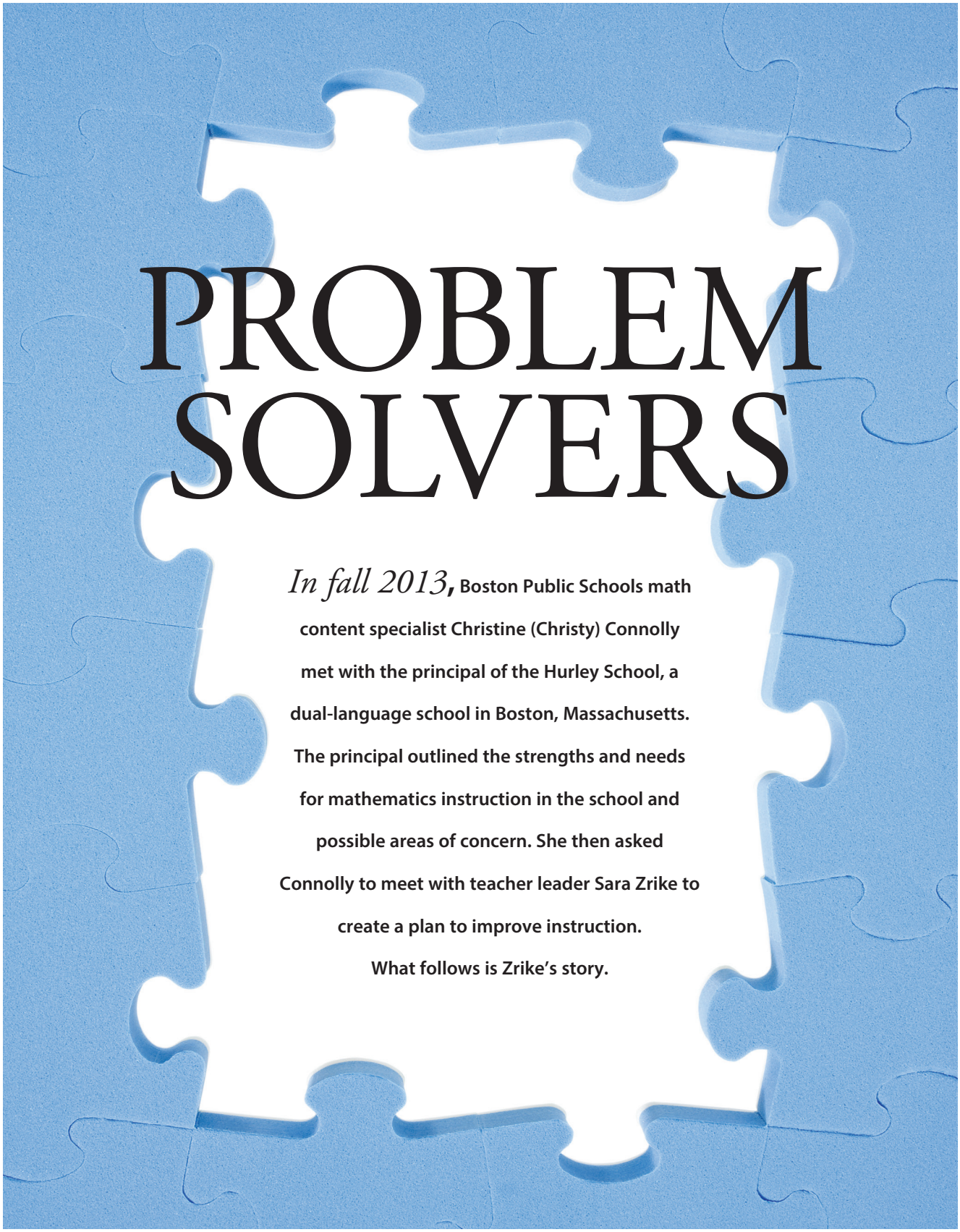

PROBLEM SOLVERS

In fall 2013, **Boston Public Schools math content specialist Christine (Christy) Connolly met with the principal of the Hurley School, a dual-language school in Boston, Massachusetts. The principal outlined the strengths and needs for mathematics instruction in the school and possible areas of concern. She then asked Connolly to meet with teacher leader Sara Zrike to create a plan to improve instruction. What follows is Zrike's story.**

TEACHER LEADER TEAMS WITH CONTENT SPECIALIST TO STRENGTHEN MATH INSTRUCTION

By Sara Zrike and Christine Connolly

In early November 2013, I (Sara) started talking to Christy about visiting the Hurley School. I felt that the Hurley had spent considerable time transitioning to the Common Core State Standards on literacy, but little time addressing the shifts in math. I worried that our math classes were no longer rigorous enough to meet these more demanding standards.

Christy and I decided that she would do a round of observations in K-8 classrooms, specifically on the types of questions that teachers were asking students during math class. I created a schedule for her to visit classrooms for 20-minute intervals to see as many grades as possible and arranged for her to meet with Jen Muhammad, the math facilitator and 4th-grade teacher, and me to plan next steps.

When Jen and I met with Christy during her visit, she shared with us her initial thoughts after visiting classrooms. She noted that teachers were following the pacing guides, but that their level of questioning was not engaging students in higher-level thinking. The three of us discussed how to address this low level of questioning with grade-level teams during our common planning time meetings in January. Christy agreed to type up the transcript of the questions she heard in classrooms, in no particular order, for use during common planning time.

FUNNELING VS. FOCUSING

Over the next few weeks, I collaborated with Jen and Christy to plan the agenda (see p. 22). Christy suggested we read the article, "Questioning our patterns of questioning" (Herbal-Eisenmann & Breyfogle, 2005), which discussed the difference between funneling (leading) and focusing (more open-ended) questions during math class.

I looked at trends in the observations that Christy recorded. In addition to the transcript from Christy's visit, I created a list of questions I observed in Jen's classroom. I felt that to get buy-in, I needed to show teachers what this looked like in a real classroom in their own school. We decided to ask teachers to read the article before common planning time and be prepared to discuss it. We planned for this work to occur over two sessions of common planning time so that teachers could leave with next steps for their own classrooms.

For two weeks in January 2014, I attended the common planning time sessions in all grade levels. Teachers discussed the data trends around questioning that Christy provided, connected this work to the Common Core, sorted the questions from Jen's classroom into funneling and focusing piles, discussed the article, practiced how to convert some of the questions from the Hurley transcript from funneling to focusing, and planned for next steps in their own teaching.

Teachers said they had no idea that they were asking so many funneling questions and felt that it would be easy to make some of the same questions more focusing. All teachers left the two meetings with actionable items and with the knowledge that Christy would be back for another round of observations in March.

SIGNS OF IMPROVEMENT

When Christy returned in March 2014 for her follow-up observation, Jen and I met with her to discuss her find-

Sara Zrike

Christine Connolly

ings. She reported, "The improvement efforts regarding questioning in mathematics at the Hurley over the past three to four months was evident during this second round of observations. A majority of the questions asked by teachers probed students to explain how they solved a problem, why they solved it that way, and how do they know they problem solved correctly. Often, teachers exhibited longer wait times, which is necessary when asking cognitively demanding questions requiring significant language in the answers. The funneling questions have decreased significantly, allowing students to think critically through their own processes."

After comparing her notes to her last observation, Christy made suggestions for next steps, and this was shared with the staff.

Overall, the math question cycle of inquiry was quite successful. Initially, teachers seemed a bit reluctant to look at Christy's transcript for fear that it would unveil poor instruction. However, through readings, observations, and first-hand experiences with classroom practices, teachers were able to discuss their own strengths and weaknesses.

Teachers eventually felt comfortable pointing out which questions in the transcripts were theirs. Ultimately, they recognized that small changes, such as altering the order of words in a question, could yield big results for deepening student thinking.

A 5th-grade teacher later told me that she had become much more aware of how she asked questions and was actively making sure she asked more focusing than funneling questions. In fact, "focusing vs. funneling" has now become a part of the Hurley vernacular. This new and improved awareness and level of questioning allows for more student-to-student discourse in class, informs the teacher of any misconceptions that need to be addressed, and deepens mathematical thinking.

The ultimate goal of effective professional learning is improved student learning. In August 2104, preliminary Hurley School Massachusetts Comprehensive Assessment System data showed student improvement in math. The percentage of students who scored proficient or higher was 65%, a 5% increase from the year before. The composite performance index for English language learners went from 75.3 to 78.9, and the overall student growth percentile went from 47 to 50.5. In fall 2014, the Hurley K-8 received a letter of commendation from the Massachusetts State Department of Education for narrowing proficiency gaps.

COMMON PLANNING TIME AGENDA:
MATHEMATICAL QUESTIONING AT THE HURLEY K-8

Big question:

How can we facilitate rigorous student conversation, as opposed to teacher-to-student conversation, through the types of questions we ask?

The data show:

- In five out of 10 classes, teacher talk was more frequent than student talk.
- In three out of 10 classes, students offered comments and questions regarding other students' work without prompting.
- In seven out of 10 classes, teachers asked questions in back-and-forth style.
- In three out of 10 classrooms, teachers illuminated misconceptions as learning opportunities (i.e. found errors that are common and had a discussion).

Agenda:

- Establish connections between this work and the Massachusetts State Frameworks for Mathematics, including the Standards for Mathematical Practice.
- Sort questions from Ms. Muhammad's math lesson.
  - What did you notice?
  - How did you sort? Why?
  - How is this connected to the article "Questioning our patterns of questioning."
- Discuss the article "Questioning our patterns of questioning."
  - Aha! moments.
  - What types of questions do you think you ask in your classroom?
- Identify the types of questions in Hurley School classrooms.
  - One color = funneling questions; another color = focusing questions.
  - What did you notice about questioning at the Hurley?
- Practice rewriting funneling questions as focusing questions.
  - How can these questions be rewritten to encourage student-to-student discourse, extend mathematical thinking, and allow students to learn from misconceptions?
- Where do we go from here?
  - What are the implications from this article and these activities for your own teaching?
  - What is one takeaway?

NEXT STEPS

This year, I am working to implement some of Christy's suggestions for next steps in math. These include increasing opportunities for student-to-student talk

Continued on p. 29