

BEYOND THE TEXTBOOK: LESSONS LEARNED FROM TWO YEARS AS A MATHEMATICS SPECIALIST

K. RACE

Alexandria City Public Schools

Alexandria, VA 22311

I check my watch as I back down the driveway and wonder if my commute around the Washington, D.C. Beltway will be a quick one, or if an accident will delay my arrival at school. I mentally list the things I need to accomplish before the school day begins: deliver a set of pattern blocks to the kindergarten teacher who will do a lesson on patterns today; go over number grids with a first grade teacher who sent a panicked e-mail yesterday asking for a quick review of the concept; send a summary to the district staff development coordinator of the session on problem solving strategies I will be presenting to my staff next month; drop off the list of differentiated activities discussed yesterday at the second grade team meeting; and, answer all the teachers' last-minute questions as they put the finishing touches on today's math lessons. I also need to quickly review the schedule of classes in which I will be co-teaching today. Since it's Tuesday, I'll be in five classrooms, helping the teacher present the lesson, working with small groups and individuals, and providing assistance during math game time. My discussion with the principal to beg for money to purchase more geoboards for fifth grade will have to wait until our weekly meeting this afternoon.

I arrive early at school (no accidents today!), and start down my list. Suddenly, a teacher appears at my office door with a puzzled look on her face. She says, "Yesterday, I taught my students the rule that when you divide fractions you just invert the second fraction and multiply, but my students asked why that works and why the answer is larger than the numbers you started with, unlike division of regular numbers." After we work through the concept, drawing pictures and making models, and she goes off to meet her first class, I reflect on what her question tells me about her own mathematical understanding of the concept, the teaching strategies she uses, and her openness to exploring new ideas. Later that afternoon, when I check in with her, we continue our discussion, doing more problems and focusing on good questions she could pose to her students.

Background

My role as the Mathematics Specialist at Douglas MacArthur School in Alexandria, Virginia is a challenging one. Two years ago, the Alexandria City Public Schools (ACPS) placed a Mathematics Specialist in each elementary school. These were, for the most part, teachers

trained previously through the University of Chicago School Mathematics Project (UCSMP). Then in 2004, with the strong support of our superintendent, our mathematics curriculum specialist, the ACPS executive director for elementary programs, and funding from the ExxonMobil Foundation, the ACPS Board of Education directed that each elementary school in the district should have a full-time Mathematics Specialist without classroom responsibilities. Their vision created a curriculum position similar to a Reading Specialist, but with broader responsibilities.

Responsibilities/Goals

Our overarching responsibility is to increase the mathematics achievement of all students in the school by collaborating with individual teachers through co-planning, co-teaching, and coaching. In addition, our duties include:

- Supporting National Council of Teachers of Mathematics (NCTM) and Virginia standards-based instruction;
- Assisting teachers to understand and use mathematics concepts in their instruction;
- Scheduling and encouraging the use of resources such as manipulatives, technology, pacing guides, and Virginia's *Standards of Learning (SOL)* instruction modules [1];
- Co-teaching with each mathematics teacher in the school at some time during the year (strategies include modeling lessons, observing classrooms, co-planning lessons, reflecting on practice, analyzing evaluation data);
- Participating in grade-level, school, and district math meetings;
- Delivering staff development tailored to the expressed needs of classroom teachers;
- Involving families in the school mathematics program; and,
- Working closely with administrators to implement the goals of the Mathematics Specialist Program.

This list of responsibilities seemed daunting when our Mathematics Specialist cadre came together for the first time. Enthusiasm ran high, but with it came the anxiety of implementing a new program and developing a new role. As I look back on the last two years, I realize how much I have grown as a teacher, coach, mentor, and mathematician. I am excited when I hear of the many other school districts across the country that are implementing the Mathematics Specialist model. At national and regional mathematics conferences, I talk to other

Mathematics Specialists and coaches who are anxious to share their experiences and discuss “what works.” The most important lessons I have learned and suggestions I would make to other Mathematics Specialists are outlined below.

Define Your Role Clearly

Your role is to facilitate teacher learning which, in turn, leads to improvement in student learning. You will be an agent for change, the goal being to encourage teachers to change their thinking about mathematics, not just improve individual lessons. Be sure they understand that your job is to help them increase their own understanding of mathematics and also to ensure the success of their students.

Build Collegial Relationships

The relationships you develop with the teachers in your school will be a primary focus. It is critical to establish trust and confidentiality with each teacher. Perform your job so that they know they can count on you to support them in every way. Try to arrive at school before most teachers and be there at the end of the day so you are available to answer questions. In the school, be visible to teachers and parents. Build an organizational structure to your day and week, and then post your daily schedule so the staff knows you are in classrooms on a regular basis and where to find you. Your role will vary according to the needs of each teacher. Plan to spend extra time with first year teachers and those who need more help. You will observe, model lessons, co-teach (partners), and work with small groups. Be sure to listen as much as you talk. The time you spend discussing mathematics lessons may be the only opportunity teachers have to reflect on their practice. Remember, the key is collaboration.

Continue to Grow Professionally

Be knowledgeable about content and curriculum, the NCTM and Virginia standards, and how children learn. Seek out opportunities to increase your own understanding by taking courses from *Developing Mathematical Ideas (DMI)* [2]. My training with nationally known experts provided the mathematical underpinning essential to coaching. Join local, state, and national mathematics organizations like the NCTM and National Council of Supervisors of Mathematics (NCSM). Attend their conferences to keep current about new developments in the field, to increase your knowledge, and to share ideas with other Mathematics Specialists. Distribute articles from their publications to your teachers and discuss them at team meetings. Develop a lending library of manipulatives, games, reference works, and technology for use by teachers, students, and parents. See yourself as a learner and part of a learning community. Read widely in the content area [3-9].

Develop a Strong Relationship with Your Administrator

The administrator can determine the success or failure of the program at your school. If the staff knows that your administrator supports you and the Mathematics Specialist program, they will be more open to your regular visits to their classroom. Encourage the administrator to clearly state to the faculty that you will be in each classroom and that your visits are not optional.

Meet at the beginning of the year to develop common goals, and set up a regular time each week to keep the principal informed of all mathematical issues. Remember to keep the confidentiality of the teachers with whom you work; remind them that you are not an evaluator. If you are concerned about a teacher and what is happening in her classroom, suggest that the principal observe that classroom during a math lesson. Encourage the administrator to schedule a common planning time for each grade level so there will be an opportunity for you to meet with them as a group to discuss content and strategies. Trying to schedule a meeting with each teacher is difficult and many concerns can be addressed to the group.

An important role you can assume is as a liaison between teachers and parents. Encourage your principal to refer parents with questions about the math program to you. They will be pleased to be able to speak to an “expert.”

My principal believes so strongly in the value of the Mathematics Specialist model that this year, she has directed our reading teachers to become coaches working with teachers in the classroom rather than pulling students out of the classroom. More students benefit from the expertise of the Specialist when she works with the classroom teacher rather than with small groups of students.

Provide Staff Development

Provide regularly scheduled staff development sessions for the entire staff and for specific grade levels. You can address issues that are of concern to your own teachers, rather than relying on systemwide sessions that may not meet the needs of the teachers at your school. Some of the best staff development occurs during those spur-of-the-moment conversations in the hall and at lunch, which can be just as effective as more formal presentations.

Use grade-level meetings to put the focus on math. Since teachers at our school have a common planning time each day, one planning period every two weeks is devoted to mathematics. During that thirty-minute time period, we discuss content and instructional

strategies, work with manipulatives, and play the games that will be introduced in the next two weeks. Remember always to keep teachers focused on the mathematics in each lesson.

Expect Teacher Resistance

Expect teacher resistance, especially if you are using a reform curriculum. Some teachers may feel threatened and uncomfortable having another person in the classroom. Others are unsure of their mathematical knowledge or teaching ability, or simply are not comfortable with change. Plan to spend more time with these teachers, providing them with whatever will make them more confident. Offer to gather materials for a project, teach a lesson or game, develop an assessment, or write a math newsletter for their class. Work at their comfort level, and gradually increase your involvement in their class.

Develop a Network of Other Mathematics Specialists

Meet regularly with other Mathematics Specialists in your district or in a neighboring district. You will find this time invaluable for sharing knowledge, solutions to common problems, and strategies for working with teachers. You need the support of other people facing the same challenges.

Involve Families in the School Mathematics Program

Family involvement is especially important if your district uses non-traditional teaching materials. Parental resistance can be disastrous for a new adoption. Early in the school year, a general presentation at a PTA meeting will familiarize parents with the philosophy of the curriculum. During the school year, workshops for parents by grade level provide opportunities for them to participate in the hands-on activities and games that their children are experiencing in class. Family Math Nights are also effective ways to get parents into classrooms to participate in math activities. The more parents understand the mathematics and the instructional techniques of a program, the more supportive they will be.

Set Goals for Yourself

As Mathematics Specialists, we ask teachers to reflect on their practice, refine it, and be willing to try new strategies. We also need to set personal professional goals for ourselves and share them with other teachers. One area in which I would like to be more proficient is the analysis and interpretation of assessment data, including unit tests, quarterly tests, and standardized test results. Using those analyses, I want to learn to design ways to improve instruction and student achievement. I also want to help teachers become more comfortable using

differentiated instructional strategies, not only with those students categorized as English as a Second Language (ESL), Learning Disabled (LD), and Gifted, but with all students.

Conclusion

The job of the Mathematics Specialist is a rewarding one. For every teacher, the moment when a struggling student's face lights up and he says, "Oh, I get it!" makes the hard work of getting him to that point worth all the effort. The Mathematics Specialist gets the same reward when a teacher says, "When I was in school, I could do the math, but I never understood why. Now it makes so much sense. I can't wait to share this with my class." If we can be the agent of change for teachers, encouraging them to broaden and deepen their thinking about mathematics, we will have given them and their students the best possible gift. ■

References

- [1] *Standards of Learning for Virginia Public Schools*, Board of Education, Commonwealth of Virginia, Richmond, VA, 1995.
- [2] D. Schifter, V. Bastable, and S.J. Russell (eds.), *Developing Mathematical Ideas*, Dale Seymour Publications, Parsippany, NJ, 1999.
- [3] S. Chapin and A. Johnson, *Math Matters: Understanding the Math You Teach*, Math Solutions Publications, Sausalito, CA, 2000.
- [4] J. Kilpatrick, J. Swafford, and B. Findell (eds.), *Adding It Up: Helping Children Learn Mathematics*, National Academy Press, Washington, DC, 2002.
- [5] L. Ma, *Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States*, Lawrence Erlbaum Associates, Mahwah, NJ, 1999.
- [6] "Mathematics Specialists Task Force Report," Virginia Mathematics and Science Coalition, *The Journal of Mathematics and Science: Collaborative Explorations*, **8** (2005) 5-22.
- [7] J. Mokros, S.J. Russell, and K. Economopoulos, *Beyond Arithmetic: Changing Mathematics in the Elementary Classroom*, Dale Seymour Publications, Parsippany, NJ, 1995.
- [8] J. Van de Walle, *Elementary and Middle School Mathematics: Teaching Developmentally*, Pearson/Allyn and Bacon, Boston, MA, 2004.
- [9] L. West and F. Staub, *Content-Focused Coaching: Transforming Mathematics Lessons*, Heinemann, Portsmouth, NH, 2003.