Japanese lesson study comes to California

Mathematics instruction is improved using a process of collaboration, observation, analysis and reflection, also known as the lesson study method.

The teachers barely look up from their table discussions as visiting administrators pause to listen in, or pull up chairs nearby to hear more. Deeply engrossed in their discussions, which are regularly punctuated by laughter, the teachers in Project DELTA delve into deep analysis of recent, shared lessons, studying the impact of the content and strategies used by the teachers and the effect on students' understanding.

The Riverside County Office of Education is the LEA for the project, now in its second year, in partnership with California State University, San Bernardino. Developing Educators Learning to Teach Algebraically (DELTA) serves approximately 90 mathematics teachers from the Perris Union High School District in Riverside County and its four feeder districts: Menifee Union, Nuview Union, Perris Elementary and Romoland School Districts.

The cohort also includes special education and alternative education teachers from RCOE, and teachers from the charter school, Oak Grove at the Ranch. The project covers the grade/course span from third grade through Algebra I, and includes mathematics intervention teachers at the secondary level.

All of the participating districts, as well as the Riverside County Office of Education, strongly support their schools in the journey to becoming effective Professional Learning Communities. Thus, teacher collaboration was not a new concept for any of the teacher teams.

Teaching the public "research lesson"

Japanese lesson study – Jugyou kenkyuu – which is a cornerstone of Project DELTA, adds a new twist: the teachers take turns publicly teaching the collaboratively planned lessons with their own students for the rest of the team to observe and then analyze, based on the students' learning.

In the Japanese model, the team begins by studying frameworks and other documents to build their shared knowledge of the

By Madeleine Jetter and Gwen Hancock

topic they are about to teach. Then the team collaboratively plans a lesson based on an upcoming topic. Everyone teaches the lesson to their own students, but one member volunteers to teach the public "research lesson," during which the other team members observe and collect data on student understanding as the lesson progresses.

After collecting the student work, the team reflects on the understanding demonstrated in the papers, as well as the student behaviors during the lesson that revealed their thinking. Then they revamp the lesson using the observation data and analysis of student papers, as well as insights from individual team members' experiences teaching the lesson.

Another teacher volunteers to teach the improved version of the lesson, while the others again observe and collect data. Afterward, the team analyzes the new lesson data along with the student work, and compares the results to those of the first lesson to see if student understanding improved. Finally, they discuss the broader implications for their mathematics instruction in general.

Most cycles include two such "live" student lessons and team reflections, but some teams have completed a third lesson cycle to maximize the potential of improving the lesson for students.

One teacher said, "We must design lessons very well so children want to learn, and want to pursue the questions themselves."

Impact on classroom practice

Catherine Lewis, co-author of "Lesson Study Step by Step," speaking to the Project DELTA teachers at the 2011 summer institute, discussed the improved quality of instruction over time resulting from the lesson study method of collaboration. Lewis is fluent in Japanese, and has observed this quality improvement trajectory firsthand in classrooms in Japan and the United States through her involvement with the model for more than two decades with a wide variety of students, schools and subject areas.

Riverside County Associate Superintendent of Schools Diana Walsh-Reuss agrees with Lewis about the impact on classroom practice. "Our most challenging group is the community school population," she says. These students are expelled from their home districts, and attend the county program for varying terms, ranging up to a year. "But the [Project DELTA] teachers have new ways to deliver instruction so that the kids are more interested and can better understand the concepts," she says. "It's more hands-on and engaging. The students obviously like it. And we've already seen the results in improved student scores on the CAHSEE."

Algebra students at the Arlington Regional Learning Center (Riverside COE) participate in "physical math" lessons, in which they work in competitive teams to solve problems using manipulatives.

RCOE Alternative Education Coordinator-Principal Robert Brough adds, "For the kids, DELTA is perfect because our kids like to do things their way. They don't like being put in boxes. The approach is not just about getting a right answer. It is a varied approach, where they are asked to find, maybe, three or four ways to solve a problem, but they have to be able to explain it. Our kids like choices, and they really buy into this."

Project DELTA teacher Karen Earle asked Brough to create a class for her comprising students who scored just below the cut-point on the assessment to be placed in Algebra I. She believed that using DELTA methodology, these students could succeed.

She says, "They are being successful because of this method, which is more conceptual than rules and shortcuts. Rules make no sense unless the students know why they work. And they are not only learning the math content standards, but also the [mathematical] practice standards from the Common Core, like sense-making and perseverance. I believe our initial success in improved CAHSEE test scores is just the tip of the iceberg. Now they're learning to really look to see if an answer makes sense." For teacher practitioners, an added value of lesson study as part of a collaborative model includes the opportunity to observe the impact that a teacher's wording and presentation, as well as the content of a problem or activity, can have on a student's learning.

Observing students while they do the work

The opportunity to closely observe student behaviors during the peer-taught lessons provides new insights, including such subtleties as notations of "tsubuyaki" (under-breath exclamations) students make during the lesson, which the instructing teacher may easily miss. The debrief allows the entire team to benefit from individual members' observations, and enables everyone to refine their ability to anticipate student responses within a given lesson.

Another teacher remarked, "We had been looking at student work, but didn't realize how important it was to look at students while they were doing the work."

In addition to the introduction of the Japanese lesson study model, with six days annually for teams to complete full inquiry

cycles on priority concepts, Project DELTA provides 80 hours of in-depth professional development in mathematics through a two-week summer institute, and two Saturday sessions.

Anthony Rosilez, superintendent of Romoland School District, says, "This is sustained PLC – [collaboration is] frequent and ongoing. It uses all the tenets of PLCs – research, data, good lesson planning, and discussing student learning issues. The teachers get energized by it.

"The teachers have become so reflective in their practice. I can see their growth in metacognition. Because of it, they are also teaching the kids to be reflective, inquisitive and metacognitive."

Asked about the out-of-class time needed for lesson study, he responds, "It is a lot of time, but the time spent today has multiple future benefits. What [the teachers] gain in skills and confidence helps them address curriculum at a deeper level. The planning is so comprehensive, with so many standards. When they are discussing one lesson, it transfers to multiple curricular areas. I see them integrating standards from language arts, science and social studies. We have to do so much more with the kids now, with so little time. By doing [Project DELTA], they actually gain time."

Training more qualified math teachers

With one of its goals being to increase the number of highly qualified mathematics teachers, Project DELTA also funds teachers' attendance in UCLA courses through the Mathematics Content Program for Teachers (MCPT). Twenty-two Project DELTA teachers are currently enrolled in MCPT, and all have passed the first three courses.

Earle participates in the MCPT classes and says, "As teachers, we are discovering things that we didn't realize were going on. We approach the material ourselves as students. We're using the manipulatives the kids will use – pattern blocks, fraction strips, cuisinaire rods – and we can anticipate things that could make the students shut down.

"Vocabulary is a huge part of DELTA. In the lessons, the kids have to use the correct math content vocabulary. We've made it necessary. So when you're going around listening to the groups work, you'll hear them using all the terms, because they have to, to solve the problem."

Community school students at RCOE's Arlington Regional Learning Center enrolled in Algebra I and Algebra Readiness participate every Friday in "physical math" lessons, in which they work in competitive teams to solve problems using manipulatives, usually in an outdoor setting.

"It's loud," says DELTA teacher Charity Cox. "But they really get into the competition. It's hard to get our kids to come to school on Fridays. But our Friday attendance is up, because they don't want to miss this activity."

Cox, a tiny teacher wearing a black "Got Math?" T-shirt, climbs up on a bench to call out the instructions to the teams. The students, many of whom drifted from their classrooms into the designated area displaying less-than-avid enthusiasm, become more

engaged as the card stacks of decimal values and fractions, and various pre-cut paper shapes and number lines are distributed, and each new problem is assigned.

The adults move rapidly from team to team calling out encouragement and occasional hints and reminders ("Wait! Can that value go there? Good thinking!).

Impact on student results

Project DELTA is already having a measurable impact on student results, based on data collected by independent evaluator Key Data Systems during this first year of the project. A higher percentage of DELTA students scored proficient or advanced on their grade level CSTs (grade 3-Algebra 1) than the students in a matched comparison group, and the difference was statistically significant (50 percent vs. 44 percent).

Students whose teachers are pursuing Math Supplemental or Subject Matter Authorizations via MCPT coursework had even better outcomes, with 53.5 percent scoring proficient or advanced.

Among students taking the General Math CST, 57.7 percent of DELTA students increased a performance level or more, whereas 41.3 percent of students in the comparison group did so. Among those taking Algebra I, 26.7 percent of DELTA students increased a performance level or more, while 20.7 percent of the students in the comparison group did so.

The Key Data project evaluator commented that it is unusual to see significant improvement in student outcomes after only one year in new projects such as DELTA.

What accounts for the success of this project? Feedback from teachers suggests that the time invested in lesson study has been a decisive factor. The Project DELTA team collected surveys from teachers following their first cycle of lesson study. A large majority (69 percent) of participants agreed with the statement, "As a teacher, I made a significant discovery during lesson study that will impact my pedagogy and future interactions with math students."

In their written responses, teachers emphasized the value of lesson study collaboration and reflection:

"It allows me to see other teachers' methods and how they approach the lesson."

"What I thought students were learning and what they are actually learning are two different things."

"It was invaluable to see the lesson taught and watch the students learn it. I could anticipate their needs and tweak the lesson."

"Big difference from the first to the second lesson – we learned a lot."

"The debrief was vital!"

Brough adds, "The teachers challenge each other to do better. They know they'll be meeting in a few weeks, and they'll all have to report back to their peers [about their individual experiences teaching the collaboratively planned lesson]. It has created a very reflective practice for the teachers."

The support of school and district leaders like Walsh-Reuss and Brough has been crucial to the success of Project DELTA. Support and open communication between administrators and practitioners of lesson study is particularly important because of the need for time out of the classroom for teachers to research, plan and observe live lessons.

But the teachers of Project DELTA see the investment of time spent in lesson study generating a direct payoff in insights that im-

Continued on page 38

Goal setting to achieve results

Continued from page 16

schools can't be compared to that of a video game, our students and staff need to be able to set tangible goals that connect to a related purpose. In fact, our students may need this compass even more as it is they who will ultimately be responsible for answering questions, taking tests, and retaining the skills and knowledge they learned in school to be productive citizens. ■

References

Chappuis, S., Chappuis, J. & Stiggins, R. (2009). "Supporting Teaching Learning Teams." *Educational Leadership*, 66(5).

Spillane, J. (2004). *Distributed Leadership: What's all the hoopla?* Institute for Policy Research, Northwestern University, online at http://www.northwestern.edu/ipr/publications/papers/Spillane_DistribLead.pdf.

Spillane, J. (2006). *Distributed Leadership.* San Francisco: Jossey-Bass.

Spillane, J., Diamond, J. & Jita L. (2003). "Leading instruction: The distribution of leadership for instruction." *Journal of Curriculum Studies* 35(5).

Spillane, J., Halverson, R. & Diamond, J. 2004. "Towards a theory of school leadership practice: Implications of a distributed perspective." *Journal of Curriculum Studies* 36(1).

Rich Newman is principal of Monterey Ridge Elementary School in the Poway Unified School District in San Diego. He began his education career as a Teach for America fellow, and has since worked at the school, district, university and national level. Newman served as a program officer at The Wallace Foundation, where he helped lead a large-scale education leadership initiative. He was recently awarded the prestigious Author E. Hughes Career Achievement Award from the School of Leadership and Education Sciences at the University of San Diego.

Japanese lesson study

Continued from page 21

prove learning and lead to more rigorous instruction. One realized, "Allowing students to struggle can be such a powerful thing, as it allows the students to discover."

Clea Fernandez and Sonal Chokshi (2005) have conducted extensive research on lesson study groups working in the eastern United States. They write:

"Ultimately, lesson study provides a way to reengineer U.S. teaching. It also provides a clear vision for what this profession should look like: one that has a rich, coherent and continually evolving body of professional knowledge; one that creates productive and satisfying roles for its members; and one that supports a healthy interplay between policy and practice."

Lesson study is an ambitious undertaking with enormous potential rewards. Schools beginning to engage in lesson study can realize that potential when teachers and school leaders do not view it simply as one more demand on school and teacher time, but as a structure to nurture and empower teachers' work.

The lesson study process results in the development and attainment of shared goals across the school – producing real and lasting improvement to classroom learning and student achievement. ■

Resources

Chokshi, Sonal & Fernandez, Clea. (2005). *Reaping the Systemic Benefits of Lesson Study: Insights from the US.* Bloomington, IN: Phi Delta Kappan.

Lewis, Catherine C. & Hurd, Jacqueline. (2011). *Lesson Study Step by Step.* Portsmouth, NH: Heinemann.

Wang-Iverson, Patsy & Yoshida, Makoto. (2005). *Building Our Understanding of Lesson Study.* Philadelphia, PA: Research for Better Schools, Inc.

Madeleine Jetter is principal investigator, Project DELTA, and assistant professor of mathematics at California State University, San Bernardino. Gwen Hancock is program specialist, Project DELTA, Riverside County Office of Education.