

## **WHAT WE ARE LEARNING ABOUT THE ELEMENTARY MATHEMATICS SPECIALIST'S ROLE: SOME REFLECTIONS ABOUT MATH COACHING**

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### **A Day with a Mathematics Specialist**

The elementary Mathematics Specialist met us at the school office and whisked us off to her office somewhere down one of the long hallways. After weaving through the corridors, we entered her office, which she shares with other specialists (e.g., special educator, child psychologist, etc). As we proceeded to her work area, she told us about recent events. She has a new principal, one that supports her work much more than the previous one did. She welcomes the support and direction that the new principal plans to take. As she continues to recount the new initiative that her principal has established around the Mathematics Specialist's role this new school year, she suddenly realizes that it is time to begin her morning rounds to different classrooms. Every forty-five minutes or so, we will visit several classrooms: a first grade classroom, followed by a third grade classroom, followed by a special education classroom, etc. As we enter the first grade classroom, the Mathematics Specialist hits the floor running. She follows the classroom teacher's lead regarding the pacing of the lesson. She interjects questions to further clarify a student's thinking during the whole class discussion. She communicates with the classroom teacher briefly as the students begin their small group work. She then speaks with different students, listening and responding as they explain their thinking. She stops at one student's desk because he is not working on his assignment, nor does the regular teacher expect him to since he lags at least two years behind his fellow classmates in all subjects. The Mathematics Specialist adjusts the activity, and works for several minutes with this student before moving on to another student's desk. After about thirty minutes, we proceed to the next classroom. There, we observe a similar routine. After three classroom visits, we bid good-bye because we must visit a different school building. As we leave this building, we wonder how the Mathematics Specialist works at this pace for hours on end with such energy, purpose, and confidence. It does not matter which school building we enter, what leadership activities we observe, our question is always the same: What motivates, energizes, and sustains the Mathematics Specialist as she engages in her daily work? The answer comes immediately: the students.

### **Observation and Interviewing Process**

The above account provides a glimpse of a Mathematics Specialist's daily schedule. Some of her many responsibilities throughout the school day include teaching or co-teaching lessons at different grade levels, assessing and "remediating" students' mathematical difficulties, providing materials for teachers, preparing teachers and their students for the upcoming quarterly benchmark tests, as well as the end-of-the year state-mandated tests, or planning and participating in math coaching sessions with teachers in the school building [1].

Over the past few years, we have worked closely with six Specialists to develop a better understanding of what their Specialist roles entail. To accomplish this task, we visited the school buildings in which they worked and observed their daily routines as Specialists. We also conducted interviews with them to get first-hand information about their daily work. Sometimes, we interviewed them before observing their work with students or teachers. At other times, we interviewed them after we observed their school-based activities.

We have begun to synthesize this information to provide a more detailed account of the scope of their work. Because coaching is one of the more important aspects of their roles, we have focused our efforts on understanding their coaching roles. Following Fullan and others, we believe that teacher learning must occur in the teachers' own classroom as they work with students [1-4]. Thus, the Specialist's role as a coach is particularly important because she has the opportunity to support the classroom teacher's learning. As stated in the National Council of Supervisors of Mathematics' *The PRIME Leadership Framework*, "A single mathematics education leader can have an incredible impact on the development and effectiveness of others" [5]. So she might affect teaching practice on a small or large scale as she works side by side with teachers to enact research-based practices, such as those ascribed to by the National Council of Teachers of Mathematics [6].

### **The Specialist's Evolving Role**

In our discussion, we outline several themes that have emerged in our work with these six (female) Specialists. These themes are based on examples taken from their daily work in their respective school buildings. The themes are composites of sorts and do not represent one particular Specialist's experience. So as we present each theme, we might use examples taken from several of the Specialists' work on any given school day.

The themes that we highlight relate to how the Specialist defines her role, with whom and where she works, her continued learning on the job, and the importance of coaching teachers. Although these themes are related to one another, we highlight those issues that are unique to a particular theme. After we do so, we provide an example to illustrate how issues related to one of the themes, coaching teachers, is enacted as a Mathematics Specialist works with a new teacher.

**Theme 1: The Specialist Defines Her Own Role within the School Building**—As the Specialist has conversations with teachers, the building principal and others who may help to shape her role in the school building, she makes choices about what aspects of her role are and are not negotiable. How can she effectively support teacher and student learning? For instance, she might be asked to formally evaluate a classroom teacher’s mathematics instruction. Should she? If the principal asks her to join her as she conferences with the teacher, how might the Specialist respond? She realizes that if she serves in a formal role as an evaluator, she cannot effectively work collaboratively with the classroom teacher. Similarly, she is aware that if she only works with students (e.g., pulls students out of the classroom), she will not be able to work closely with the teacher to positively affect the teacher’s instructional practice. Further, she must find a common ground for how she addresses, manages, and supports teachers as they prepare for state-mandated assessments. Thus, the role that she establishes is hinged on the extent to which she can effectively support teacher and student learning.

**Theme 2: The Specialist Is a Life-Long Learner**—The Specialist continues to learn on the job. In fact, because of the nature of her work, she will need to learn parts of her craft as she works with teachers, students, and school district personnel. She will continue to develop a rich and deep understanding of the mathematics that is covered in the elementary school curriculum. She also will continue to make connections to develop an intricately woven web of ideas about teaching, about student thinking, and about how to best support teacher learning. As such, she will draw on old as well as new resources to plan and implement professional development activities for her teachers, principal, district personnel, and possibly others in the community in which she works.

**Theme 3: The Specialist’s Work Is Situated in a Living and Breathing System**—As a result, change will occur. In fact, the Specialist will adapt to a wide range of changes that may affect her work from one year to the next. She will move her office, perhaps every year. So, she will need to pack and unpack, reorganizing all the mathematics education materials each time. She may have a different principal after only working in the school building for a few years. So, she will need to re-establish her role as a Mathematics Specialist as she works with this new principal. In

addition, in any given year, she may have an unusually large turnover of teachers. Perhaps there will be twenty new teachers in her school building. Most of these teachers will have never taught mathematics using research-based practices. Therefore, she will begin to work with them immediately as the school year unfolds. Further, because her school did not meet Adequate Yearly Progress (AYP) the previous year, the principal may require her to work with students in a pullout program to ready them for the quarterly and the state-mandated end-of-the-year tests. In any given year, she will face these and other changes that provide unforeseen challenges. In some cases, the results of the work that she did the previous year will no longer be useful because of these changes, so she will need to adapt her goals, her practices, etc. as she faces these changes from year to year.

**Theme 4: Part of the Specialist’s Work Is to Develop Mathematics Teacher Leaders**—One of the biggest challenges that the Specialist faces is identifying and building relationships with other teachers who will eventually become teacher leaders in the school building. So, she makes deliberate choices regarding with whom she works. By choosing to work with teachers who have the potential to become leaders in the school building, she begins to craft a plan for affecting mathematics instruction on a broader scale. Her aim is to essentially “work herself out of a job.” To accomplish this, she will support colleagues as they move into these leadership roles. For instance, she might encourage a colleague to conduct a workshop or to observe other teachers’ mathematics instruction or even co-teach a lesson with another teacher. The Specialist might work collaboratively with this potential leader, or she might teach in this colleague’s class while her colleague works with other teachers.

As she works to build capacity, there will be others who will be unsupportive of her work. Hence, she will likely meet a number of different obstacles that might be characterized as meeting resistance. Some will be direct with their lack of support for the Specialist’s work. Others may simply choose not to participate and will encourage their colleagues to do the same. As a result, it will take time to develop these productive, collaborative relationships with teachers in her school building.

**Theme 5: The Specialist Actively Engages in Content-Specific Coaching**—The Specialist engages in content-specific coaching in order to affect teachers’ practice which in turn may support student learning. When working with teachers, the Specialist will have clearly defined goals on which to focus a coaching session. She and the teacher will talk about the important mathematical ideas that they will highlight during the lesson. In some instances, as they plan,

they may not anticipate all of the issues that will surface during the lesson. As such, the Specialist will have the opportunity to learn along with the classroom teacher about students' methods, misconceptions, etc. What is important is that the Specialist finds ways to address key mathematical ideas around students' mathematical thinking and misconceptions. She will likely address these ideas during the planning session. If not, she will have the opportunity to do so after the lesson, either formally or informally. *When* she addresses these issues pales in comparison to *how* she chooses to capitalize on these opportunities for teacher learning.

### **Discussion**

As we stated earlier, these five themes are not mutually exclusive. To illustrate this point, let us consider *how the Specialist establishes her role* might be related to *the extent to which she engages in content-specific coaching*. Suppose the Specialist works collaboratively with teachers during the first part of the school year. In particular, she and one of the grade-level teams plan a series of lessons that cover one of the strands in the curriculum. Each of the teachers will teach a mini-lesson to one of the groups of students as the students rotate from classroom to classroom throughout the morning. During this "math event," the Specialist moves from classroom to classroom to support teachers as they implement these mini-lessons. If necessary, she might co-teach part of the lesson to support one of the new teachers who is implementing this type of lesson for the first time. This event is one of many professional activities that the Specialist engages in as she works with teachers during the first part of the school year. By way of contrast, during the second part of the school year, the Specialist will not be able to engage in these types of activities. At the principal's request, she must prepare third, fourth and fifth graders for the state-mandated standardized tests that the students will take in May. So during the second part of the school year, the Specialist has a different set of responsibilities than she had during the first part of the school year. She must develop practice tests and then grade those tests to identify students who did not score 100% on any portion of the test. Once she has identified these students, she will develop lessons for them that target only those concepts that they missed on the practice test. After implementing this intervention, she will then administer a second practice test to determine if these students mastered the concepts and skills. Because she needed to redirect her focus to that of preparing for the end-of-the-year, state-mandated assessments, she is unable to work with individual teachers, and more generally, to engage in coaching activities. As this example illustrates, her role as a coach is directly affected by what the principal perceives to be the Specialist's role during the second part of the school year.

In the next section, we highlight the Specialist's role as a coach to illustrate aspects of the Mathematics Specialist role as it might be enacted. Because of the important role that coaching can play in affecting teacher and ultimately student learning, we frame our discussion around an example taken from a coaching session between one of the Specialists, Ms. Snead, as she worked with a first-year teacher, Mr. Stark.

### **Coaching a New Teacher—Background**

Ms. Snead, one of the six Specialists that we have followed, became a Mathematics Specialist during the second year that she was enrolled in a graduate endorsement program [7]. She has continued to work in the same building since she became a Specialist. Over time, Ms. Snead has become more selective about which teachers with whom she collaborates. During this school year, her fourth as a Specialist, she worked with Mr. Stark, a first-year teacher that recently joined the faculty after graduating from a state university. Because Mr. Stark taught at one of the grade levels that did not perform well the previous year on the state-mandated assessments, Ms. Snead has been encouraged by her principal to work with him and other teachers that taught at this grade level.

The example that we share is taken from one of our school building visits when we observed Ms. Snead plan and co-teach a lesson with Mr. Stark. When we visited with Ms. Snead and Mr. Stark, it was only their second coaching session, although they talked about mathematics instruction from time to time. Remarkably, even though they had only collaborated for a short period of time, they seemed to work quite well together.

### **The Coaching Session**

A coaching session is, at least in theory, a three-part process [1]. The Specialist plans a lesson in collaboration with the teacher. During this planning session, they might explore the mathematics that is to be taught, work out logistics, and develop shared goals for their work together. As part of the process, they decide, for instance, whether the Specialist will co-teach or simply observe the lesson. After planning the lesson together, the Specialist visits the teacher's classroom to observe (and possibly co-teach) the lesson. The Specialist and the teacher meet immediately after the lesson has been taught to debrief about what happened during the lesson. For her part, the Specialist makes careful and deliberate decisions about what issues to address during this debriefing session (e.g., student learning, the teacher's practice).

### **Ms. Snead and Mr. Stark's Planning Session**

During the planning session, Ms. Snead first helped Mr. Stark to outline the big ideas for the lesson using a lesson plan form. As they filled out the form together, they discussed the state and district standards related to the goals of the lesson. Ms. Snead recorded information on the form as they talked about these ideas. They also discussed issues related to working with English Language Learners (ELL). For example, they identified several words in the problem (e.g., “catalog,” “presents,” “Christmas,” and “spent most”) that might be problematic for students with language challenges. As the discussion continued, Ms. Snead and Mr. Stark addressed his students’ estimation number sense. During this conversation, they talked about how students might use a front-end strategy (i.e., round numbers to the nearest 1,000, 100, and 10) to solve problems. Ms. Snead even illustrated how students might use this strategy to estimate 10,542. By the end of the twenty-minute session, Ms. Snead and Mr. Stark agreed that, as students worked in small groups to solve the problem, they would monitor students’ progress. They also agreed that when they reconvened the small groups for a whole-class discussion, Mr. Stark would highlight some of the different methods that the students used to solve the problem. Although they did not explicitly talk about what Ms. Snead’s role might be during the lesson, it was understood that Mr. Stark would teach the lesson.

On a side note, Ms. Snead and Mr. Stark planned the lesson, but they did not plan for what they might do if students only derived exact answers as they solved the problem. As we summarize the lesson, note that this issue surfaced as an important one.

### **The Lesson**

Mr. Stark began the lesson by posing problems that involved using different denominations to make \$0.78, \$1.09, \$0.98, and \$1.23. During this part of the lesson, several students talked about which coins they used to make the specified amounts. For each problem, a student explained that he used the largest coin (the quarter) until he could not use this coin anymore and continued to use the next lower denomination until he had made the total amount. As a student explained his ideas, Mr. Stark recorded the answers by writing each type of coin that the student used. For example, for \$0.98, a student explained that he used 3 quarters, 2 dimes, and 3 pennies. As the student gave his answer, Mr. Stark recorded QQQDDPPP to represent each of the coins.

After this brief discussion, Mr. Stark introduced the following problem using the overhead projector (see Figure 1).

You have saved your money all year to buy Christmas presents for your family and closest friends.

You have a total of \$26,462. You need to buy 4 presents.

Below is a list of gifts from your favorite catalog (they do not charge tax or shipping). What gifts could you buy? You want to spend most of your money and you have to hurry.

(In case they are out of one or more items, please prepare at least two possible lists.)

Life-Size Teddy Bear	\$1,256
Miracle Kitchen Cleaner	\$14,589
Custom Computer Game	\$10,542
Picture-Tube Telephone	\$7,499
Fancy Paints and Brushes	\$3,611
Ski Trip for Two People	\$19,653
Dinner for Two in Boston	\$15,576
Big-Screen TV with VCR	\$2,734
Dessert of the Month Club	\$4,510
Movie of the Month Club	\$6,500

**Figure 1. Mr. Stark posed the “Estimation Problem.”**

As he posed the problem, he paused before reading \$26,462 and asked students to read this number. After he asked this question, Ms. Snead asked the students to talk with their partners about how they would read this number. Mr. Stark continued to pose the rest of the problem once the students had shared their ideas. While Mr. Stark began to read the part of the problem about “favorite catalog,” Ms. Snead moved to the front of the room and drew a logo of a popular toy store. She also asked students to talk to a fellow classmate about the meaning of the word “catalog.” When Ms. Snead and the students talked about the meaning of the word “catalog,” Mr. Stark went to his desk and picked up a large catalog. As the discussion continued, he referred to this catalog while he and the students finished reading the problem.

Mr. Stark then asked the students to begin working on the problem. At this point, Ms. Snead spoke with Mr. Stark. Afterward, he immediately mentioned to the students that their answers did not need to be exact (since they were estimating the total spent). The students continued to work on the problem for the next twenty minutes. During this time, Mr. Stark and Ms. Snead talked with different groups of students. They also talked to each other briefly several times as they moved from group to group.

Ms. Snead and Mr. Stark conferred again right before they reconvened the students for the whole-class discussion. Mr. Stark and Ms. Snead facilitated a lively discussion about one group's strategy. Students in this group explained that they had added  $\$15,000 + \$1,000 + \$7,000 + \$3,000$  to derive an estimate of  $\$26,000$ . As they explained their strategy to their classmates, Mr. Stark recorded their method on the whiteboard.

In the next section, we highlight parts of interviews that we had with Mr. Stark and Ms. Snead, respectively, immediately following the lesson. We were particularly interested in finding out what they had talked about during the lesson. Did Ms. Snead provide certain kinds of support for Mr. Stark during the lesson? What types of support did she offer? Did Mr. Stark ask Ms. Snead questions about how he might proceed? By considering their comments against the backdrop of our observations during the lesson, we hoped to develop a better understanding of how these conversations might have benefited Mr. Stark and his students.

### **The Follow-up Interview with Mr. Stark and Ms. Snead**

When we spoke to Mr. Stark, we asked him about the conversations he had with Ms. Snead during the lesson. In the excerpt that follows, he indicated what they talked about during one of their exchanges, and explained why he and Ms. Snead spoke just before he reconvened the students for the whole-class discussion about the estimation problem.

Interviewer: During the lesson at one point you and Ms. Snead were talking while the students continued to work on the problem. What did you talk about?

Mr. Stark: I asked her to go check on the group because they might be a group that I might want to share their method. We [were] trying to find a group that we could use as a presenting group...I just said go take a look at that group because it looks like they had done some estimation and she said, "Let's get [those students] up there."...

When Mr. Stark and Ms. Snead communicated at this point during the lesson, they made a decision about which students' work to highlight during the discussion. As Mr. Stark's comment suggests, he asked Ms. Snead to check one of the group's solution methods to see if she, too, agreed that they should highlight this group's method during the whole-class discussion. He went on to say that after she talked with this group, she communicated to him that she agreed with his suggestion. His next statement, "Let's get [those students] up there," is evidence of this fact. Additionally, notice that he stated, "We [were] trying to find a group that we could use as a

presenting group.” His choice of the pronoun “we” is particularly interesting. Mr. Stark stated what appeared to be one of their shared goals for the lesson.

When we spoke with Ms. Snead after the lesson, she also provided insight into the types of conversations that she and Mr. Stark had during the lesson. In fact, she mentioned another conversation that occurred earlier in the lesson. She said that after Mr. Stark sent the students off to solve the problem, she asked him to “make sure you emphasize that [the students] do not need to get the exact answer.” She also said that when she made this suggestion to Mr. Stark, he stated, “Oh yeah, I forgot about that...”

We, too, recalled this instance during the lesson, and wondered what they might have talked about. As it happens, immediately after she reminded him of this point, Mr. Stark gave some additional instructions to the students while they worked on the problem. He mentioned that they should not find an exact answer (i.e., they were to estimate). Therefore, by speaking to Mr. Stark immediately after he had finished posing the task, she made a timely suggestion that he then incorporated into the lesson in the form of additional directions to the students.

Interestingly, as in our previous example, the exchange between Ms. Snead and Mr. Stark seemed to advance the goals of the lesson. In both cases, Mr. Stark had the opportunity to possibly develop or refine certain teacher moves during the lesson. In the former, Ms. Snead supported his decision to select a particular group’s work to highlight during the whole-class discussion. In the latter, she reminded him about the intent of the activity. So in both instances, the exchanges they had advanced the goals of the lesson, albeit, in different ways.

Did Mr. Stark benefit from conversations with Ms. Snead during the lesson? We suspect that these types of exchanges were possible learning opportunities for Mr. Stark (and possibly for Ms. Snead). Mr. Stark could communicate with an in-house expert about subsequent instructional moves that he might make during the lesson.

Students also may have benefited from the collaboration between Ms. Snead and Mr. Stark. In fact, we suspect that the exchanges they had also supported his work with his students. During the lesson, for instance, Mr. Stark highlighted a particular group’s solution method. As a result, other students, most of whom had derived exact answers, had the opportunity to understand their classmates’ strategies for estimating the amount of money they could spend. So

as Ms. Snead collaborated with Mr. Stark, she may have supported not only Mr. Stark's, but also his students' learning.

These types of situations may also have been learning opportunities for Ms. Snead. She may have developed a better understanding of the extent to which she and Mr. Stark needed to discuss the purpose of the lesson as they planned together. Perhaps she presumed that they did not need to discuss the intent of the activity. Or, she may not have realized that they needed to discuss this issue during the planning session. Although we do not know which of these or possibly other scenarios might best describe Ms. Snead's situation, her decision to address the issue during the lesson seemed an important one.

Interestingly, during the interview, Ms. Snead did mention what she does when unanticipated issues surface during the lesson. She made the following statement:

It doesn't matter what the lesson is, there are things that come up that we should have talked about during the planning session. Or, "Oh I wouldn't have known to talk about this during the planning session, but I want to talk about it now."

As her comment states, when issues come up that need to be discussed with the teacher, she can address them when she converses with the teacher after the lesson. Or, perhaps Ms. Snead may mention these issues during the lesson, for instance, as she did with Mr. Stark. Additionally, because she and Mr. Stark talked about this and other issues during the lesson, she could revisit them after the lesson. Consequently, when situations occur that the Mathematics Specialist may not have anticipated, she may have opportunities to reflect on her own coaching practice. What ideas does she need to address with the teacher about students' misconceptions? Does the teacher understand what the intent of the lesson is? As the Specialist considers these and other questions, she has the opportunity to refine her coaching practice. In our example, for instance, Ms. Snead might consider why she needed to mention to Mr. Stark that the students should not compute exact answers to solve the problem. When she and Mr. Stark plan another estimation lesson, she might refer to this earlier lesson to highlight students' misconceptions. In doing so, she would continue to refine her own skills as a math coach, and at the same time, provide opportunities for Mr. Stark to refine his teaching skills.

During the interview with Mr. Stark, we also asked him what he learned from working with Ms. Snead during this coaching session. When we asked Mr. Snead this question, we

thought that he might address issues around the students' misconceptions about estimation. Instead, he responded that the most important idea that he learned was related to aligning the lesson with the pacing guide and the state standards:

Biggest thing was looking at the standards that corresponded with the lesson and think about [how] I had addressed [them] previously. I didn't think about how I had addressed it before today and now that I am talking to you, I realize that I haven't addressed it in weeks really...I see that it is something that I really need to go back to. So that is something that I haven't been thinking about in terms of the standards in each individual lesson. I haven't been thinking about how 3.4 corresponds to the lesson I am doing today...And the standard that corresponds to the pacing guide...think about that more, I can keep track of things that I [am] hitting and things that I am not.

As Mr. Stark's comment suggests, he thought that his discussion about the pacing guide during the planning session was helpful. He could (and should) use these documents to guide his planning among other things. As he stated, he could "keep track of things that I [am] hitting and things that I am not."

Notice also that Mr. Stark mentioned that the "biggest thing" he learned was related to using the pacing guide to frame lessons. What else did he learn working with Ms. Snead? As we have suggested previously, Mr. Stark had additional opportunities to learn or refine ideas about teaching estimation during his conversations with Ms. Snead during the lesson. In fact, during the lesson, Ms. Snead told one of the researchers that he mentioned that he should have posed a different task at the beginning of the lesson—an estimation task—before introducing the problem solving activity. While he did not mention this and possibly other issues during our interview session, he may have had other opportunities to reflect on and learn about his practice before, during, and after this lesson.

### **Follow-up Interview Discussion**

We use this example to illustrate how interrelated the learning opportunities are for the teacher, the Specialist, and the students. In our example, the issues that did not surface during the planning session were ones that became important as Ms. Snead and Mr. Stark made decisions during the lesson. Whereas Ms. Snead but not Mr. Stark addressed students' misconceptions about estimating during the interview session, we suspect that this was one of the key ideas they might explore during subsequent planning sessions.

Our example is also instructive to Mathematics Specialists as they work with first-year teachers. One of the ways the Specialist can help the teacher is *to move beyond* discussions about logistics, pacing guides, and state standards. Although it is important to have these types of discussions with new teachers, it is also important for the Specialist to address ideas around students' misconceptions, representing students' thinking, etc. Because it is impossible to address every important issue during planning sessions, the Specialist must still choose the focus of the planning session. If important issues that were not addressed during the planning session do surface during the lesson, she has additional opportunities during and after the lesson to highlight these ideas [1].

### **Final Comments**

In our discussion, we have highlighted five themes that have emerged as a consequence of our work with Specialists. For emphasis, we have addressed issues that are unique to each of the five themes. We have also illustrated how these themes might be related to one another. In this final section, we address several broader issues about coaching.

We have also illustrated how the Specialist might affect not only the classroom teacher's learning, but also his students' mathematical learning. As these examples illustrate, the Specialist may make different types of contributions during the lesson. Some of the Specialist's contributions may directly influence or reorient the teacher during the lesson. Others may simply support the classroom teacher as he makes instructional decisions. In either case, the Specialist must be quite flexible as she moves in and out of these different types of situations.

Additionally, we have shown that coaching may provide opportunities not just for teachers, but also their students to build new understandings. In Mr. Stark's classroom, for instance, Ms. Snead played an active role in supporting him as he made decisions so that his students could explore particular mathematical ideas. Hence, the teacher and the students, albeit in different ways, may benefit from the Specialist's role as a math coach.

The Mathematics Specialist faces many challenges as she establishes her role in the school building, particularly as she enacts her role as math coach. She needs to "convince" the school building principal and possibly administrative personnel that coaching is a critical part of her job. She must work hard to find blocks of time so that she can work effectively as a math coach (e.g., plan, co-teach/observe *and* debrief about the lesson). In most cases, the six Specialists that we observed rarely had opportunities to engage in all three phases of a coaching

session. This issue is problematic from our point of view, and yet it is presently one of the realities of school life. Ideally, it would be more beneficial for all (Specialists, teachers, and their students) if Specialists could enact all three phases of the coaching process in a single block of time. Ms. Snead for instance, will be hard pressed to have more than a brief, follow-up conversation with Mr. Stark about this estimation lesson. She will likely speak with him as he takes his students to the library or as they walk students to the buses at the end of the day. As such, Mr. Stark may have fewer opportunities to benefit from these coaching sessions.

Because teachers' classrooms are the sites for their learning, we must continue to press for professional development that best serves teachers and their students. Mathematics Specialists with whom we have worked seem to know much more about mathematics instruction in their school building, the teachers' instructional practice, the mathematics curriculum and research-based practices than most individuals in their school building, and possibly in their school district. Our observations align with Amy Morse's views about math coaches' roles in school districts (personal communication, July 2009). Her seminal book, *Cultivating a Math Coaching Practice: A Guide for K–8 Math Educators*, in turn, sheds light on the crucial ways that math coaches can affect teachers' mathematics instruction [4]. They have the opportunity to effectively support reform recommendations that have been made by the mathematics and mathematics education communities. It behooves us to understand and to support their important work.

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