A Deeper Look at

Lesson study is not just about improving a single lesson. It's about building pathways for ongoing improvement of instruction.

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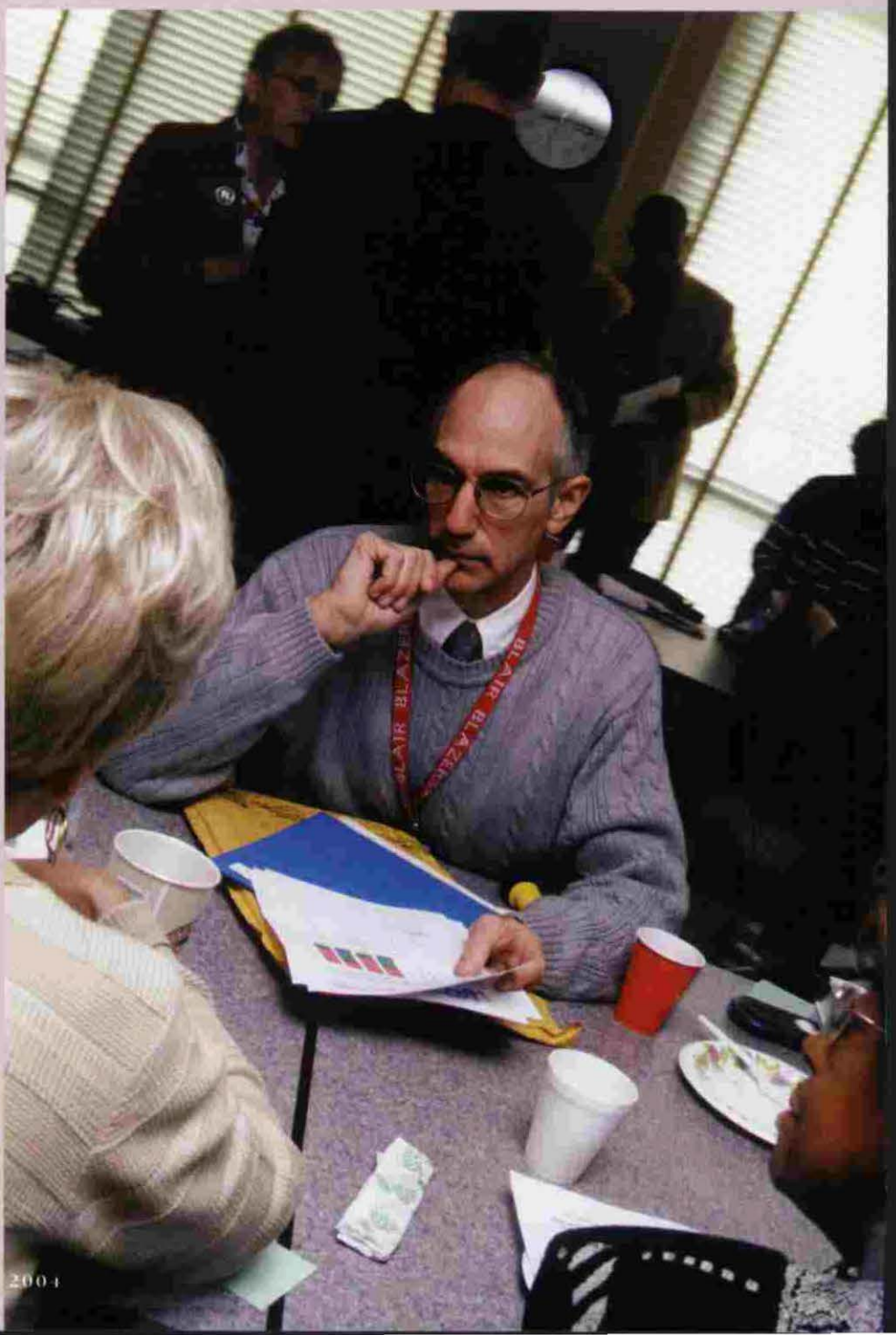
Six elementary school teachers uncover an interesting paradox in the data that they have just collected during a 4th grade mathematics lesson on pattern growth. Most students correctly filled out a table that related the number of tiles in a pattern to the pattern's perimeter, but many students were unable to express this information in words or as an equation. These data suggest that the table "spoon-fed" the students. The teachers—the one teaching the lesson and the five observing it—redesign the lesson, eliminating the worksheet that contained the table. Two days later, another of the six lesson study team members presents the redesigned lesson to a different class of 4th graders while her colleagues once again observe. She discovers that students grasp the pattern as they work at organizing the data themselves instead of just filling in a table that organizes the data for them. One team member reflects on the experience of planning, teaching, observing, revising, and reteaching the lesson: "I learned that a worksheet can be a dangerous thing."

These teachers are practicing lesson study, a professional development approach that originated in Japan. Educators have credited lesson study with bringing about Japan's evolution of effective mathematics and science teaching (Lewis, 2002a, 2002b; Lewis & Tsuchida, 1997, 1998; National



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Lesson Study


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Research Council, 2002; Takahashi, 2000; Yoshida, 1999a, 1999b). In 1999, *The Teaching Gap* brought Yoshida's account of lesson study to a broad public audience (Stigler & Hiebert, 1999; Yoshida, 1999a, 1999b). Lesson study has subsequently swept across the United States, springing up in at least 250 schools in 29 states (www.tc.columbia.edu/lessonstudy).

Will lesson study become an important tool for instructional improvement, or is it a short-lived fad? Many promising innovations die because their visible features are implemented ritualistically, without a clear grasp of how they relate to instructional improvement. This points to the importance of understanding not just an innovation's visible features—such as planning, observing, and rethinking a lesson, in the case of lesson study—but also the underlying pathways that link the innovation to instructional improvement.

Key Pathways to Instructional Improvement

Interviews with teachers in Japan over the past ten years (Lewis, 2002a, 2002b; Lewis & Tsuchida, 1997, 1998) as well as recent studies of U.S. educators engaged in lesson study (Lewis, 2002b; Perry, Lewis, & Akiba, 2002) indicate seven key pathways to improvement that underlie successful lesson study: increased knowledge of subject matter, increased knowledge of instruction, increased ability to observe students, stronger collegial networks, stronger connection of daily practice to long-term goals, stronger motivation and sense of efficacy, and improved quality of available lesson plans. Understanding these pathways—in addition to lesson study's visible features—may enable U.S. educators to build lasting, successful lesson study. The San Mateo-Foster City School District in California is a case in point. A teacher-led lesson study effort initiated in 2000 has grown from including 28 teachers to 78 during the past three years.

Increased Knowledge of Subject Matter

Lesson study begins by examining existing textbooks and standards (Lewis, 2002b; Yoshida, 1999b). Teachers discuss the essential concepts and skills that their students need to learn, compare the concepts' treatment in existing curriculums, and consider what the students currently know and how they will respond to the planned lesson. As teachers engage in these activities, they naturally generate many questions about the subject matter. The group can often answer such questions; if not, the teachers look to outside resources.

For example, when a group of elementary school teachers in the San Mateo-Foster City School District planned a research lesson designed to help students distinguish between different kinds of triangles, one teacher initially visualized all scalene triangles as obtuse. "We get locked into the pictures in the textbooks," noted one teacher, "and we think that's the triangle in question." The group's discussion and check of reference material clarified that scalene triangles could be obtuse, acute, or right.

Middle school teachers in another California lesson study group had a sudden realization about the connection between a line's slope and its visual appearance when they changed the y-axis units (but not the x-axis units) in their lesson redesign and saw the line's steepness change although the slope remained the same. "I had always thought of slope and steepness [holds up arm to illustrate tilt] as the same thing," said one team member.

Likewise, when Japanese teachers discussed a lesson in which 4th graders tried to speed up a solar-powered toy by intensifying the light on the solar cell, a teacher posed the following question to the group:

> I want to know whether the three conditions the children described—putting the battery closer to the light source, making the light stronger, and gathering the light—would all be considered the same thing by scientists. They don't seem the same to me. But I want to ask the teachers who know science whether scientists would regard them as the same thing.

This question sparked a productive discussion with visiting high school and university faculty.

Increased Knowledge of Instruction

Much of what teachers learn during lesson study applies to areas beyond the particular lesson and subject matter. Take, for example, the previously mentioned lesson study on pattern growth, in which teachers eliminated the worksheet. One team member summarized what she learned from

Observers may focus on one student who struggles with math concepts, one who quickly finds the correct answer and becomes bored, or one who is an English language learner.

planning, observing, and revising the research lesson: "The students must do the work, not us!" Reflecting on the two-week mathematics and lesson study workshop that took place during the summer, San Mateo–Foster City teachers describe many effective strategies they learned that have broad instructional implications, such as carefully wording the main problem to propel student interest, making students "hungry" for new mathematics terminology, and seeing how students use their prior knowledge.

Increased Ability to Observe Students

During the research lesson, one lesson study team member teaches while the remaining team members collect specific data, which generally include detailed narrative records of the learning of several students—what the students said and wrote, how the students used the materials, what specific supports encouraged understanding, and what obstacles to learning arose during the lesson. Team members might observe either a single student or several gathered at a table. The teacher usually informs the class beforehand that a group of teachers will observe the lesson and study student thinking about the topic to learn how to be better teachers.

For example, a San Mateo–Foster City teacher documenting student work during the pattern growth lesson noticed that students counted in different ways and that these methods provided a glimpse into how students thought about the problem. Spurred on by this observation, the teachers asked students during the next research lesson to share different counting methods with the class. Looking back at the research lessons at a later meeting, one teacher remarked that she had not initially understood why they focused on student counting methods. Learning that those methods revealed student thinking about a problem, however, increased her awareness of the different thought processes involved in problem solving.

Collecting complete narrative data on selected students who typify particular challenges that the school faces is a common data collection strategy during research lessons. Observers may focus on one student who struggles with math concepts, one who quickly finds the correct answer and becomes bored, or one who is an English language learner. Knowing that observers will study each of these students in depth encourages the teacher to design the lesson in a way that effectively reaches learners of all backgrounds and abilities. After observing the research lesson, teachers can compare their predictions about student thinking with students' actual thinking during the lesson, thereby gaining direct feedback on their own knowledge of how students think. Likewise, as they share their data collection with colleagues, teachers learn about different facets of student behavior—counting strategies, for example—that may reveal student thinking. At a time when teachers feel pressured to teach particular standards and curriculums, information about what students are actually learning is essential to instructional improvement (Darling-Hammond, 1997; Lewis, 2002a; Stigler & Hiebert, 1999).

Stronger Collegial Networks

Lesson study can help build a community of practice in which teachers routinely share resources and ideas. Whereas the average teacher in Japan participates in about 10 research lessons a year, U.S. teachers have few opportunities to observe lessons that others teach (Darling-Hammond, 1997; Darling-Hammond & Ball, 1998; Yoshida, 1999b). As a Japanese teacher commented after a research lesson,

> The research lesson is not over yet. It's not a one-time lesson; rather, it gives me a chance to continue consulting with other teachers. For example, I may say to other teachers, "I want to ask you about my last lesson you saw." Then the other teachers can provide me with concrete suggestions and advice because they have seen at least one lesson I conducted. We teachers can better connect with each other in this way.

Ideally, the interpersonal bridges built during lesson study enable collaboration well beyond the research lesson, increasing the coherence and consistency of the learning environment. As a Japanese elementary teacher explained, teachers can greatly improve students' lives by working together as a whole faculty. The habits of mind and heart fundamental to success in school—including persistence, cooperation, responsibility, and willingness to work hard—develop over many years and in many classrooms (Lewis, 1995). What's the use of students learning to "think like scientists" in one classroom if next year's teacher devalues this quality (Lewis, 2002b)?

Stronger Connection of Daily Practice to Long-Term Goals

U.S. educators are often surprised to find that lesson study in Japan usually begins with an overarching question, such as What kind of people do we hope our students will become? Lesson study addresses students' long-term development—their eagerness to learn, for example, or their concern for others—as well as the content of a

particular lesson or unit. In a 5th grade research lesson entitled "Can You Lift 100 Kilograms?" (Mills College Lesson Study Group, 2000), Komae teachers gathered a wide array of data, not just on how student thinking about levers progressed during the lesson, but also on whether students had "shining eyes," "exclaimed under their breath," and included the quietest students in their discussions.

This dual focus of lesson study sometimes puzzles U.S. educators. Focusing simultaneously on long-term goals and the immediate lesson recognizes that student motivation, classmate support, and other qualities of heart and mind greatly shape instruction, and, conversely, that the daily experience of lessons solidifies those qualities of motivation and collaboration. To many U.S. educators, the connection of daily practice to long-term goals feels like the essential missing piece of instructional improvement. As one U.S. teacher commented,

> A lot of [U.S.] schools develop mission statements, but we don't do anything with them. The mission statements get put in a drawer and then teachers become cynical because the mission statements don't go anywhere. Lesson study gives guts to a mission statement, makes it real, and brings it to life.

Stronger Motivation and Sense of Efficacy

Elmore (1999–2000) argues that U.S. education suffers not from a lack of good programs but from a lack of demand for them. Successful lesson study efforts build grassroots demand among teachers for improvement. For example, in the course of analyzing research lessons that their colleagues taught, San Mateo–Foster City teachers noted that students' attention spans lengthened when the teachers gave the students challenging and motivating problems. "What will motivate students to solve this problem?" became a question teachers routinely asked themselves as they planned future lessons.

Photo courtesy of Catherine Lewis

Members of a lesson study team observe a class and collect data.

Information about what students are actually learning is essential to instructional improvement.

Lesson study can also strengthen the belief that improvement in teaching is possible. One teacher commented that lesson study puts a professional component back in teaching that is generally missing and treats teaching as a science that teachers can analyze and improve.

A San Mateo–Foster City kindergarten teacher describes how her view of her own responsibilities shifted:

> As a kindergarten teacher, I was always very focused on the kindergarten state standards. And I always thought, "I like teaching kindergarten because I know enough. I don't need to learn any math." But when I saw that 1st grade example [a lesson planned by Japanese teachers], they weren't thinking 1st grade math. They knew the standards all the way up. I feel like I've been teaching from such a narrow perspective. I really didn't understand the first week [of a two-week summer workshop] why we kept spending an hour or two on geometry. I thought, "Who cares, I'm not going to teach this in kindergarten." And then I realized, "No, I need to know the whole picture."

Many attempted instructional improvements fail to take hold because educators perceive them to be incompatible with their beliefs, values, or priorities. By clarifying and incorporating teachers' individual beliefs, values, and priorities during the planning phase, lesson study circumvents a common roadblock to improvement.

For example, to reach a decision about eliminating the worksheet in the lesson on pattern growth, the six teachers needed to discuss the situation at length. They expressed their fears that students would flounder. After seeing the results, however, teachers unanimously agreed on the value of the change.

Improved Quality of Available Lesson Plans

The pattern growth lesson that "spoon-fed" students by giving them a chart to

arrange their data became much more challenging after teachers eliminated the chart. Students learned how to organize data and grasp the geometric reason behind a numerical pattern rather than simply identify the numerical pattern from a table. Although this revised lesson plan undoubtedly provides a better starting point for future teaching about patterns, it captures only a modest slice of what the teachers on the team learned during the lesson study, which also illuminated how students' counting may reveal their thinking and how easy it is to unwittingly provide students with answers. For this reason, the San Mateo–Foster City teachers share their learning—not just their lesson plans—when they share evidence about the success of their lesson study work.

What's the use of students learning to "think like scientists" in one classroom if next year's teacher devalues this quality?

The visible features of lesson study—well-designed processes of goal setting, research lesson planning, data collection, discussion, and revision—are essential to lesson study. Careful study of available protocols (Lewis, 2002b; see also www.tc.columbia.edu/lesson study and www.globaledresources.com) will help U.S. educators understand that these lesson study activities differ fundamentally from lesson planning and observation as we commonly know it. In settings where the foundation for collaboration and content study is already well established, careful implementation of the visible features of lesson study may gradually and naturally build learning pathways. But where the foundation is not set, educators should make a point of creating those learning pathways themselves.

If lesson study is to avoid the graveyard in which so many other once-promising innovations are currently buried, then U.S. educators must understand that lesson study means far more than just walking through a set of specific activities. It means building a set of pathways that enable continual growth of the knowledge, interpersonal resources, and motivation required to improve instruction in the classroom and beyond. ■

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