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A PUBLICATION OF THE NORTHWEST EISENHOWER REGIONAL CONSORTIUM FOR MATHEMATICS AND SCIENCE

A MATH AND SCIENCE JOURNAL
DEVOTED TO RIGOROUS AND IMAGINATIVE LEARNING

LESSON STUDY:
TEACHERS LEARNING TOGETHER

▪ A New View to Professional Growth ▪ Leading From Within ▪
Creating Happy Memories Through Lesson Study

Northwest Regional Educational Laboratory

NORTHWEST
TEACHER
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and Imaginative Learning

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ON THE COVER:

This still life with tulips was created with tempura and oil pastel by Grace Culhane, 7, a student at Innerscape Art Center, Portland, Oregon.

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EDITORS' NOTE

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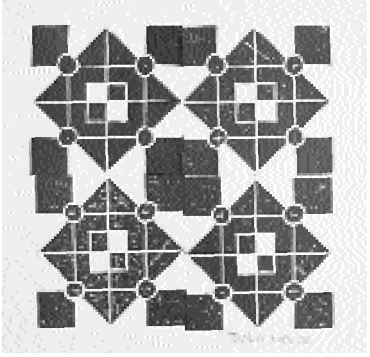
JUST EMERGING IN THE United States, lesson study is a professional development practice that holds substantial promise for improving teaching and learning.

Lesson study is an ongoing practice used in schools throughout Japan in which teachers collaborate to plan, observe, and refine a lesson. The cycles of lesson study form the core of teachers' professional growth. Researchers believe that it is one of the key reasons for Japanese students' high achievement in mathematics and science, and Japanese teachers also believe that it is essential to their success.

This issue of *Northwest Teacher* takes a look at lesson study, both in its Japanese form and as it is being implemented in this country. We introduce the lesson study process, the rationale for using such an approach, and illustrate how teachers and administrators around the United States are taking the first steps toward adapting and implementing lesson study.

The Mid-Atlantic Eisenhower Consortium @ Research for Better Schools in Philadelphia is one of the organizations working to bring lesson study to U.S. schools. We have been very fortunate to collaborate with the Mid-Atlantic Consortium on this issue of the journal. Patsy Wang-Iverson of the Mid-Atlantic Consortium has helped us to understand both the origins of lesson study and how it is being implemented in U.S. schools.

Understandably, many teachers are wary of yet another international comparison in which the United States comes up short of Japan. Lesson study scholar Catherine Lewis points out: "American teachers are constantly being bashed by the Japanese example, and that's really unfortunate." In fact, Japanese teachers are eager to learn from their American counterparts about such things as fostering children's independent and creative thinking.



By Tasha Iverson, George Middle School, Portland

Lesson study appeals naturally to teachers who long for opportunities to collaborate, learn about their practice, and facilitate their own professional growth. The lesson study process integrates a number of effective professional development strategies, such as peer observation, ongoing collaboration, and looking closely at how students think, both by observing them in the classroom and examining their classwork.

In Japan, there is a lesson study group that calls itself the Polar Method Group. In these teachers' view, teaching is similar to polar exploration because it requires a great deal of training, knowledge, and meticulous planning, while also calling on teachers' abilities to be flexible and respond to unpredictable situations. Exploring unfamiliar territory is an apt metaphor for embarking on lesson study in this country.

Our vision is that Northwest Teacher will serve as a tool for professional development by actively engaging readers and by speaking to them as imaginative problem solvers, thoughtful inquirers, and lifelong learners. The stories that follow were selected to inspire teachers to reflect on and talk about their own experiences and beliefs.

Professional development providers might use an article to illustrate a concept, providing time for reading and discussion. Teachers might want to share the journal with their colleagues, discussing their responses to the stories, perhaps even collaborating to try a new approach. Administrators might distribute copies to staff members, inviting them to share their reactions and reflections at a meeting or by e-mail exchanges. Northwest Teacher can serve as a starting point for group dialogue about issues in mathematics and science teaching, as well as for independent reading and personal reflection.

A NEW VIEW OF Professional Development

STORY BY Jennifer Stepanek ILLUSTRATIONS BY students of Innerscape Art Center

TEACHERS ENGAGE IN LESSON study as researchers and scholars of their own classrooms. Their inquiries honor the fascinating and complex nature of teaching.

Classroom life is full of habits and routines that often pass unnoticed. They will often remain invisible until they are viewed from a different angle or in a new landscape. A video study of eighth-grade classrooms in Germany, Japan, and the United States allowed researchers to make cross-cultural comparisons of mathematics teaching. In doing so, they were able to look at teaching "with new eyes" and observe commonalities among teachers that might have gone unnoticed when only looking into U.S. classrooms.

In *The Teaching Gap*, James Stigler and James Hiebert (1999) explain how the video study from the Third International Mathematics and Science Study (TIMSS), conducted in 41 countries, provides a new perspective on teaching and educational reform:

"Teaching is a cultural activity. We learn how to teach indirectly, through years of participation in classroom life, and we are largely unaware of some of the most widespread attributes of teaching in our own culture. The fact that teaching is a cultural activity explains why teaching has been so resistant to change. But recognizing the cultural nature of teaching gives us new insights into what we need to do if we wish to improve it."

By Megan Armstrong, 5, Innerscape Art Center, Portland

By Taylor Vlastelicia, 5, Innerscape Art Center, Portland

According to Stigler and Hiebert, lesson study—a model for intensive, school-based professional development used in Japan—is a strategy for change and improvement that is appropriate for a cultural activity such as teaching. Developing new approaches requires deep thought, inquiry, and collaboration with a collective focus on teaching rather than teachers. Lesson study provides a way for teachers to look at their own practice "with new eyes."

Mills College researcher Catherine Lewis has written extensively about lesson study and "research lessons," the lesson activities that take place in the classroom as part of the lesson study process. She is writing a handbook for teachers and administrators based on her research, *Lesson Study: Teacher-Led Improvement of Instruction*, due out this summer.

> THE TRUE VOYAGE OF DISCOVERY CONSISTS NOT IN SEEKING NEW LANDS, BUT IN SEEING WITH NEW EYES.
> **— MARCEL PROUST** (1934)

During her observations of science lessons in Japanese elementary schools, she noticed her own understanding of science concepts was increasing. She found that Japan had experienced a shift from rote teaching to teaching for understanding based upon the recommendations for science education reform in the United States. While the change process seemed to be successful in Japan, it was much more inconsistent in the United States. The Japanese teachers identify research lessons as the source of their success (Lewis & Tsuchida, 1998).

Lesson study embodies many of the principles of effective professional development. Patsy Wang-Iverson, a senior associate with the Mid-Atlantic Eisenhower Consortium for Mathematics and Science Education @ Research for Better Schools in Philadelphia, has been working with Paterson School 2 in Paterson, New Jersey, one of the first schools in the United States to use the lesson study model. She explains that lesson study brings to life many of the theories about teacher learning and change: "Even though the term 'lesson study' is not familiar to most people in the United States, it converges with our current thinking about what's the most effective kind of professional development." For example, it is embedded in the classroom and focused on students, it is collaborative and ongoing, and it is based on teachers' own concerns and questions (Darling-Hammond & McLaughlin, 1995).

students at the center

In her autobiography, Virginia Woolf (1976) noted her desire to break through the "cotton wool" of daily life—the routines and habits that prevented her from seeing and living deeply. When teachers participate in lesson study and observe a lesson being taught, they have an opportunity to focus their attention on students. There is little time for such concentration when teachers are caught up in the flow of teaching.

Catherine Lewis explains that this is a key part of lesson study. "Japanese teachers say that the most powerful part of lesson study is that you develop the vision to see children. So you're really watching how children are learning, and learning to see things that you didn't see before: their thinking and their reactions."

When they observe, the teachers are often assigned to follow one group of children throughout the lesson. They pay close attention to the conversations students have with each other as well as the teacher's interactions with the small groups. They are also intent on capturing students' reactions to the lesson: How eager are they to investigate the topic? The teachers mention watching the students to see if their eyes are shining and listening for the exclamations that students make to themselves (Lewis, 2000).

The process of watching students as they think and learn is the part of lesson study that is most appealing and exciting. Patsy Wang-Iverson also points out that this is the reason the process is so effective. "The Japanese approach to lesson study provides two important pieces that are often missing from U.S. professional development: the direct observation of students and teachers in the classroom and teachers coming together to discuss what they've observed. Rather than examining student work, teachers should be examining students *working*."

> UNLESS I CALL MY ATTENTION TO WHAT PASSES BEFORE MY EYES, I SIMPLY WON'T SEE IT.
> **— ANNIE DILLARD** (1974)

Steve Rhine, who teaches at Willamette University in Salem, Oregon, suggests that the success of programs such as Cognitively Guided Instruction and Integrating Mathematics Assessment lies not in providing teachers with research on student thinking and cognitive development, but in focusing the teachers' attention on student thinking in their own classrooms. Lesson study may provide teachers with a similar experience, inspiring them to "open their eyes and minds to

the diversity and complexity of students' thinking" (Rhine, 1998).

An anecdote from Columbia University researcher Makoto Yoshida's (1999) ethnography of lesson study in Japan demonstrates teachers' attention to student thinking and the thoughtful use of manipulatives. The teachers spent a great deal of time in deciding what manipulatives they would provide for a subtraction problem. In this example we see that the teachers were not merely concerned with what type of manipulative might help students solve the problem. More important to them was identifying materials that would allow them to see and understand students' thinking.

developing professional authority

School improvement efforts often fail to engage teachers as knowledgeable practitioners, instead providing mandates, incentives, or "teacher-proof" strategies and materials. Some educators argue that professionalizing teaching is a more effective way to improve the educational system. Darling-Hammond (1997) advocates for teachers' professional authority and judgment as a more authentic means of developing and ensuring high-quality schools than bureaucratic accountability systems.

Lesson study approaches teaching as intellectually demanding work rather than a set of skills to be implemented. The attention paid to each lesson honors the importance of teaching as a profoundly complex and interesting endeavor.

"Through the process of improving lessons and sharing with colleagues the knowledge they acquire, something remarkable happens to teachers: they begin viewing themselves as true professionals. They see themselves as contributing to the knowledge base that defines the profession. And they see this as an integral part of what it means to be a teacher" (Stigler & Hiebert, 1999).

In Japan, lesson study is a collaborative, schoolwide process, which means that improvement happens in more than one classroom, and teachers benefit from building on each other's knowledge and ideas. The process of learning through inquiry and discussion about classroom teaching helps teachers to build their sense of professional authority (Linn, Lewis, Tsuchida, & Songer, 2000). Lesson study also increases teachers' access to different points of view rather than limiting their interactions to those colleagues who share similar perspectives (Lewis, 2000).

By Mackenzie Lamberton, 7, Innerscape Art Center, Portland

constructing knowledge

In Liping Ma's (1999) study of elementary teachers in China and the United States, she found that the Chinese teachers demonstrated a deeper and more thorough understanding of elementary mathematics than the U.S. teachers. For example, the Chinese teachers emphasized "knowing how but also knowing why," interweaving procedural and conceptual knowledge. The U.S. teachers were concerned almost exclusively with procedural knowledge. This focus on procedural knowledge was also characteristic of the U.S. teachers in the TIMSS video study (Stigler & Hiebert, 1999).

Though they had a deeper understanding, the Chinese teachers had less formal education in mathematics than the U.S. teachers. Ma found that the Chinese teachers develop their pedagogical knowledge after they start teaching. They use a process similar to lesson study, working together in teacher research groups. The teachers study teaching materials together, exploring both what to teach and how to teach it. Their content knowledge in mathematics focuses on understanding the concepts in order to teach them to children (Ma, 1999).

Catherine Lewis points out that lesson study provides "a meaningful, motivating, high-fidelity context in which teachers can build their content knowledge" (Lewis, 2000). Therefore, the process of lesson study seems to be a more effective way to improve teachers' understanding

of the content than increasing the number of college-level mathematics classes that teachers are required to take. In commenting on lesson study, a Japanese teacher echoes Ma's findings: "The knowledge you gain by majoring in something is important, but more important is what kind of studying you do after you become a teacher" (Lewis & Tsuchida, 1997).

It may not be practical for schools in the United States to simply adopt the lesson study process without modifications. Nevertheless, it is a useful model for delivering intensive, school-based professional development that educators may want to adapt to their own needs. In Japan, lesson study helps teachers to "reinvent" policy in the classroom (Lewis, 2000). Teachers and administrators in the United States will make adjustments and reinvent lesson study in their own schools.

The challenge will be to strike a balance between keeping the essential elements of lesson study intact—for example, collaboration and peer observation—and changing the model to fit the reality of schools in the United States. For example, teachers tend to work in isolation and they have few, if any, opportunities to observe each other. Lesson study may help educators to see these barriers "with new eyes" and identify possibilities for change.

Jennifer Stepanek is coeditor of Northwest Teacher.

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The Lesson Study Process

In Japanese schools, the lesson study process generally flows through the following phases. The amount of time devoted to each lesson study varies, but the teachers commonly work on a lesson for about one month. This overview of the process is based on the work of Lewis (2000), Stigler & Hiebert (1999), and Yoshida (1999).

1. Focusing the Lesson
The lesson study usually focuses on a broad, schoolwide goal such as "independent thinking" or "love of learning." The teachers help determine these broad goals, and they choose the specific topic of the lesson. The topic often comes from a problematic concept that the teachers have observed in their own classrooms.

2. Planning the Lesson
The teachers research the topic of the study, reading books and articles about the problem they are working on. They collaborate to develop the lesson plan, and a draft is presented to the school staff for feedback.

3. Teaching the Lesson
One teacher from the team presents the lesson in his classroom. The other teachers observe the lesson very closely, taking notes on what the students and the teacher are doing and saying. The lesson may be documented through video, photographs, audiotapes, and student work.

4. Reflecting and Evaluating
The group meets after school to discuss the lesson and their observations. The teacher who presented the lesson speaks first, outlining how he thinks the lesson went and identifying problems he observed. The other teachers contribute their own observations and suggestions.

5. Revising the Lesson
Based on the problems identified in the first presentation, the study group makes changes in the lesson. Changes are usually based on student misunderstandings that the teachers noticed during their observation. The group may meet several times to improve the lesson and prepare for a second implementation, although sometimes the teachers decide that they do not need to reteach it.

6. Teaching the Revised Lesson
The lesson may be presented again to a different group of students. The same person may teach the lesson a second time or a different teacher may try it out. Often, all the teachers in the school are invited to observe the revised lesson.

7. Reflecting and Evaluating
The whole faculty will participate in the second debriefing session, which may cover more general issues of learning and instruction. There is usually an outside expert working with the lesson study group, who speaks last during the debriefing.

8. Sharing Results
Teachers share the lessons they develop through this process, creating a bank of well-crafted lessons to draw upon. The teachers will often publish a report about their study, including the teachers' reflections and a summary of group discussions. In addition, teachers from outside the school may be invited to observe the teachers present the lesson.

Creating Happy Memories

STORY AND PHOTOS BY Denise Jarrett Weeks

For veteran teacher Judy Thiel, lesson study transformed a difficult unit into a fun and successful one for her Tillicum Middle School students.

BELLEVUE, WASHINGTON—Every year, math class seems to hum along for eighth-graders at Tillicum Middle School, right through data collection, graphing, and manipulating variables. But just as spring promises warmer breezes, pupils and teachers can find themselves caught in the annual doldrums you might call the Bermuda Triangle of middle school math: linear algebra.

Linear relationships are, perhaps, the most important functions students study in algebra, yet they can be tough for young learners. While students might sail through the concrete aspects of linear relationships—such as coordinate graphing—their understanding often flags when confronted with the more abstract concept of $y = mx + b$, the slope-intercept equation.

Teacher Judy Thiel, a 16-year veteran math teacher in the Bellevue School District, longed for a better way to teach this essential lesson. Despite its abstract form, it's an application that has many real-world purposes, such as modeling data or comparing rates of change. Last fall, when she and three other teachers got together for the first time to do a lesson study, the teachers tossed around several ideas for the focus of their study, but $y = mx + b$ seemed the best candidate for improvement.

TEACHERS ARE BUILDING—AND SHARING—THEIR WISDOM AND KNOW-HOW THROUGH LESSON STUDY. IN THE PROCESS, THEY'RE CREATING MEMORABLE LEARNING EXPERIENCES FOR STUDENTS, AND FOR EACH OTHER.

The teachers started their lesson study by creating a "mind map," a chart of all the essential ideas students needed to understand the slope and *y*-intercept concept. "For me, that was an incredible eye-opener," recalls Thiel. "When I saw all of those things on that page that these kids had to master to develop the understanding of $y = mx + b$, I said no wonder they don't get there!"

Even for this master teacher, the best way she knew how to get through the unit, before today, was to "crank and grind" through the components of linear relationships and hope students would get it. After grappling with it in a lesson study, she sees new ways to teach this important concept.

Now, she organizes and plans her lessons differently, building a stronger foundation for learning by anticipating students' approaches. She pays closer attention to the details—the smaller components of a lesson as well as those subtle misconceptions that can stump a student. She's more creative in how she gets the fine points across to all students, using varied strategies to support their learning. She also breaks ideas down and stays on those ideas longer because she's more in tune with each student's understanding.

In the process, she's found her own knowledge of mathematics deepening.

"You learn the math along the way," she says. "You also see how all the pieces fit together, step by step by step. I teach everything a little more solidly, I feel."

transforming teaching

Lesson study gave Thiel and her teammates the time to look closely at the lesson as it was presented in the district's middle school textbook, Connected Mathematics Project. They also delved into the equation itself and the many ways students could approach it. They incorporated an interactive computer lab activity they found on ExploreMath.com that roused students' enthusiasm while providing visual reinforcement of $y = mx + b$, and they developed materials and activities to support learning all along the way. The experience changed everything.

For Thiel, the lesson study focus transformed a difficult unit into one in which she and her students could succeed and have fun. "I was much more relaxed and my students a lot less frustrated. I think their scores were higher, but more than that, their attitude was just so much better," she says. "To a teacher, what makes you frustrated sooner than anything else is if you've taught something to the best of your ability and the kids don't understand it."

Learning to take time is one of the keys to lesson study, says Tillicum teacher Liz Jones.

The experience also changed the way these four teachers work with each other. Now, Thiel and fellow Tillicum math teacher Liz Jones regularly share materials. When one of them writes a supplemental worksheet or activity, she will slip it under the other's door—the welcome token is almost always put right to use.

"One of the things that we realized," says Jones, "is we taught the whole unit better. It wasn't just about one lesson. We were able to share ideas and compare notes from about six weeks' worth of material, which is so rich. That never happens!"

Two other teammates brought special points of view that enriched the whole group's thinking about learning and teaching. Barb Diesel-Hoover is a special education teacher for the district and Steve Lelievre teaches math at Robinswood Middle School, the district's alternative school. Their insights and suggestions for adapting instruction for special-needs students—learning disabled students as well as those who are talented and gifted—have been invaluable, say Thiel and Jones.

in it for the long run

A triathlete in her off hours, third-year teacher Liz Jones knows how to go the distance. Last fall, when the superintendent of the Bellevue School District initiated lesson study districtwide, Jones stepped right up to the challenge, volunteering to be a lesson study leader for her school. Yet, lesson study tested her in unexpected ways. In lesson study, she discovered, it's not about crossing the finish line, it's about the run itself.

"I'm a product person as opposed to a process person. It's a stretch for me to spend so much time on one topic. As teachers, the demands are incredible to get through the material. It's been a good lesson in patience for me," she says, laughing. "I've really come to appreciate the process."

Like many others in her district, Jones has read *The Teaching Gap*, a slim volume describing Japan's approach to lesson study and suggesting how it can be introduced in U.S. schools.

"In the Japanese model, they might take years before even coming up with a [finished] lesson," says Jones. "My Western response to that is, Oh yeah, right! That's an extreme difference in our cultures that I don't think we can collapse in our first experience with this." As a lesson study leader, she feels an obligation to help her group produce well-developed lessons within weeks.

Researcher Catherine Lewis encourages teachers to also pay attention to other valuable outcomes of lesson study. In Japan, lesson study is used to create memorable lessons and a supportive classroom community, she says. "When you ask Japanese elementary teachers, 'What's your most important job?' they say things like, 'My job is to create happy memories.'"

Creating good memories and learning experiences for students is no less important to U.S. teachers, despite immense pressure to cover a broad curriculum and produce high test scores. For Jones and her teammates, every aspect of the lesson-study process had something to teach them. Their discussions were open and rich, and they learned a great deal from watching each other teach. Jones, who twice modeled a lesson for her teammates, says she was a little nervous at first, "but it was just so nice to have help, that's such a rare experience. I counted on their eyes and ears to keep track of how the kids were doing. When you're giving the lesson, you can't honestly say how it is going, you're too busy teaching."

learning by watching

While Bellevue's teachers were following the lead of their superintendent, teachers in San Mateo Foster City School District in California were taking up the call to lesson study from one of their own.

Jackie Hurd, a math coach and teacher at Highland Elementary, has been something of a trailblazer in her district, clearing the way for teachers to join lesson study groups and creating a growing network of enthusiastic participants. Her role at the front of this grassroots effort began with a visit to Tokyo where she attended a lesson study open house at one of the schools. These open houses occur at schools around Japan each year, commonly attracting thousands of teachers who crowd into classrooms to watch demonstration lessons developed during lesson studies. What Hurd saw there convinced her that lesson study was also a good idea for U.S. schools.

"I definitely felt fortified from the experience," she says, and she returned to San Mateo with resolve. With a nod from district leaders, Hurd mailed letters to teachers inviting them to attend a lesson study training session the day before the start of school last fall. She included articles including Catherine Lewis' "A Lesson Is Like a Swiftly Flowing River" that appeared in *American Educator*, winter 1998.

Several teachers showed up that day, and the seeds of lesson study were planted. Since then, more than 25 teachers have joined lesson studies across the district. Some meet with teachers in their own school buildings, others have formed cross-school teams. Teachers receive $500 stipends for 20 hours of lesson study work and can request substitutes, enabling them to observe other teachers' classrooms.

Like Bellevue, San Mateo has adapted lesson study, including making allowances for the pressure teachers feel to cover the curriculum.

"We're so challenged by how we are going to teach all of this," says Hurd. "In Japan, their mathematics curriculum is much more narrowly focused, and teachers get a lot more support for training. They can really spend that time on one issue. We feel like we don't have that kind of time."

In this first year, most groups have produced 2–3 lessons. The teachers found that it took a lot more than 20 hours to complete the lesson study cycles, but that hasn't dissuaded them. In fact, more teachers are being drawn in from all disciplines and specializations.

Newport High School teachers Christy Brasher (left) and Laura Peterson meet with a group of other Bellevue science teachers to analyze a lesson they've designed.

As did Bellevue, San Mateo encouraged but didn't require teachers to observe each other teaching a lesson. "We said, 'We're going to make it as comfortable as possible for you to participate.' If teachers want to teach the lesson by themselves in their classrooms, and then come back and share what happened, that's fine," says Hurd. "It has happened that in every

group, there's at least one teacher who's willing to demonstrate and teach the lesson so that everybody can watch. I do think that's much more powerful than people doing it individually. People quickly discovered how useful it is for everybody to be watching the same group of kids."

To introduce more teachers to lesson study, the district is creating a demonstration school where teachers from near and far can come to watch lesson-study lessons being taught.

"What teachers love is the opportunity to see another teacher teach, the opportunity to just collaborate and bounce ideas off of people, and just how much richer they can create lessons by getting the input of other teachers," says Hurd.

The day after one of her first lesson study meetings, Hurd walked back into her classroom realizing she had many new ideas at her disposal. Her group had been developing ways to differentiate a particular lesson, but now it occurred to her that she could organize all of her lessons in a similar way. For example, they had come up with a way to arrange the lesson materials and to use the blackboard so that all of the students' work would be retained while the lesson unfolded. In this way, teachers and students could refer back to these artifacts of the lesson process to reinforce learning.

"So people are feeling like, immediately, they're learning things that are enhancing their teaching every day," says Hurd. "I think we're starved for that kind of collegiality."

searching for understanding

Their group discussions have been of the highest caliber, Hurd says. "It really elevates our profession and gives you a real appreciation for how you can take teaching and make it this highly refined craft." The focus of one of their lesson studies was subtraction and regrouping, concepts difficult for some second-graders.

"We started this whole conversation about what kids need to know to be able to do subtraction," Hurd says. "What are the things that we are assuming that they can do? Should you teach subtraction by itself or do you teach addition and subtraction together? What are all of the concepts that kids have to have?

"In order to plan that lesson, it really made us think about the content and really understand what it means to subtract. It isn't just about 'take away,' but rather which numbers will lead to kids understanding certain patterns and relationships? We had long conversations about what numbers we were going to select for these story problems. We definitely got into some very deep content conversations."

These discussions led them on their own search for understanding in books like Liping Ma's *Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States* (1999). They also talked to the first-grade teachers in their schools to find out which math concepts they focused on at that grade level. By talking with each other and

QUESTIONS TO CONSIDER

- **What lesson has been the most difficult to teach?** Create a "mind map" of the concepts and skills involved. Identify ways students might approach the problem and pinpoint trouble spots.
- **What activity will reveal students' thinking?** Will different manipulatives reveal different aspects of their reasoning?
- **Who can we invite to observe our classrooms and then sit in on a lesson study meeting to offer feedback?** A specialist can help teachers deepen their content knowledge.
- **How will our group negotiate differences in opinions and teaching philosophies?** Working collaboratively doesn't mean teaching the lesson exactly alike. Teachers might adapt the lesson for their particular students. A diversity of views is a strength of lesson study.
- **What if we're apprehensive about being observed teaching?** By developing a lesson collaboratively, everyone shares ownership of its strengths and weaknesses. The focus is on teaching, not the teacher.

consulting other experts, they sharpened their own mathematical knowledge.

"To move people [ahead] in terms of their content understanding, it is definitely good to have an expert, like a math coach or curriculum director, come to some of the lesson demonstrations," says Hurd.

'knowledgeable others'

Inviting outside experts to observe demonstration lessons and offer feedback is a common practice in Japan. In the United States, the school that has been doing lesson study the longest, School 2 in Paterson, New Jersey, credits much of its success to its partnerships with the Greenwich Japanese School in Connecticut and researchers at Teachers College/Columbia University in New York and the Mid-Atlantic Eisenhower Consortium @ Research for Better Schools in Philadelphia.

Paterson teachers have observed Japanese teachers at the Greenwich School teach demonstration lessons and meet in lesson studies. Also, the Japanese teachers have been guest teachers at Paterson School 2, allowing Paterson's faculty to observe their own students working through a lesson-study lesson. The researchers from Columbia and the Mid-Atlantic Consortium have shared their knowledge about lesson study with the teachers, and they're also studying the influence lesson study is having at School 2.

Paterson teacher Magnolia Montilla was one of the first to join a lesson study group in February 2000. "It would be very difficult to transform the way your school does professional development without 'knowledgeable others,'" she says.

Paterson Principal Lynn Liptak agrees that outside experts are essential to supporting teachers' professional growth through lesson study, but the intellectual pursuit must be driven by teachers themselves. "It must begin with a question which takes us to our own professional knowledge, not to a question posed by an expert."

In fact, teachers should expect that the first step any professional development provider should take is into their classrooms, says Patsy Wang-Iverson of the Mid-Atlantic Consortium. Only by observing students and teachers at work can a provider understand the needs of the students, and thereby identify what training or technical assistance to organize for teachers.

"You have not done a good job until you assess what's happening in the classroom," she says.

challenges to face

Lack of time is the biggest obstacle for U.S. teachers. Typically, Japanese teachers' official work day continues after classes are out of session, until about 5 o'clock, allowing them to meet for lesson study during their regular work hours. U.S. schools must find extra funding to pay for substitutes or stipends to pay teachers to stay after school to do lesson study.

Classroom interruptions are another challenge for U.S. teachers. In Japan, interruptions are kept to a minimum, while class periods in the United States are frequently disrupted by announcements over the intercom, attendance collectors, messengers from the office, and ringing telephones. Liptak notes that Japanese teachers view the lesson as "a story that should not be interrupted."

Many teachers struggle with a burgeoning curriculum. Paterson School 2 switched to a Singapore math curriculum, distributed by SingaporeMath.com in West Linn, Oregon. It is a lean curriculum focusing on key concepts that are efficiently sequenced. This helps teachers focus their lesson studies on those ideas that are most essential for students to learn. In the process, they've improved their own mathematical understanding while raising students' mastery of more complex ideas. Yet, cautions Montilla, this mastery isn't always revealed in state standardized tests.

"Using the Singapore curriculum, your students' progress may not show up in standardized test scores, because they don't test these kinds of complex problems," she says. Getting students ready to do well on state tests that emphasize rote learning, while also trying to foster students' higher-order thinking skills, is a burden that's felt heavily by Paterson faculty.

"The pressure on teachers at School 2 to prepare for the test is phenomenal," concedes Liptak.

lesson study pioneers

Despite the challenges, lesson study offers something many teachers long for: the chance to work together to improve student learning. In a guidebook she is preparing for publication this year, Catherine Lewis writes:

"Our lesson study pioneers will need to be brave enough to challenge the norms of privacy and isolation that pervade so many schools and to take on work that is both intellectually and interpersonally demanding."

The teachers in Bellevue, San Mateo, and Paterson—and in other places around the country where lesson study is emerging—may be pioneering this new practice, but, for most, it feels like coming home.

Denise Jarrett Weeks is coeditor of Northwest Teacher.

A Superintendent's View

It's not so much reinventing the wheel, says Bellevue's Superintendent Mike Riley about adapting Japan's lesson study to U.S. schools, it's more like, "Here's a picture of a wheel, now create one that will actually fit your car." Lesson study is as natural—and necessary—to teaching as wheels are to your sedan.

"When you take away the words 'lesson study,' and you just say, 'How would you like to get together with other people who teach the same thing that you do and develop lessons?' Would somebody really say, 'No thank you?'" asks Riley, a former English teacher. "It's formalizing something that most of us have wished we could do our entire lives."

Riley has been described both as a "visionary" and as a "top-down" administrator. Whatever his leadership style, he's succeeded in putting into place many practices that support lesson study. He's initiated weekly early release to free teachers to meet in lesson study groups and provides stipends and training for lesson study leaders. He's raised donations to offer $1,000 to groups that develop Blue Ribbon Lessons, which are published on the district's intranet. But implementing districtwide curricula may be the linchpin to Bellevue's apparent early success with lesson study.

"It was a change from a very loose association of schools called the Bellevue School District," says math specialist Eric McDowell. "Every single building was using whatever the heck they wanted to use for their curriculum." Now, he says, "we can all talk together, share our common experiences, our successes, our failures. If you didn't have a common curriculum, a lesson study would be absolutely impossible."

With districtwide curricula, teachers can form cross-school teams and use lessons developed by other teachers. In this way, the wisdom and knowledge of individual teachers can be saved and shared, says McDowell.

Lessons are to include five elements: a narrative objective, assessments, student work samples, activities, and teachers' reflections. "What we were looking for was the kind of deep reflection and hard look at curriculum and instruction that we believe lesson study provokes," says Assistant Superintendent Jan Zuber.

Former math teacher and University of Washington graduate student Mike Gilbert is observing a lesson study group as part of his dissertation research. While most professional development is done "to" teachers, he says, lesson study is teacher-driven. "Of all the different things I've seen, this really holds the most promise for practice."

In Bellevue, they're putting their faith in the promise of lesson study. It's an initiative Superintendent Riley plans to stand by: "You can call it 'top-down' if you want, but I think it's a hell of a good decision."

LEADING FROM WITHIN

STORY BY Suzie Boss

LESSON STUDY BUILDS TEACHERS' instructional skills, but also moves administrators in new directions.

For 90 minutes on a January afternoon, four teachers and their principal sat down with pencils, paper, and a specific goal: improving how they teach expository writing to fourth-graders. One of the teachers—a 30-year classroom veteran—started the discussion by leading her colleagues through an exercise designed to help them understand the components of good writing.

Betsy Hill, principal of Medina Elementary School in Bellevue, Washington, remembers the afternoon vividly: "The directions weren't just to write so many words on such and such a topic and use proper capitalization. We broke it down into the elements of writing. We talked about how to create those elements in a quality way. What's the process? How do you organize what you want to say? What might get in the way? Then we wrote something, putting what we had learned into practice. What I wrote for that exercise was unlike anything I had ever written before. It all tied together for me." Others in the room experienced their own "Aha!" moments. "We all became better writers ourselves that afternoon," says Hill.

She recalls something else. When the session ended and they were walking into the hallway, one of the teachers announced, "I learned more in that hour and a half about how to teach writing than I did in four years of college." As her colleagues chimed in their agreement, Hill felt her own excitement surge. "It's exhilarating to feel that momentum. Here was a group of experienced teachers who had just figured out how to make a difference for their students—starting tomorrow."

But they were far from finished. Once a week since that first afternoon, the team has been coming together to continue fine-tuning the instructional skills that relate to expository writing. Hill participates on an equal footing with her teachers, learning right alongside them and going into classrooms to observe teaching practices in action. She describes the process: "We talk about something specific that relates to how to teach writing, then go into the classroom the next day and do something—try out what we've discussed. The next week, we bring the results back to the group. What did we miss? What worked well with our students? We keep at it until we get it right."

That long-term goal of improving instruction is what's driving support for this professional development process known as lesson study. The Bellevue School District is one of a handful of districts in the nation to embrace lesson study across all disciplines and grade levels, putting teachers in a leadership role for improving their own classroom practices. Administrators are, however, discovering that they, too, play a critical role in whether lesson study will succeed or falter.

start-up questions

Because lesson study is still so new in this country, administrators are having to grapple with a host of start-up questions. How can principals gauge whether lesson study will be a good idea for their schools? How might administrators get teachers excited about the idea of coming together in small groups to improve their skills and deepen their content knowledge? How can a school or district allocate staff time and other resources to support lesson study?

The answers vary widely from one community to the next. Bellevue, for instance, has launched lesson study as a voluntary activity, coaxing teachers to participate by providing staff development time, financial incentives, and training for teachers willing to facilitate lesson study teams. But important groundwork must also be laid at the individual school level to support teachers.

"My school was ripe for lesson study," says Hill. "I had already spent a lot of time getting the staff together. We were in the

habit of talking collaboratively about teaching and learning objectives. Now when we meet as a lesson study team, people feel free to suggest ideas. It's a safe place. We all look forward to it. It's not a chore. It helps to have that teamwork in place." For a school that is less cohesive, however, Hill suggests, "Lesson study could be the thing you use to bring people together."

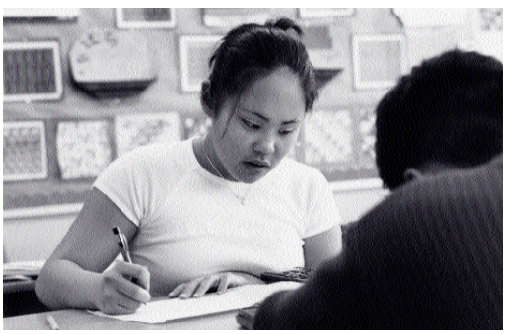
In Paterson, New Jersey, Principal Lynn Liptak of Paterson School 2 says administrators should be honest with teachers about the energy, time, and commitment it takes to make lesson study work, and let them decide if they're ready for it. "Lesson study requires so much teacher direction that it is not something you want to manipulate people into doing," Liptak says. A supportive principal is essential, "but it goes nowhere without the interest, commitment, and hard work of the teachers." As principal, she shows her support not only by serving on a lesson study team, but also by scheduling two hours per week—during the regular school day—for her teachers to work on lesson study.

Other districts are taking a more direct approach to get teachers involved. Nashville Metro Schools, for example, rolled out lesson study last September for its entire staff of more than 4,000 teachers. David Shearon, then a member of the Nashville School Board, got inspired when he read *The Teaching Gap* by James Stigler and James Hiebert. "I finished that book and thought: This is *it*," he recalls. "We have to create an ongoing structure to give teachers time to work on issues related to teaching and learning." He proposed that the district make lesson study the cornerstone of school improvement. Contract negotiations then underway with teachers provided the opportunity to replace five half-days of unstructured planning time with five full days, spaced throughout the school year, devoted to lesson study teamwork. Between June and September 2000, the district moved from talking about the idea to implementation. Says Shearon, "Some things you can't ease into."

Indeed, some decisions—funding for staff release time, policy about use of substitutes to cover classes when teachers are observing one another's lessons, and so forth—almost have to be made by administrators. "Administrators can free up the time that teachers need" to pursue lesson study, says Janice Itzel, a teacher-in-residence for lesson study at the Delaware Department of Education. As she travels the state promoting lesson study and helping teachers overcome obstacles, she consistently sees lack of time as the biggest barrier.

No matter how the idea gets launched, when it comes to putting lesson study into practice, administrators must be willing to let teachers take the lead. "And that's a radical change—to trust teachers to be the leaders of their own instructional improvement," acknowledges Shearon.

The traditional role of the principal does not work well in the context of lesson study, cautions Liptak. "You are not leading from in front (where you have the answer and share it). You are not



Students are the big beneficiaries of their teachers' lesson study efforts in Bellevue.

leading from behind (where you facilitate). You are truly *leading from within* along with everyone else."

Catherine Lewis of Mills College in Oakland, California, says that principals like Liptak are effective leaders because they dare "to put their own teaching on the line, to make it clear that they are learners also. That says to other people what learning is in this school, that leading is learning." When a principal volunteers to model a lesson in front of teachers and invites them to critique it, as Liptak does routinely, "that makes it safe for other people to do it," says Lewis.

lessons for leaders

Tom Ward, principal of Hume-Fogg Magnet High School in Nashville, chaired the committee assigned to implement lesson study throughout the district during the 2000–2001 school year. The committee's first step was to buy a copy of *The Teaching Gap* for every teacher in the district "so we'd be on the same page, literally." Ward laid out his committee's vision to the school board. "I explained that this is about cultural change. It's going to be slow. And we can't do it by writing a memo that tells teachers: 'Do this.' It has to be open-ended. It won't work if we try to tell teachers what to do."

In hindsight, Ward can also see the important role that principals play in the process. "They have to set the right tone," Ward says. "You can't build success without that."

At a principals' retreat just before the school year began, Ward led a training session intended to pave the way to lesson study. He outlined the process and stressed the need for collaboration to make it work. Then he listened to their questions—in amazement. "I'm not sure any of us had a realistic analysis of the state of our principals, of their different levels of development as leaders," he admits. "There are those who understand collaboration. They are able to lead without people feeling put upon. But they are not as many as we'd like. The ones who are autocratic—the little dictators—really struggled with this. And so did the ones who were afraid of getting their hands slapped. They wanted us to tell them exactly what to do." If he had a chance to start over, Ward says he would put "more energy into working with principals."

Administrators can also play a role in lining up resources to support teachers as they begin to put lesson study into practice. Paterson Principal Lynn Liptak turned to outside experts early on. "I don't know how you begin lesson study in this country without the help of outside experts," she says.

Researchers Clea Fernandez and Makoto Yoshida of Columbia University Teachers College in New York put Liptak in touch with the Greenwich Japanese School in Connecticut. Lesson study is part of the culture at this school geared to teaching the children of Japanese expatriates who are working in the United States. "Makoto explained lesson study to us in detail at the outset and then remained with us step by step, as did the teachers and principal of the Greenwich Japanese School," Liptak explains. "Their help was invaluable. It is crucial to select outside experts who not only possess the precise target expertise that you

Teachers observe and eavesdrop while students dig into their science project at the Greenwich Japanese School in Connecticut. Photo courtesy of the Mid-Atlantic Eisenhower Consortium@Research for Better Schools.

need, but also look for those who are willing to roll up their sleeves and work alongside you."

Others acknowledge that experts can bring more understanding about the theory of lesson study, but stress that the real work must be done by teachers themselves. Janice Itzel turns to *The Teaching Gap* coauthor and fellow Delaware resident James Hiebert as a consultant and mentor. "We might invite him to speak to a cadre of teachers or at a professional development workshop," she explains. "But this is bottom-up work. It's grassroots. We want teachers to help each other through this, not be led by experts. Experts can talk about it, but teachers do the work."

recognizing success

Given the current accountability climate, some administrators may be put off by hearing that lesson study is a slow process of improving instructional skills. "If you're looking to raise test scores by spring, this is not the program for you," acknowledges Itzel. "You have to be in it for the long haul."

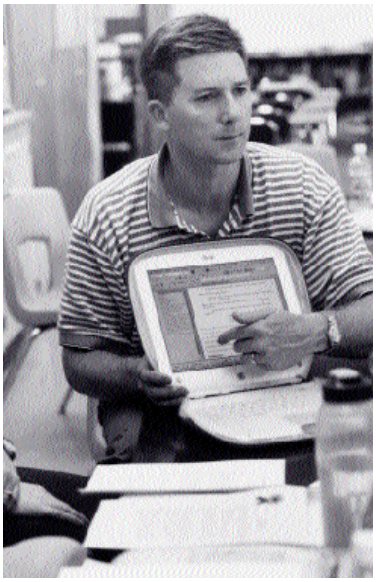
How can administrators tell if lesson study is working? Long-term results may include improved student achievement, deeper levels of understanding, and teachers who feel less isolated and more skilled at collaborating with colleagues. In the short term, though, many administrators are basing their impressions on what they see: Are teachers excited about their discussions? Do they understand how to observe and critique a lesson in a constructive way? Are they having fun? Are they deepening their understanding of the subject matter?

At a Delaware elementary school, Itzel watched a team plan a lesson designed to teach students to write with more descriptive detail. The team included classroom teachers from kindergarten through fifth grade, plus a P.E. specialist. The lesson they designed had students working in pairs: One would strike a pose and the other would describe it—in exquisite detail. The P.E. teacher played a key role in lesson planning, demonstrating that lesson study cuts across disciplines and supports an integrated curriculum. Watching the team work together, Itzel was impressed by the atmosphere. "You could see the fun of this!" she says. "They enjoyed the freedom to plan this lesson collaboratively." In the debriefing that follows an actual lesson, Itzel listens for the group's receptiveness to constructive criticism. The goal is always to direct criticism toward the lesson, not the teacher. "The results," she says, "really depend on how you take that criticism, and what you do as a result in your classroom."

Liptak says she has no hard data yet to show that lesson study has improved results for kids in Paterson. But she has plenty of reasons to think it's been a positive experience for her school. She explains: "Because it is ongoing, because it involves the teachers intellectually, because it challenges all of us to think more deeply and look more closely, I see changes in the day-to-day teaching of mathematics [the focus of the first

QUESTIONS TO CONSIDER

- **Does the culture of our school support collaboration?** As an administrator, what can I do to increase the spirit of teamwork in my building?
- **How well do I model giving and receiving constructive criticism?** An important step in the lesson study process involves reflection.
- **How active a role would I want to play?** Some principals join lesson study teams and participate as peers with their teachers. Others take more of a backseat role, supporting teams with release time or other resources.
- **How might I let teachers know that I'm supportive—and patient?** Lesson study is about long-term improvement in instruction.
- **How will I make sure that lesson study leads to better learning results for students?** Collecting data about lesson study outcomes is an important aspect of the process.



Mike Ferguson, science specialist for the Bellevue School District, leads a discussion with science teachers as they review a lesson design.

lesson study team]. I hear a difference in the conversations that we are having and the number of them that are about teaching and learning."

Ward, the Nashville principal, has made the rounds of every lesson study team in his building. "The key for the principal," he says, is "to go be an educator again."

When Ward visits lesson study teams, teachers sometimes turn to the principal for answers. He replies with more questions. "I tend to rephrase their question so they can discover what they need to figure out. That may be frustrating for them to hear at first, because most educators are never allowed to do that," he admits. "It's important to encourage them to go ahead and make some mistakes."

Evidence of collaboration and reflection have been common at Nashville elementary schools, as well, during the past year. Shearon recalls watching a second-grade team struggle with developing a math lesson on problem solving. "They wanted to find out whether students really know how to solve a difficult problem. The challenge is that students pick up on the vocabulary of test taking. It was fascinating," Shearon says, to hear teachers wrestle with how to design a math lesson where students' thinking would not be prompted by the language of the lesson.

On a morning when Ward arrived early to serve breakfast to his lesson study teams, he overheard seasoned veterans talking intensely with rookie teachers about how to improve instruction. At every table, conversations were humming with energy and enthusiasm. And Ward had his own powerful insight into the value of how they were spending their time together. "Lesson study," he says, "is a highlight of community in your school."

Suzie Boss is associate editor of NWREL's quarterly magazine, Northwest Education.

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Links to Lesson Study

SOME LEADING U.S. RESEARCHERS HAVE CREATED WEB SITES to share their accumulating knowledge about lesson study: how lesson study can be implemented in this country, which schools and districts are trying this approach, what educators and researchers have to say about it, and where to find further resources.

The Lesson Study Research Group at Teachers College/Columbia University in New York (www.tc.edu/centers/lessonstudy/) examines how lesson study is practiced in Japan, the effect of American and Japanese teachers' practice of lesson study on teaching and learning, and the tools needed to support this activity. From the home page, lesson study field application sites can be accessed, allowing viewers to read about the progress of lesson study activities at schools around the country.

Mills College Education Department in Oakland, California, hosts a Japan-United States Elementary Education Research Project funded by the NSF which looks at lesson study. The project has a Web site (lessonresearch.net) featuring publications, video clips study from Japanese classrooms, descriptions of lesson study videotapes that can be ordered, as well as news of events and funding opportunities related to lesson study. Links to additional resources and further professional development around the issue of lesson study are also available.

James Stigler, coauthor of The Teaching Gap, has set out to develop Web-based software that will support teacher lesson study groups by providing a means for creating databases; placing entire classroom lessons online; and structuring electronic communities for facilitating collaborations, sharing information, and disseminating lesson study results and curriculum. Stigler's company, LessonLab Inc. of Los Angeles (www.lessonlab.com/), examines the applications of multimedia technologies to large-scale research into teaching.

The Mid-Atlantic Eisenhower Consortium for Mathematics and Science Education @ Research for Better Schools in Philadelphia hosts the TIMSS Resource Center (www.rbs.org/ec.nsf/pages/L2TIMSS). This site provides links to TIMSS-related resources, a lesson study Web site (www.rbs.org/ec.nsf/pages/LessonStudy), and the Journey Beyond TIMSS brochure, which provides information linking TIMSS results and the importance of professional development grounded in the practice of lesson study (www.rbs.org/ec.nsf/pages/JourneyBeyondTIMSS).

The Journey Beyond TIMSS Web site presents an easily understood outline of the components of lesson study, as well as the characteristics of teachers who have a deep understanding of mathematics as revealed through Liping Ma's book, Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States (Lawrence Erlbaum Assoc., 1999).

To find out more about how lesson study is being implemented at some of the schools and districts featured in this issue of Northwest Teacher, visit these Web sites:

- Bellevue School District, Bellevue, Washington (belnet.bellevue.k12.wa.us/lessonstudy.html)
- Nashville, Tennessee (www.nashville.k12.tn.us)
- State of Delaware (www.doe.state.de.us/englangarts/lstudy.htm) and (www.doe.state.de.us/Lessonstudy.htm)

ERIC BLACKFORD
is an associate for the Northwest Eisenhower Regional Consortium at NWREL.

LET US HEAR from you

More To Say About Standards

I was struck by two sections in the article "Standards and the Impulse for Human Betterment" (Winter 2001).

1. You describe how the move to raise standards was a response to two problems: poor performance by U.S. students and low graduation rates. The first claim (which you offer as fact) has been challenged by many researchers on many fronts. TIMSS deals only with rankings, which tell us nothing about whether we're doing well or poorly, only who's winning. Iris Rotberg and Gerald Bracey have challenged even these ratings at the high school level (the only level where it's argued U.S. students lag) for methodological reasons. Your second claim is graduation rates, but no one has ever argued for "tougher standards" and testing to solve this problem. In fact, it's becoming increasingly clear as the data accumulate that the standards movement is making the problem far worse. (Recently, it was revealed that the NYC dropout rate spiked again as another high-stakes Regents test was added.) By the way, is it possible your article is conflating vertical standards (efforts to "raise the bar") with horizontal standards (NCTM-type guidelines for pedagogy)?

SUBMIT LETTERS TO:

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2. After raising concerns about state standards, with their lists of facts and skills, you uncritically quote Marzano and Kendall to the effect that teachers still ought to make sure all that stuff is covered. Yet if the standards are atrocious, representing a superficial "bunch o' facts" pedagogy, then the last thing conscientious teachers should do is try to align their teaching to those standards. The point isn't that the state is unclear about what the tests will cover; more precision and advance warning won't address the real problems here.

ALFIE KOHN
Author of *The Schools Our Children Deserve* and *The Case Against Standardized Testing*
Boston, Massachusetts

Our Partners in Science teachers have used the [Alaska state] standards with great success for a number of years. I have gotten feedback from them regularly and they feel supported by the standards. Where the problem arises is when standards are used to construct high-stakes tests, but it is the tests that are the problem, not the standards, in my opinion.

What I am afraid may happen is that the high-stakes tests may label and condemn kids when it is the system/district/school and teaching that are broken and need the remedial support. I am afraid if we have tests without the support to change teaching, they will fail and the whole standards movement may be dragged down with the failure of the tests. There are no quick or easy fixes in education today, but I am not sure that politicians and others have the patience needed to make changes in a way that will endure.

Teachers need to understand and support the standards movement or it will go nowhere, in my opinion. Standards can provide a framework of goals (key concepts and skills) but the substance of how each concept and skill is taught is up to the teachers.

LESLIE GORDON
Partners in Science Project, NSF
Fairbanks, Alaska

CONTINUED NEXT PAGE

LETTERS CONTINUED:

In the last edition of your journal you strongly recommended that every teacher become knowledgeable about his/her state's standards. While I strongly agree with this, I don't believe you went quite far enough. To thoroughly understand the standards you must understand how the standards document is constructed.

The Oregon Science Standards have four categories: Common Curriculum Goals, Content Standards, Benchmarks, Eligible Content. Each of these categories has a different purpose. Too often, the intended purpose is either ignored or misunderstood.

The Common Curriculum Goals are broad statements that define the breadth of instruction that is to be covered across Oregon. The rest of the Standards relate to state assessment. The Content Standards define the portion of the Common Curriculum Goals that will be tested. Benchmarks break the Content Standards down by grade level and are themselves broken down further by Eligible Content, which defines specifically what may be included on the state test.

All too frequently, teachers use the Benchmarks and Eligible Content to build their curriculum because they offer fairly specific statements compared to the Common Curriculum Goals. But these statements represent only a small portion of the content that is to be taught, so the result [of relying solely on them] can result in an incomplete curriculum. For example, a high school biology teacher did not teach photosynthesis because it wasn't specifically included in a Benchmark and the principal required that teachers teach only what is in the Benchmarks.

Teachers need to be knowledgeable about the curriculum they are required to teach, as defined in the state standards. Learn how those standards are constructed, then use instruments such as Benchmarks for Science Literacy and the National Science Education Standards to interpret the standards for your grade level.

MIKE TOMLINSON
Durham Elementary School
Tigard, Oregon

While I strongly agree that education should be discussed and analyzed by all aspects of society, I also strongly believe that the assumption that education in the United States is failing could not be more wrong.

Although I don't have the factual data at my fingertips, I believe that we are educating more people than ever before in the history of the United States. What percentage of the American population is now reaching the high-school level? How many more percentage-wise are receiving diplomas? More are going on to higher education than ever before. A higher percentage of students are now taking SAT tests, yet the average scores are not far off the peak scores from the "good ol' days." Putting it simply, we are educating more people, lower-level students are being evaluated, and we are still measuring up reasonably well.

Other aspects of our educational system that are rarely discussed include our world leadership economically and production of more Nobel Prize winners than anywhere else in the world. Does that sound like our system is failing? The contextual setting of the American society at the turn of the century needs to be included in any discussion about education: the crumbling family structure; the many new requirements thrown at educators from federal and state governments (without funding of course); the paralysis often created due to fears of liability; more parents required to work (read: less time for their children); and the negative rhetoric from all facets of society.

When you truly examine education in a more objective context, analyzing all factors that influence the educational product, it's difficult not to admire the people (teachers) who are continuing to work at doing a better job in their classrooms to reach the most diverse population in the history of the United States.

JIM BOYCE
White River High School
Buckley, Washington

books and materials available from THE LENDING RESOURCE COLLECTION

THE NWREL MATHEMATICS AND SCIENCE EDUCATION CENTER'S Resource Collection is a lending library of teacher-support material. Search the collection and request items from the Web site at www.nwrel.org/msec/resources/ or call (503) 275-0457. The only cost is to mail items back at library rate.

While lesson study originated as an effective professional development method in the Japanese educational system, U.S. educators are finding much promise and relevance in this teacher-centered approach. The resources below highlight successful professional development practices that support elements of lesson study.

Learning Circles
Creating Conditions for Professional Development
Michelle Collay, Diane Dunlap, Walter Enloe, and George W. Gagnon Jr. (1998)
Learning circles are small communities of practitioners who come together to support each other in the process of learning. This guide examines the essential conditions for creating such a professional culture: building community, constructing knowledge, supporting learners, documenting reflection, and assessing expectations.

Reflective Practice for Educators
Improving Schooling Through Professional Development
Karen F. Osterman and Robert B. Kottkamp (1993)
The authors outline a collaborative process for educators to develop a greater level of self-awareness about the nature and impact of their performance, creating powerful opportunities for professional growth and development.

Creating the Conditions for Classroom Improvement
A Handbook of Staff Development Activities
David Hopkins, Mel West, Mel Ainscow, and John Beresford (1999)
To be effective at managing change, schools and teachers need to modify the internal conditions of the classroom at the same time as introducing changes in teaching or in the curriculum. Based on the international Improving the Quality of Education for All project, the book provides ideas, materials, and strategies to help create conditions that support changes in the classroom.

Listening to Urban Kids
School Reform and the Teachers They Want
Bruce L. Wilson and H. Dickson Corbett (2001)
After interviewing students at several low-performing schools over a three-year reform effort, the authors conclude that successful reform touches students' classroom lives noticeably and their input should be an important part of planning, implementing, and adjusting reform.

The Teaching Gap
Best Ideas From the World's Teachers for Improving Education in the Classroom
James W. Stigler and James Hiebert (1999)
Based on the TIMSS video study that compared the teaching of eighth-grade mathematics in Germany, Japan, and the United States, this highly readable book shows the extent to which teaching is a cultural activity. The descriptions of Japanese lesson study provide insight into a process for developing professional knowledge and giving teachers the opportunity to learn about teaching.

Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States
Liping Ma (1999)
This book describes the nature and development of the "profound understanding of fundamental mathematics" that elementary teachers need to teach math effectively, and suggests why such teaching knowledge is much more common in China than in the United States. Chinese teachers work together in teacher research groups to improve their teaching and understanding of mathematics.

Singapore Math Textbooks
Ministry of Education, Singapore
These texts from Singapore are being used in schools around the United States. The lending collection includes several textbooks and workbooks in the Primary Mathematics Series, for grades 1–6, and the New Elementary Mathematics Syllabus and Teacher's Guide, for grades 7–10.

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A WORD FROM THE DIRECTOR

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IN THE COLLABORATIVE SPIRIT OF LESSON STUDY, the Northwest and Mid-Atlantic Eisenhower Consortia have teamed up to produce this issue of Northwest Teacher.

I'm very excited about the topic of lesson study! Like many others in the mathematics and science education community, I have been intrigued with the findings and implications from the Third International Mathematics and Science Study (TIMSS) since the results were first released in 1996. The differences revealed in the study regarding U.S. and Japanese approaches to teaching mathematics are especially thought-provoking.

More recently, as our staff began to learn about lesson study and its relationship to Japanese instructional strategies and student performance, my beliefs about the connections between effective teaching and effective professional development have been reinforced. Dennis Sparks, executive director of the National Staff Development Council, says it well, "Quality teaching fed by powerful professional learning can make a difference in all schools. Teaching is a complex, intellectually demanding task that requires sustained, intellectually rigorous forms of professional development" (*Education Week*, April 4, 2001). It is our belief that lesson study represents this type of professional development.

By Linea Dymond, Roosevelt High School, Portland. Courtesy Pacific Northwest College of Art, Young Artists Program.

In collaboration with our Consortium partner site schools around the Northwest, we are beginning to explore the promising potential of lesson study by engaging teachers in meaningful discussions about their classrooms, providing them with an opportunity to examine their instructional practices, and observing and learning from each other. We believe that one of the most important outcomes of lesson study is the deeper mathematics and science content knowledge teachers gain by working together to design, implement, and revise lessons.

By attending seminars and conferences, reading professional journals and papers, and talking with others, we are developing a deeper understanding of the process and how we can best facilitate lesson study groups. Our counterpart, the Mid-Atlantic Eisenhower Consortium @ Research for Better Schools in Philadelphia has been a valuable partner in our efforts to develop expertise and resources on the topic of lesson study. The Mid-Atlantic Consortium organized two symposia at the 2001 American Association for the Advancement of Science conference, where we deepened our understanding of the theory and practice of lesson study.

We're excited about the promise of lesson study as an effective professional development strategy for improving mathematics and science teaching and learning. We plan to develop resources that others might use in their efforts with lesson study and perhaps host a regional forum on the topic. For now, we hope this issue of *Northwest Teacher* and the lesson study links on our Web site, www.nwrel.org/msec/nwerc/index.html, will be informative and spark your interest!

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