any examination of practice that we encourage teachers to

engage in ought to help them internalize productive mindsets for learning from their work. After all, this kind of internalization is part of being a "reflective practitioner," a stance that many educators have long advocated (National Council of Teachers of Mathematics, 2000).

Quite likely, continued research on lesson study could help us specify productive ways of asking questions about teaching and of looking in classrooms for answers to these questions. No doubt, developing this knowledge could also be of use to others trying to understand how to help teachers learn from their practice in contexts other than lesson study. Conversely, those coaching teachers in these other contexts should step back from their work and try to make explicit ways to work with teachers to develop their dispositions toward inquiry and reflection. To date, too much of this work has been taking place without making transparent the practices of those who engage teachers in these activities. As a result, thus far we have not capitalized on our efforts so that we can better understand what it means and what is required of teachers to adopt the stance of reflective practitioners. Missing these important lessons in our work, whether we are focusing on lesson study or on other efforts, is something we should avoid at all costs.

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NOTES

1. The amount of time teachers devote to working on a study lesson will vary depending on how committed and invested they are in their lesson study work and whether the lesson is going to be shared outside of their group (see the section on open houses for details about this sharing).

2. The fact that lesson study is not common in Japanese high schools has more to do with the nature of Japanese high school life and its teachers than with any inherent feature of lesson study that would make it inappropriate for teachers of older students.

3. In-service teachers generally conduct most of their lesson study work after school (except for teaching the actual study lessons). Although in Japan, school lets out between 2:40 and 3:45 p.m., teachers are hired to work until 5 p.m. It is during these afternoon hours that most lesson study meetings are conducted. It is, however, not uncommon for lesson study meetings to spill into after-hours.

4. The utility of these reports is of course facilitated by the fact that in Japan, all teachers teach with the same national curriculum.

5. Informal surveys conducted by the author and her research team have confirmed the existence of at least 50 lesson study groups across the United States, some of which represent districtwide and statewide initiatives. The Lesson Study Listserv established by the author and her research team currently connects more than 550 individuals nationwide who are interested or engaged in lesson study.

6. Developing a strong core of instructional superintendents should by no means be seen as an easy task. The requisite skills for fulfilling this role are numerous, and developing these in any individual will require a concerted effort.

7. The teachers who participated in lesson study through the project described in this article report both finding their experience very valuable and also learning a lot from the process in which they engaged and the observations it allowed them to make of their colleagues' classrooms.

8. Whomps are fictional characters that appear in the textbooks used by these teachers. In this lesson, the teachers were going to have the students enlarge a poster with a picture of one of these whomps on it.

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