

MATH MAKEOVER

A SCHOOL-UNIVERSITY
PARTNERSHIP TRANSFORMS
ELEMENTARY MATH INSTRUCTION

BY NICOLE RIGELMAN,
SARAH CRANE,
KELLIE PETRICK,
AND DONNA SHRIER

Walk into Jackson Elementary School in Hillsboro, Oregon, on any school day, and you'll notice the excitement in the air. You'll encounter students enthused by the mathematics lesson they just had, along with teachers excited about the collaboration they just completed.

Teachers at Jackson embrace a growth mindset and continuously try best practices that better reach all students. They collaborate and bounce ideas off one another, and they observe one another and provide feedback. They'll even ask another teacher to model lessons with their students so they learn how to implement particular instructional practices.

The energy is contagious. As Sarah Crane, Jackson's principal, reflected, "It's uncommon for me to walk through the halls without someone telling me about a lesson they did, one they're going to do and want me to watch, or one they just watched a colleague do with students. Walking into classrooms and seeing the authentic, productive student discourse or listening to a student explain the lesson is truly an administrator's dream."

Collaboration between Portland State University and Hillsboro School District personnel helped create this instructional environment where students thrive because teachers are working and learning together.

During Crane's first year as principal at the K-6 school, teachers worked together to develop this mission



Photo by NICOLE RIGELMAN

Teachers at Jackson Elementary School in Hillsboro, Oregon, discuss potential next steps for students and implications for their math instruction. A partnership between the school and Portland State University supports learning that focuses on examining instructional practice with teacher candidate and cooperating teacher teams in the area of math instruction.

statement: *At Jackson, we are a family community that embraces a tradition of excellence that fosters emotional, social, and academic growth in a culture where everyone is happy, welcomed, included, and challenged.*

So when the district mathematics specialist and a university mathematics education faculty member approached Crane with the idea to collaborate, she agreed immediately. She knew that the collaboration would be good for all teachers, as well as for the teacher candidates hosted at the school, and that using lesson study — one of the proposed approaches — would spur such collaborative practice to continue. Ultimately, it seemed like the perfect step toward realizing the school mission.

THE POWER OF PARTNERSHIP

School and university leaders agree that developing a shared vision and collaborative practices in school-university partnerships leads to mutually beneficial experiences for all

Jackson Elementary School
Hillsboro, Oregon
Enrollment: 560
Staff: 25
Racial/ethnic mix:
White: 66%
Hispanic: 14%
Multiracial: 9%
Asian: 7%
Black/African-American: 3%
American Indian/Alaska Native: 1%
Limited English proficient: 8%
Free/reduced lunch: 23%
Special education: 13%
Website: www.hsd.k12.or.us/Jackson

involved (Petti, 2013; Rigelman & Ruben, 2012; Teitel, 2003).

This present partnership extended the long-term relationship fostered between Portland State University’s

Graduate Teacher Education Program and Jackson Elementary in Oregon’s Hillsboro School District. Jackson has long hosted large groups of teacher candidates working alongside cooperating teachers who are willing to open their classroom practice in ways that benefit learning for the candidates, the teachers, and the students they serve.

The school was eager to expand the partnership to include opportunities for the teacher candidate and cooperating teacher teams to learn together through book studies and modified lesson studies, which would be co-facilitated by a project leadership team on which we, the four coauthors, served: Sarah Crane, school principal; Kellie Petrick, district mathematics specialist; Donna Shrier, university supervisor; and Nicole Rigelman, mathematics teacher educator. The collaborative work provided learning opportunities for both teacher teams and project leaders.

We leveraged the existing school-based professional learning community

(PLC) structures to support learning that would focus on examining instructional practice with teacher candidate and cooperating teacher teams, specifically in the area of elementary mathematics.

We selected mathematics as a focus because performance on the Smarter Balanced Mathematics Assessment was flat in its first two years of implementation. Because of the long-term partnership between the mathematics specialist and the teacher educator and our previous similar work in Title I schools, we were interested in extending our professional development model to include teacher candidate learning and practice.

We used protocols and tools — such as the Task Analysis Guide (Stein, Smith, Henningsen, & Silver, 2009); the Bring•Do•Leave Instructional Planning Guide (Rigelman, 2011); and the Student Discourse Observation Tool (Weaver, Dick, & Rigelman, 2005) — that focused the collaborative planning and teaching cycles at both the classroom and PLC levels.

The quarterly cycles included four phases: preplanning, collaborative planning, co-teaching/focused observing, and debriefing based on student data (Rigelman, 2017; Rigelman & Ruben, 2012), much like a Japanese lesson study cycle (Fernández, 2005; Watanabe, 2002). Our work differed in that the focus was not on tuning a lesson, but rather on tuning practice.

The PLC also engaged in monthly book studies and examination of student work. This benefitted the 16-member cross-grade PLC, and, more specifically, the five teacher candidate and cooperating teacher teams by helping all develop a shared vision for mathematics teaching and learning that focused on eliciting and using student thinking and discourse to deepen student learning and inform instruction (National Council of Teachers of

Mathematics, 2014).

We used problem-based lessons as a vehicle to promote student thinking and reasoning. These included tasks where students were not expected to solve in one particular way.

For example, we posed the following problem stem: *Bobby had 38 toy cars. Mia had 53 toy cars.* The first stages of eliciting student thinking came in making sense of what the task might be about and brainstorming potential questions students could ask and answer, given this information. After students selected a question to answer and developed a solution strategy, selected students shared their approach with the whole group. The teacher candidate and cooperating teacher team asked students questions and recorded their thinking on chart paper for later reference when comparing strategies.

This common vision deepened participants' capacity for co-teaching and surfaced enthusiasm for what students may say or do with various mathematics tasks. The district mathematics specialist and school principal noted the benefit of teachers focusing on continuous improvement of their instructional practice, as well as the side benefit of replicating this model both in other subject areas in the school and in other schools in the district. The university faculty benefitted from continued study and improvement of ways to develop mutually beneficial partnerships in schools.

WHOLE-SCHOOL LEARNING: **THE PRINCIPAL'S PERSPECTIVE**

Crane, the principal, knew this collaboration had potential to be powerful, given her previous experience with lesson study, but she also noticed two unanticipated outcomes.

First, she had the chance to be a learner with her teachers. Although teachers may have been nervous in the first PLC meeting about speaking

openly with their principal present, that quickly faded as they realized she was there to learn and grow — and not to evaluate. Even the teacher candidates, who understandably started out shy and quiet, grew to a point where they were leading lessons while all 16 PLC members watched.

A second unexpected outcome was connected to the time spent dissecting student work and student talk in ways that the PLCs had not done before. Teachers now had a common language and a continuum for student mathematical discourse — from procedures and facts, to justification, to generalization. They used this tool to plan, analyze, and extend the student discourse. “We saw the power of these practices,” Crane said. “I don’t think any of us will ever teach without wanting another set of eyes in the room at times to really capture what the students are saying and doing.”

The collaborative lesson study experiences also produced a lot of buzz among the staff. Other teachers wanted to know what we were doing and how they could join in. Although we kept the group closed to honor the process we had been through together, we began to share lessons and collaborate with other teacher teams in the building.

For example, when teachers finished a schoolwide day of instructional walk-throughs, they asked how the teachers in the collaboration had fostered such authentic discourse in their students. They observed that students in these classrooms were talking more about the math they were doing and that teachers and students were building on one another’s ideas during whole-group discussions. Basically, those teachers wanted to have what the collaborating teachers were having.

When the principal talked to the teachers about the work, they immediately signed up for an onsite university mathematics course

that would give them background knowledge and learning aligned with the work in this collaboration.

How to sustain the work? “Next year, we will not benefit from the grant funding and collaboration to the extent we did this year,” Crane said. “However, we have planted seeds in the building that will not only remain, but also continue to grow and flourish. My job now is to help continue the process by encouraging teachers and teacher candidates to collaborate, find covered time for lesson study and instructional rounds, and maintain my own excitement about student and teacher growth.”

DISTRICTWIDE LEARNING: **THE MATHEMATICS SPECIALIST'S PERSPECTIVE**

The most productive use of a district mathematics specialist's time is within schools, working directly with teachers and students. Even more productive is a partnership among school staff, the school administrator, university faculty, and our next generation of teachers on behalf of Jackson's K-6 students. Through this school-university partnership, we identified four additional benefits.

First, within months, there was noticeable instructional accountability among the teacher candidates, cooperating teachers, and the mathematics specialist. The teacher candidate and cooperating teacher teams exchanged frequent emails, photographs, references to specific pages from the book study, and video footage as a means to celebrate student growth, as well as to initiate brainstorming toward potential next steps.

Second, the mathematics specialist and school principal collaborated to sustain and propel this learning culture beyond the participating grade-level teams. They scheduled schoolwide professional learning —

for example, on how to implement problem-based lessons and how to deepen mathematical discourse with connections to the district's instructional framework — both to minimize initiative fatigue and generate broader enthusiasm for the work.

Third, this move also positioned partnership teachers and teacher candidates as leaders, given their experience with student-focused instructional practices, as they planned and delivered lessons. Through this deprivatization of practice, all participants, including the mathematics specialist, deepened their knowledge and ability to elicit and use students' mathematical understanding and consider its development over time.

Last, the partnership fostered broader interest in professional development. As Kellie Petrick, the mathematics specialist, noted, “The presence of risk-taking created a lasting impact on the district's mathematics work as it propelled others, both in and out of this project, to get involved in related district professional development opportunities. Most notably, teachers at Jackson Elementary enrolled in a Portland State University course from the elementary mathematics specialization program.”

Similarly, all the teacher candidates attended district mathematics professional development sessions alongside their cooperating teachers. A willingness to learn together was an extension of the meaningful collaboration present in this partnership.

TEACHER CANDIDATE LEARNING: **THE UNIVERSITY SUPERVISOR'S PERSPECTIVE**

It's typical for teacher candidates to start the student teaching year feeling somewhat overwhelmed. So it wasn't surprising that the five teacher candidates involved in the partnership

initially expressed some trepidation about how they would have time to complete the required readings, attend extra meetings, and collaborate on lesson planning.

However, those feelings quickly subsided for one candidate who co-planned a lesson study lesson with her cooperating teacher, the principal, and the district mathematics specialist. After the initial planning session, she said: “I was able to see what it was like to collaborate with others who held different roles. My feelings moved from worry about extra work to appreciation for the opportunity to learn.”

The collaboration later extended to all the teacher candidates as each planned and delivered number talk lessons. Planning was a frequent focus of their conversations. One candidate said that she was beginning to take more ownership with teaching and that she felt more like a teacher than a teacher candidate. As the year progressed, the candidates commented on how comfortable they were with sharing thoughts with teachers from other grade levels and with the principal. They felt they were a part of the community of teacher learners.

There were many other ways in which the teacher candidates experienced growth as a result of their involvement in these mathematics-focused PLCs. Compared to the typical teacher candidate, they seemed more comfortable planning and teaching mathematics lessons. Their lesson planning included thinking through common misconceptions concerning the topic at hand and considering how to support student discourse throughout the lesson.

A focus on student thinking was central to their goals. They regularly invited the university supervisor to observe their mathematics lessons. As the year progressed, candidates were able to make connections between

what they were learning about teaching mathematics and apply it to other subjects.

For example, during one literature study group that the university supervisor observed, the teacher candidate leading the session asked mostly factual or one-answer questions. During the debrief, the supervisor compared the learning about high-level mathematical discourse to the potential discourse for book discussions. The connection was clear to the candidate, who then began to notice that higher-level questioning and discussions fit in with literature study and science lessons, just like in mathematics.

Another candidate mentioned that she did not envision discourse as a model to get students to think deeper until she saw this carry over to community circle time, where students practiced the skills they had learned in mathematics — using wait time, listening to others explain their thinking, solving problems together, and having open discussions, including agreeing to disagree.

Although teamwork and collaboration are emphasized in the teacher education program, few candidates have the opportunity to experience them in their student teaching settings to this extent. To be a respected member of a team working alongside experienced teachers while all learn together is powerful and an experience that will serve them well throughout their teaching careers.

SUSTAINING THE WORK

This partnership has generated enthusiasm throughout the school, and teachers report great impact on student mathematics learning. There is an authentic desire to continue collaboration within and across the school's PLCs and to empower teams through the use of lesson study.

According to Petrick, the

mathematics specialist, “Colleagues are clamoring to get involved and hope this type of work continues in their grade levels next year.” To promote continuous teacher learning and student-centered mathematics instruction, the specialist is leveraging this experience across the district by using lesson study with teacher teams across schools and elevating the participating teachers as models for others to observe to learn more about deepening student discourse.

This work becomes sustainable when school structures and university structures align to achieve a common vision for student learning and focus on ways to support learning for all members of the partnership. In this case, school structures included teacher collaborative time and a focus on particular instructional approaches and curriculum areas for improvement; university structures included the availability and expectations of teacher candidates, as well as a clearly defined role for a university supervisor.

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Nicole Rigelman (rigelman@pdx.edu) is professor at Portland State University, Oregon. Sarah Crane (cranesa@hsd.k12.or.us) is principal of Jackson Elementary School in the Hillsboro School District, Hillsboro, Oregon. Kellie Petrick (petrickk@hsd.k12.or.us) is an elementary mathematics specialist in the Hillsboro School District. Donna Shrier (shrierd@pdx.edu) is assistant professor of practice, Portland State University. ■