

A DAY IN THE LIFE OF TWO MATHEMATICS SPECIALISTS: BRINGING MATH TO THE FOREFRONT IN ELEMENTARY SCHOOLS

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The idea of having Mathematics Specialists at individual schools has long been overlooked. Educators are beginning to see the value in having a Mathematics Specialist in every elementary school to help teachers understand correct math content, as well as address the specific needs of the students at that school. This article will follow the typical day of two Mathematics Specialists in their schools. Though the goal is the same for both teachers—to increase student achievement and teacher knowledge—their days are very different in order to meet the individual needs of their schools.

8:00 a.m. Beth Rodriguez arrives at the Title I school in which she works, but her day started long before then. On her ride into school, she had begun thinking about what her day would entail and more specifically, how to make the pre-conference with a new third grade teacher more meaningful.

8:05 a.m. As she walks down to her room, “the math closet” as she likes to refer to it, teachers are busy preparing for the arrival of their students. It is in the math closet where the many materials for teachers’ use are stored. Beth has ordered these materials over the years with the assistance of teacher requests. Teachers stop in at all times during the day to talk to Beth about ideas for math lessons and to pick up resource books and/or materials to make their instruction more meaningful and engaging for their students. Some stop her as she walks down the hallway, asking for the most appropriate math manipulative for a lesson they have planned that week or for strategies to teach a math concept. Beth is eager to help and feels her expertise is needed in a school with numerous needs.

8:10 a.m. The new third grade teacher enters Beth’s room, complete with his laptop computer and a smile, anxious to get their pre-conference started. They had decided beforehand to co-teach a lesson on fractions to his third graders. This pre-conference will help them determine “the math” in their lesson and what they

want the students to learn. The structure of the lesson will also be discussed, as well as their roles throughout the lesson. They know that in the sixty minutes they have for the lesson, they want to see what the students already know about fractions and to give opportunities for them to understand that fractions are relationships to the whole. They come to a decision to build this understanding through many different forms: the region or area model, the measurement model, and the set model. Today, they opt to use fraction circles and fraction rectangles to build understanding of the region model.

8:30 a.m. *Susan Garthwaite begins her day across town in another Title I elementary school. She reviews her schedule for the day to determine with which teachers she will be working. She then begins to gather materials for her day and checks her e-mail. Many teachers e-mail Susan with questions about materials or lessons early in the morning. She wants to respond as quickly as possible. She also needs time to gather any materials from the math storage area that she may need to drop off in classrooms.*

8:50 a.m. Beth's pre-conference with the third grade teacher has ended so the teacher can return to his classroom in preparation for the students' arrival. They have both enjoyed the collaboration and see how many wonderful ideas they each have contributed to the lesson. Beth asked a lot of leading questions so the teacher felt a part of the instructional decisions. She kept the discussion focused on the Mathematical Big Ideas to add to his repertoire of knowledge and pedagogy while centering on what the students need to know according to the Program of Studies for third graders in Fairfax County Public Schools, as well as the objectives of the *Virginia Standards of Learning (SOL)* [1]. Both teachers are looking forward to the lesson they will be co-teaching the following day.

8:55 a.m. Beth now delivers base 10 blocks to a second grade classroom. She has sorted them into containers for easier use during the upcoming lesson. Students will be solving problems with a partner. She often helps teachers prepare materials for their math lessons. Beth is greeted by students as they come down the hallways hastily entering their classrooms. Since she works with kindergarten through fifth grade, she has worked with many students in the school at each grade level. Students often stop her to discuss the math they are doing in their classrooms.

- 9:00 a.m. Beth enters the second grade classroom to drop off the supplies and co-teach a pre-planned lesson with the classroom teacher, and the English Speakers of Other Languages (ESOL) teacher. The teacher has already begun the lesson. It will be Beth's turn then to engage the students in the lesson building the concept of subtraction using a real-life problem solving situation. Working with Beth, the teacher has allowed students to construct their own meaning of problems and to solve them in a way that makes sense to them. As the students move into the active learning part of the lesson, each teacher plays a role in facilitating the learning through their planned questioning. They have discussed which students may need more support and which ones will need more challenging problems and are prepared to differentiate the instruction as needed. After fifty minutes, the ESOL teacher leads the students to the rug area to share their strategies for solving the problem with one another in a whole group setting. Beth and the classroom teacher watch, not afraid to ask the presenting student questions of their own. Through Beth's modeling during previous lessons, the classroom teacher's and the ESOL teacher's questions have become more effective at understanding the students' thinking. Beth closes the hourlong math class by restating the strategies presented and posting them on the wall for tomorrow's lesson.
- 9:30 a.m. *Susan enters a fourth grade classroom. The teacher is a second year teacher. Susan worked with her last year when she was new to teaching. They focused on understanding the state and county mathematics objectives for fourth grade students, as well as lesson plan design during their first year working together. This year, Susan and the teacher decided to focus on implementing best practices during math. The teacher wanted to look at her questioning of students. Susan models a lesson on fractions in which she implements good questioning techniques. The teacher observes the instruction and then the two teachers walk together to help individual students during their work time. By doing this, the teacher can begin to try out some questioning techniques of her own with support.*
- 10:00 a.m. Beth heads to a fourth grade team meeting. The teachers asked Beth to bring ideas and resources for the next unit of study. They want to use other resources besides their textbook for instruction, but are uncertain how to do this. Beth and the teachers had previously discussed the objectives they would be teaching

throughout the upcoming unit of study, which allowed time at this meeting to focus on the variety of resources available to them on the topic. As always, Beth is enthusiastic and asks many questions so she can help them where they are.

- 10:30 a.m. *Susan makes her way from the fourth grade classroom to a fifth grade classroom. This teacher is very traditional in the way she teaches mathematics. She reviews homework and then looks at the textbook with the students to demonstrate a procedure for solving an operation problem. Students get assigned practice problems to complete at the end of the lesson. Susan knows that when students are actively engaged in their learning, they comprehend at a deeper level. She has been working with this fifth grade teacher to add some student investigations into her lessons. Susan has planned a lesson which involves students using their own methods to solve an operation problem. Students solve the problem, then discuss their strategies. The strategies are posted and a similar problem is given to allow students to try a new strategy. The teacher observes the lesson, paying attention to what the students are doing. Susan's goal is for the teacher to notice that students do not always need to be shown how to solve a problem before trying to solve it on their own, and that students' strategies can be very powerful.*
- 11:00 a.m. Beth is back in the “math closet,” gathering alternative lessons from teacher resources she has ordered for the school. She also uses this time to answer e-mails from teachers and other Mathematics Specialists in the county. Beth then meets with another teacher to help her search the National Council of Teachers of Mathematics' *Principles and Standards* to make sure the spirit of the *Principles* has been captured in the lesson she has planned for the following day, as well as to review the math content in the lesson [2].
- 11:45 a.m. *Susan stops by a second grade classroom on her way to lunch. The teacher had sent her an e-mail earlier that morning asking about game ideas for a probability unit. Susan drops off the games she collected earlier that morning and spends a few moments to explain how to play each one and why they are powerful mathematically. The teacher asks her some questions about next steps, so the two of them set up a meeting for the following day.*
- 12:00 p.m. At least once a month, Beth meets with the administration to discuss goals/initiatives that she is working on throughout the year. This month, Beth is

working on using data to form study groups for math in the fifth grade. She shares her idea to look for strengths and weaknesses with each student when forming the small groups, and using that data to help teachers steer their instructional decisions.

12:15 p.m. Susan joins a third grade classroom as they begin their math lesson. The teacher has written a song about difficult geometry vocabulary. Students are using words and body movements to sing about points, lines, angles, and other abstract terms. The students then move into their activity for the day. This class has been working with 3-dimensional figures. Students work in groups to identify the number of faces, edges, and vertices for different 3-dimensional objects. Susan notices that one student is singing the song to herself to help her remember what some of the terms on the activity sheet mean. During the lesson, Susan and the teacher walk around to each group asking them thoughtful questions in order to make them defend their findings about the 3-dimensional objects. Susan and the teacher have discussed some students who are struggling with this unit, so Susan focuses her attention on that group to allow for more guided instruction if necessary.

1:00 p.m. Beth enters a fourth grade classroom to model a lesson for a teacher who is new to the grade level. She has been working with this teacher to help her take a textbook lesson and restructure it to be more investigative. Beth modeled her thought process for the teacher as she planned it and is now going to teach the lesson while the teacher observes.

1:15 p.m. Susan moves on to the next third grade classroom. This teacher has been working with Susan to incorporate more problem solving, writing, and discussion into her math lessons. Together, the two have created math tool kits filled with manipulatives for each group of two students to use daily. Susan has also helped the teacher begin to use a problem solving notebook in which students have a chance to solve real-life problems that focus on the topic being taught that day. The students are working on the same activity as the previous third grade classroom. Susan asks the teacher if she can share the song she saw earlier since she noticed how much it had helped some students. After she teaches it to the students, Susan models how to facilitate a discussion using the activity with

3-dimensional objects. The teacher observes because she will be leading the discussion for the following lesson.

2:00 p.m. Beth moves to a fifth grade classroom next. The teacher she is working with wants to use a more investigative approach to teaching geometry. The teacher did not know how to move away from the traditional textbook, so Beth introduced some possible resources to use for this purpose. The teacher chose to try the *Investigations* series [3]. They are now teaching a lesson from this series which allows small groups of students to sort polygon pieces by their attributes.

2:15 p.m. *The third grade teacher takes her class to art and Susan prepares for their post-conference. Susan has prepared some questions to ask the teacher to help her think about what she will do when she leads the math discussion. Upon the teacher's arrival, the two begin their meeting. First, she asks the teacher to share what she observed and to ask any questions of her own. The two discuss Susan's role for the following lesson so the teacher will receive the feedback she desires. Before the meeting is over, the two decide ways to differentiate throughout the lesson and how they plan to assess student learning.*

3:15 p.m. *Susan stops by the teachers' mailboxes in the office to drop off an article she read from Teaching Children Mathematics that she thought a first grade teacher would enjoy [4]. She sees another teacher walk in who tells her about the math lesson he taught earlier that day. He was excited to share how well his students were explaining their thinking and making connections between concepts. Helping students do this was something he and Susan had been focusing on this year. Susan was happy to hear his lesson went well.*

3:00 p.m. The day is winding down. Beth goes into the computer lab to talk to the technology specialist. Beth wants to make mathematics a focus in the morning message broadcasted throughout the school every morning. She knows it would be an opportunity to reach all the students and teachers, and to discuss math topics based on the needs of the school.

3:40 p.m. *Susan meets with the fifth grade teacher who observed her earlier that day. They are meeting to discuss the teacher's thoughts about what she saw the students doing that morning. The teacher expresses that she was surprised and excited to*

see how much her students could do on their own. She then shares her concern that by not showing her students a specific procedure, they will not be able to solve the problems on the Virginia SOL Test they will take in May. Susan knows that change takes time, so she helps the teacher set up a plan to include some more investigative activities within her regular lessons. She also plans to help her work in some test preparation lessons that will allow students to make the connection between their investigations and what they see on the test.

Math has become a focal point at both Beth's and Susan's schools as a result of their positions as Mathematics Specialists. Both of them analyze student data and assess teachers' needs to decide the best way to support the mathematics program at their individual schools. Even though their method of providing this support varies, both Beth and Susan offer assistance to teachers when they are unsure about math content and when they want to attempt a new strategy in their classrooms. Beth and Susan share new resources with teachers, and model best practices in their classrooms so that they become skilled at teaching mathematics to all learners. They also make teachers aware of the latest research on how students learn mathematics. Their role is critical to improving mathematics education at the elementary level because with their assistance, teachers are thinking critically about the math concepts they are teaching and the methods they are using to do so. ■

References

- [1] *Standards of Learning for Virginia Public Schools*, Board of Education, Commonwealth of Virginia, Richmond, VA, 1995.
- [2] *Principles and Standards for School Mathematics*, National Council of Teachers of Mathematics, Reston, VA, 2000.
- [3] *Investigations in Number, Data, and Space*, TERC, Cambridge, MA, 1998, Internet: <http://investigations.terc.edu>
- [4] *Teaching Children Mathematics* website, Internet: http://my.nctm.org/eresources/journal_home