

APPROACHING MATHEMATICS UTOPIA?

F. MORTON
Stafford County Public Schools
Stafford County, VA 22554

Well, not really, but as Mathematics Specialists, we have an idea of what it looks like. The lessons learned during the first year of working with teachers will help us reach our ideal. That perfect world of mathematics instruction is best articulated in the National Council of Teachers of Mathematics' (NCTM) *Principles and Standards for School Mathematics*:

Imagine a classroom, a school, or a school district where all students have access to high-quality, engaging mathematics instruction. There are ambitious expectations for all, with accommodation for those who need it. Knowledgeable teachers have adequate resources to support their work and are continually growing as professionals. The curriculum is mathematically rich, offering students opportunities to learn important mathematical concepts and procedures with understanding [1].

This is the “perfect world” Mathematics Specialists strive for as we set out to change the world—or the philosophy of mathematics instruction in our buildings, or the daily instruction in a classroom. I have come to realize through the experiences of the last one and a half years that it is the small steps and the seeds that we plant in the actual classrooms that push us and those we work with in the direction of truly changing and reforming the mathematics we teach. Since instructional practices are a direct reflection of a teacher’s belief system, one of the primary goals of the Mathematics Specialist is to promote the vision for mathematics education described above.

Stafford County’s Vision

In Stafford County, there are currently nine Mathematics Specialists, each one working in a K-5 building. The Mathematics Specialist Program is clearly defined in a five-year plan and was presented to administrators and staff before I started working in the building. The daily activities change as the needs in my building change, but the philosophy and intent of the Mathematics Specialist Program is focused on using best practices to improve student

achievement in mathematics by improving instructional practices. Stafford County Mathematics Specialists established the following mission statement:

The Mathematics Specialist takes a leadership role to increase the awareness and value of mathematics for students, teachers, parents, and the community. They work with teachers and parents to increase their understanding of how children learn mathematics. In serving as a resource and a coach to teachers, they model best practices in teaching and learning mathematics. They also collaborate with teachers and administrators to collect, analyze, and use data to inform instruction in meeting the needs of all students.

The following Focus Goals have also been established:

1. Encourage and support teachers in modeling and developing students' oral and written communication skills in mathematics to provide opportunities for student self-reflection and metacognition (through number talks, questioning, performance-based assessments, mental math activities, journals, etc.).
2. Support the divisionwide implementation of the *Everyday Mathematics* series throughout the year [2].
3. Revisit and refine current mathematics classes for parents and work to encourage more parental involvement.
4. Facilitate ongoing, monthly school-based professional development in content and pedagogy through grade-level meetings and at other times as needed.
5. Collaborate with teachers to examine formal and informal assessments in order to assess student understanding and to inform instruction.
6. Support teacher collaboration in developing common assessments and rubrics based on what they want children to know and be able to do, and to use those to *measure* student understanding and skills.

These statements are more than just words on paper; they guide our interactions with teachers, parents, and administrators and help us allocate our time. The Focus Goals and Mission Statement are designed to further our two primary initiatives: "Teaching and Learning for Understanding" and "Every Child Mathematically Proficient."

In addition to the six Mathematics Specialists already in place, three Mathematics Specialists were placed in three schools participating in a National Science Foundation (NSF) grant in Fall 2006. It seemed like such a simple plan: a Mathematics Specialist would be placed in an elementary school as part of a NSF research project to work with teachers to enhance mathematics instruction, thereby improving students' mathematical proficiency. Oh, and by the way, there would be a new mathematics curriculum tool to implement and support. Oh, and the report card would be changing for first through third grade in such a way that teachers would need to assess their students' mathematical understanding by evaluating their performance rather than scoring a worksheet. Oh, and one more thing—the county would be implementing an initiative to empower site-based decisions that would require teachers to meet continuously throughout the school year to complete and discuss research, develop action plans and strategies, and basically compromise any professional development time available. These were some of the more formidable issues that arose during my first year—underscoring a situation in which a teacher leaves the classroom, moves to a new building, takes on a new role that is relatively new in the division and is still evolving, and is not clearly understood by her colleagues.

Each of the aforementioned concerns could be the focus of discussion because they have truly impacted my ability to fulfill the responsibilities of the Mathematics Specialist. Instead, I have chosen to reflect more specifically on the coaching, co-teaching, and collaboration experiences during my first year and the lessons I learned from those experiences. On the surface, these three terms seem very similar. They all have the connotation of cooperation; they all seem to invoke a positive attitude with a common goal; and, they all even start with the letter “C”! As the layers of each of these models of working with teachers are peeled away, these three aspects of being a mathematics education leader become very distinct, yet still very much entwined.

Collaboration

I can remember clearly how excited I was to be starting this position. I had taken the math content courses that enabled me to feel fairly confident in my teaching ability. I had first hand experience building a community of learners in my own classroom, and knew how powerful inquiry-based learning and teaching could be. In addition, I would be working in a new building with a group of teachers who really wanted to be there. Most of them had competed for positions at this school, and I thought that they would be more open to reform mathematics and problem-based teaching. In short, I felt fairly competent in using the new curriculum materials and had worked hard to be ready to support each grade level as we began the schoolyear.

As Mathematics Specialists, we were asked to encourage teachers to implement our new materials as holistically as possible, keeping the spiral defined by the *Everyday Mathematics* curriculum intact [2]. At times, this went against the grain of my own notion of best practice; the material was more scripted than I was comfortable with, and many times I believed the concepts jumped around without enough time for students to fully grasp the ideas or practice application. To complicate the implementation of these materials, many teachers were just not willing to put in the time necessary to prepare for the daily lessons. At grade-level meetings, I would try to focus teachers' attention on where the lessons were going or their purpose in laying the foundation for future lessons. Many times, this approach fell on deaf ears. The teachers were used to immediate results: teach a few lessons, check it off, and move on. Lesson Number One: Adult learners will only hear what they are ready to hear or what they perceive they need to hear. This was, and continues to be, one of the most frustrating aspects of being a mathematics education leader in my building. I know that through collaboration we can make great strides and effect change. In order for that collaboration to take place, all involved must realize the need for change and embrace the challenges that arise.

I knew that supporting the implementation of the new curriculum materials would give me an opportunity to work with more teachers; it would afford me an entry with some teachers who might not have been willing to work with me. Unfortunately, questions and strategies related to different aspects of the new materials consumed our precious time together. My grade-level meetings were spent disseminating information or answering questions and encouraging teachers to "have faith in the spiral." I was perceived as the "mouthpiece" for a curriculum with which I was occasionally uncomfortable. In order to model a more inquiry-based approach to teaching with these materials, I offered to go into classrooms to demonstrate lessons. I would launch the lessons with number talks, while continually charting student responses, and then model questioning as much as possible. Many teachers asked me into their classrooms, to the point that I was having a hard time scheduling them all! Unfortunately, in my quest to get into more classrooms to model lessons, the collaborative planning and reflection on practice was lost. I know that I have to find a balance between modeling and collaboratively planning lessons, and realize that I can't be everywhere all the time. Lesson Number Two: A little change in a teacher's practice that will continue and sustain itself is better than one or two lessons that will be forgotten the next day by both the teacher and students. By taking the time to debrief for just a few minutes after the lesson has been taught, the teacher can articulate some specific student learning behaviors they witnessed which could lead to a change in their approach the next time they teach a similar lesson.

Co-Teaching

In Stafford County, the Mathematics Specialist co-teaches with a teacher for the entire year at a grade level the Mathematics Specialist has not taught before. As I look back on my first few writings and synthesis of Lucy West's *Content-Focused Coaching*, I am reminded again of my naiveté [3]. I was so enthralled in reading about this model of coaching. I really thought I could use these strategies of pre-conference planning, lesson observation, and post-conference debrief effectively to plan and teach lessons regularly with my co-teacher that would truly enhance student learning and our own pedagogy. I wrote about the coach and the “mathlete” with such high hopes. We were in this game together, and we would give 150% to reach our goal of student understanding. Thinking that my co-teacher and I were on the same page, I was a little anxious to be teaching such a high-stakes testing grade for the first time, but I had had the opportunity to plan and discuss the first few weeks' lessons with her and felt we were off to a good start. I remember vividly a day when my co-teacher and I had had an especially frustrating time. The students were confused, we were way behind in our pacing, the lessons in the teacher's manual forged ahead, and I knew the students weren't ready to move on. I suggested rearranging the sequence of the next few lessons so that there might be more continuity for the sake of student learning. My co-teacher was amazed when I suggested that we should always make our instructional decisions based on the needs of our students. She actually said, “That's the first time I've heard you say that.” I had worked and planned with this teacher for two months, so I was surprised to learn that she didn't know that student learning was the motivation and guiding principle for everything I had been doing. Lesson Number Three: Be explicit in your intentions and expectations. This co-teaching is not as easy as it sounds.

Looking back, I am sure her words were brought on by the same frustration I was feeling. To further complicate our co-teaching, we rarely had enough time for true collaboration in order to plan our lessons. On occasion, we fell into the bad habit of “drive-by” planning wherein we would divide the lessons, but leave no time for reflection on pedagogy or student learning. In November, this finally reached a critical point: I backed away from instruction and insisted she do the teaching for a while. I wrote in my journal that this allowed me the chance to observe her teaching and gave her the control of the classroom she needed. It was also an opportunity to appreciate what a truly gifted teacher she is—she is a master at making connections and promoting focused mathematical discourse among her students. In the day-to-day planning of instruction, I had focused too much on our new curriculum without giving her the freedom she was used to having in planning her own instruction. We had other incidences when one of us was not comfortable with the direction our math instruction was going, but we were able to work things out. Consequently, we reached a level of comfort and trust with each other that allowed us

to trade off and build the other's ideas during instruction. Many times, we knew exactly what the next question should be without having had the opportunity to plan for it. Lesson Number Four: The importance of planning and reflection is critical to the success of a co-teaching experience. While it wasn't a perfect situation all the time, I am happy to report that my co-teacher went against the grain of her grade level and did not insist on as much "paper proof" of student learning. She told me the other day that she felt that together, we had helped her students develop a much deeper conceptual understanding of the mathematics in fifth grade.

Coaching

So I leave that which I have been able to do the least, for last. Again, I am reminded of my high hopes dashed by reality! It is extremely difficult to implement West's model of coaching when there are so many other hats to wear and concerns to address. There have been a few occasions when I was able to use the "West protocol" with great success. In January, a third grade teacher asked me to help her understand and address her students' confusion. She wanted them to develop a deeper understanding of multiplication. We spent a lot of time discussing, planning, and anticipating student confusions with respect to the lessons that would build conceptual understanding and allow opportunities for practice. Over a period of two weeks, I observed, co-taught, then observed as she taught. We were both pleased with the outcome. This leads to Lesson Number Five: Observation and reflection of student learning enable the coach and teacher to work on the mathematical understanding of students. Another short-term coaching experience was an exciting opportunity to work with a teacher who had been resistant to concept of the Mathematics Specialist. She came to me asking for help in meeting the *Standards of Learning (SOL)*, and I was thrilled to have the chance to work with her [4]. Together, we planned some solid lessons, but didn't have as much time to actually teach and observe together. It just worked out better to split the class and work with the smaller groups so in the end, we didn't have an opportunity to share the nuances of our own practice and pedagogy. Once *SOL* testing started, she was feeling better about her students' understanding, and we built a rapport that will continue to grow.

West's model of content-focused coaching is a framework for collaboration with teachers that I continue to study. I realize now that this collegiality is not something that can occur just because you know the questions to ask and the content knowledge to help develop student understanding. Lesson Number Six: True coaching must be a collaboration involving co-teaching wherein both parties believe in the process, with mutually agreed upon goals. It takes a skillful listener to determine what the teacher needs to focus on, and the needs change with the teacher's level of expertise, content knowledge, and philosophy of teaching.

There is a delicate balance that must be achieved between invitations for teacher contribution to lesson design and offering direct assistance in designing the lesson. It is much more difficult to finesse the coaching conversation so that the teacher and the coach have equal contribution and ownership in the goals and outcomes of a particular lesson. I have learned many lessons about myself and about the teachers.

Summary

Collaboration, co-teaching, and coaching can be very different, yet each of these aspects of cooperative teaching involves similar layers of negotiating, planning, listening, and reflecting on the instruction and student understanding. I know that I must continue to work on being a good listener and ingrain those questions that will help a teacher reflect on the mathematics that will produce the collaborative teaching experience I envision. I have learned that it is critical to be explicit in my own intentions and expectations. Negotiating for time may be a constant frustration, but making the time for collaboration is crucial to the success of any and all aspects of teaching.

Most importantly, the lesson to be learned is that the learning goes on—it doesn't stop here—and that effecting change takes *time*. I've just come across something in my journal that I need to post on my wall at home and at school: "The true joy in improving things is the small, daily achievements along the way." We must revel in the baby steps to appreciate the strides. Perhaps we will never reach "mathematical utopia." There is always room for improvement, revealed through reflection on practice and pedagogy, and isn't that the point? As stated in the *Principles and Standards for School Mathematics*:

Teacher Leaders can have a significant influence by assisting teachers in building their mathematical and pedagogical knowledge. Leaders (especially Mathematics Specialists) face the challenge of changing the emphasis of the conversation among teachers from "activities that work" to the analysis of practice [1].

Enhancing mathematics instruction to facilitate mathematical proficiency requires us to develop and design the best lessons possible, but we must continue to learn from our own lessons as well. ■

References

- [1] *Principles and Standards for School Mathematics*, National Council of Teachers of Mathematics, Reston, VA, 2000.
- [2] *Everyday Mathematics*, University of Chicago School Mathematics Project, McGraw-Hill, New York, NY, 2004.
- [3] L. West and F. Staub, *Content-Focused Coaching: Transforming Mathematics Lessons*, Heinemann, Portsmouth, NH, 2003.
- [4] *Standards of Learning for Virginia Public Schools*, Board of Education, Commonwealth of Virginia, Richmond, VA, 1995.