

Improving Math Instruction With Content-based Coaching



With the support of principal Jesse Woods, who believes that all students are capable of learning rigorous mathematics, the faculty of Burrus Elementary School wanted to transform the mathematics program into one where students successfully do high-level mathematics. Burrus Elementary, located in Houston, Texas, serves students in grades pre-K-5. More than 96 percent of students at this Title I school receive free or reduced-price lunch, and half of the students are labeled as at-risk.

Burrus Elementary educators set a goal of placing a skilled teacher in every classroom with strong mathematics knowledge, supported by identified teacher leaders. In order for the school to reach this goal, the principal enlisted the support of the Rice University School Mathematics Project (RUSMP), known for developing teachers and teacher leaders. The university staff mentor elementary teachers and identify, develop, and support those who can become teacher leaders.

University-School Collaboration

RUSMP and Woods collaborated

to develop a professional learning community to strengthen the mathematics teachers' delivery of rigorous mathematics and to identify and prepare teacher leaders for the ongoing challenges of educating children. As an instructional coach and mentor, I designed a plan to develop teachers' mathematical content, improve their pedagogical skills, and further train several teachers as campuswide math leaders. I built upon the work of Lucy West and Fritz Staub who underscore the importance of improving student learning and achievement by having a teacher and a coach work to collab-

oratively plan instruction.

I began my content-based coaching sessions with teachers in grades 3 to 5 with frequent classroom observations and pre-and post-feedback sessions, as well as with emails and conversations during teachers' planning time. Principal Woods and I met before each coaching session to identify strengths and weaknesses of his teachers' pedagogical and mathematics content knowledge and progress teachers had made from previous coaching sessions. We also analyzed benchmark test results for each mathematics teacher. He always wanted to know what to do to help his teachers improve their students' achievement.

Content-based Coaching

Each coaching day began with a pre-lesson briefing to discuss questions previously posed to the teacher by email. The foci of a pre-lesson briefing were the learning goals, how the lesson was to begin, resources to be used, and possible real-world connections. The curriculum framework devised by the school district served as a resource to organize the lesson.

Before one of the pre-lesson briefings, a fourth-grade teacher shared that her students were not calculating the perimeter of a rectangle correctly because of computational errors. She felt that her students needed support in developing fluency with computations. She also reported that some of her students would use the standard addition and multiplication algorithms incorrectly to find their answers. This provided an opportunity for me to introduce making tens using addition to find the perimeter. As an exploratory activity for making tens, I suggested playing a game of jacks.

The teacher and I proposed two focus questions: "What is the content

to be learned by the students?” and “How is the content to be taught?” We agreed that the goal for the lesson was to use scaffolding and questioning techniques to develop fluency in computing the perimeter of a rectangle.

The Lesson

I began the lesson with the game of jacks. Students, in turn, tossed all 10 jacks on the floor, tossed the ball in the air, and picked up 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 jacks before the ball bounced back down on the floor. This led to a discussion of all the possible combinations of making 10. For example, on picking up two jacks for the “twosies,” the combinations would be $2+2+2+2+2$. On the turn for “sixies,” the combinations would be: $6 + 4$.

I then distributed standard notebook paper to students. They were given the opportunity to devise their own strategies for calculating the perimeter of a sheet of paper by forming 10s and then discussing these strategies in their small groups. Several groups of students shared their processes of forming tens with the whole group as they began calculating the perimeter of a sheet of paper. I assessed students’ reasoning by asking probing questions such as: “What are some possibilities for making tens? What patterns do you notice that were similar to those in playing the game of jacks?” The lesson continued with other computational strategies that the students used to find the perimeter.

Post-Lesson Debriefings

During the post-lesson conference, the teacher and I agreed that setting objectives and determining strategies before the lesson led to a richer post-lesson conference on student learning. The teacher felt that what she gained from observing me work with her students was the art of asking questions to help students articulate their strategies for finding the perimeter of a rectangle.

After each day of coaching and mentoring, I also debriefed with the

principal. We discussed the agendas of meetings and my coaching collaboration log about the mathematics content that needed to be taught, students who needed remediation, strengths of the mathematics teachers, and possible changes that each teacher needed to make in instruction to enhance student learning. We jointly created an action plan that he would implement between coaching sessions.

This principal has modeled high standards for student success for more than 20 years. His positive relationships with community leaders and partners have afforded valuable programs to be implemented on campus. He has been the catalyst for promoting student achievement at Burrus Elementary.

Next Steps

After conversations with the principal, we identified two fifth-grade teachers to continue development as teacher leaders. They served as department chairs, lead teachers, and workshop leaders, and volunteered for most leadership roles. Frequently these teachers coordinated the professional learning community meetings in developing lessons and getting feedback to me as to the next steps they needed to take as leaders on campus.

Both fifth-grade teachers realized that they needed additional opportunities for professional development and support to further develop their pedagogical mathematical content knowledge and leadership skills. I invited them to attend RUSMP’s four-week summer program and an academic-year leadership seminar that I offer. With the guidance and support of their principal and RUSMP, this pair will be empowered to support teachers and achieve the school goal of developing mathematics teachers capable of delivering rigorous instruction with high student expectations. ■

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