



The Role of the Elementary Mathematics Specialist

Patricia F. Campbell

The following vignette, drawn from Doyle (2010), presents a cycle of interactions between an elementary mathematics specialist and a classroom teacher. The vignette can serve as a useful starting point for considering the role of the elementary mathematics specialist (the summary and interpretation are the author's and do not necessarily reflect Doyle's views).



Ms. Doyle is a mathematics specialist who works in an elementary school located in a midsize urban school district. She and Ms. Crane, one of the teachers in the school, had finally agreed to meet to discuss how Ms. Crane might teach an upcoming geometry strand, since three or four students in Ms. Crane's class did not seem to understand any mathematics lesson unless Ms. Crane subsequently pulled them aside for targeted instruction. Before the meeting, Ms. Doyle reviewed some of Ms. Crane's resources. Ms. Doyle reflected that she had been expected to do this sort of review in her coaching and leadership course and that she had continued to do it now while working in a school because "it provides a clearer picture of the prerequisite knowledge that the students need and gives me a better understanding of what true conceptual knowledge should look like" (Doyle 2010, p. 113).

At their meeting, after informing Ms. Doyle that she had only a 20-minute planning period, Ms. Crane shared her whole-class lesson plan. The lesson addressed congruence and the plan consisted of pages from the teacher's edition of a mathematics textbook emphasizing teacher modeling after a warm-up activity, with time for guided practice prior to students' independent completion of workbook pages. Looking at the plan, Ms. Doyle realized that she and Ms. Crane could do a great deal of work on this lesson to make

it meet the needs of various students, but Ms. Doyle also knew that she “had to make sure that the beginning of our working relationship remained positive. I didn’t want Ms. Crane to feel that I didn’t see any value in her selection of a lesson plan” (Doyle 2010, p. 114). So Ms. Doyle focused her discussion with Ms. Crane on the meaning of congruence, since understanding congruence was the goal of the lesson, and on considering what prior knowledge, both strengths and weaknesses, Ms. Crane believed her students would bring to the lesson. When asked to show where the plan would confront the expected difficulties and how she could provide support, Ms. Crane noted that vocabulary would be a challenge for some students. At that point the available time for planning ran out. So, Ms. Doyle asked Ms. Crane to think more about how to support her students’ learning through a non-textbook task, perhaps involving manipulative materials.

The next day, Ms. Doyle observed Ms. Crane as she followed the traditional textbook plan in her classroom. Ms. Doyle noticed that Ms. Crane had accurately identified which students would find the lesson challenging and that the other students seemed able to use the terminology “congruent,” “non-congruent,” and “similar.” Although Ms. Doyle was glad that most of the students seemed to “gain as much understanding from the lesson as they possibly could,” she wondered how she could “get teachers to understand that it is possible and valuable to teach for conceptual understanding and still have the students do well on assessments” (Doyle 2010, p. 115).

Ms. Crane told the class to complete the independent workbook pages at their seats while she and four students worked at a nearby table. Ms. Doyle assumed that Ms. Crane would simply walk the students through the completion of the practice problems. However, Ms. Crane presented the children with vocabulary picture-word cards and, after using those to review the meaning of the terms, she distributed cutout shapes and told the students that they would decide whether paired shapes were congruent, non-congruent, or similar. But then Ms. Crane led the group through the comparisons rather than permitting them to determine and share their own approaches. Further, Ms. Crane did not follow up when one child suggested a useful strategy, because she was focused on having the students follow her directives with the shapes and then complete the worksheet.

Ms. Doyle had many questions running through her mind. Did Ms. Crane know how to focus students’ attention on conceptual meaning? Did Ms. Crane not recognize the teachable moment when the child suggested a useful strategy? Or did she not pursue the child’s idea “because she didn’t know what questions to ask” (Doyle 2010, p. 116)?

Ms. Crane sought out Ms. Doyle during lunch and was eager to talk about the lesson. They agreed to meet after school. Ms. Doyle began that post-observation conference by asking Ms. Crane how “she thought the lesson went” (Doyle 2010, p. 116). Ms. Crane replied that in her opinion the lesson was effective and the children in the small group had understood. When asked how she knew that, Ms. Crane described the responses of the four children in the small group, and she shared the workbook pages that all the children had successfully completed. Ms. Crane remarked that the vocabulary cards and cutout shapes were quite effective for the children in the small group. When asked what she thought about the strategy suggested by the one child, Ms. Crane replied that “she saw it, but that pursuing it would get the students off task” (p. 116). Besides, she explained, the students would not be able to use that strategy on the state assessments because they would not have cutout shapes. Ms. Doyle then suggested using tracing paper as another way to address congruence and similarity, and she offered to demonstrate its use in a lesson that would challenge students to come up with different strategies. After agreeing that Ms. Doyle could do that, Ms. Crane noted that she was running out of time and needed to leave.

Later Ms. Doyle reflected, “I thought we had just gotten started, but it was after school and we were on her personal time.” But as Ms. Crane was leaving, Ms. Doyle asked her to think about a question: “Would the small group activity have been as effective if she’d used it with the whole class?” She also challenged Ms. Crane “to think about how the small group lesson may have been different had the students worked in pairs to discuss and categorize the shapes” (Doyle 2010, p. 116).



What the Vignette Does or Does Not Reveal about the Role of an Elementary Mathematics Specialist

The vignette about Ms. Doyle and Ms. Crane illustrates many of the daily responsibilities and challenges that elementary mathematics specialists encounter as they assume one of their roles—coaching teachers. It also suggests how an elementary mathematics specialist operates as an on-site facilitator who enables others to grow and change, rather than as a manager who directs and controls the actions of others. So who exactly is an elementary specialist, and what does the specialist do?

The elementary mathematics specialist is a leader in the school, but she assumes that role by earning the respect of the other teachers, by being approachable, by continuing to learn, and by using interpersonal skills that ultimately allow her to influence the instructional practice of her peers. Typically she has no supervisory responsibilities, but she challenges both early-career and veteran teachers

to become more effective by supporting and fostering collaboration focused on mathematics teaching. She works to foster instructional change and promote teaching practices that could advance student learning, but she exercises influence somewhat informally, through suggestions and questions.

Allow time for teachers to change.

If I had been too aggressive with some of the teachers in my school, or if I had insisted on too much change at one time, I would not have been able to establish collaborative relationships, where teachers and I share ideas and look for ways to improve teaching practices.

—Advice from a mathematics specialist



The elementary mathematics specialist is comfortable with mathematics content and mathematics teaching and has the expertise to identify and interpret resources as needed, but he functions as a cautious, knowledgeable colleague. He is expected to bring about programmatic change, but he does not simply dispense advice. Rather, he listens to individual teachers and works patiently in partnerships determined by teachers' needs and willingness.

As the elementary mathematics specialist operates collaboratively in classrooms without challenging the authority of teachers, her presence defies the standard routine of isolated teachers working with students in classrooms. She typically comes from the ranks of teachers, and she remains a teacher. Yet, even when she is interacting with students in the classroom, she does so with the goal of advancing a teacher's understanding and professional growth.

Don't forget to reflect!

We need to model for the teachers whom we are coaching how important it is to take time to reflect. In the "plan-do-reflect" cycle, "reflect" holds the same weight as "plan" and "do." We all need to reflect on our work to move forward. Reflection is often an overlooked piece that needs emphasis right from the beginning of a mathematics specialist's career. As we reflect, we begin to learn more about ourselves and about the people we work with. Reflection allows us time to readjust and improve on the work that we do.

—Advice from a mathematics specialist



The vignette about Ms. Doyle illustrates one aspect of an elementary mathematics specialist's busy day—interacting with a single teacher about a single teaching episode. Although coaching individual teachers is not the only element in an elementary mathematics specialist's job description, it is an important one. When an elementary mathematics specialist and a teacher engage over an extended period in purposeful conversations about the teacher's students and teaching, their interaction can enhance the teacher's knowledge and foster a safe partnership that produces ideas and improved teaching. The changes that teachers incorporate in their practice may then positively affect student learning. But the elementary mathematics specialist is frequently expected to be more than a coach for individual teachers.

Elementary mathematics specialists typically meet regularly with small groups of teachers, often in grade-level teams, to plan for curricular pacing, highlight mathematical meaning and emphasis in an upcoming instructional unit, or solve a mathematics problem as an entry point for considering students' misconceptions or needs. Mathematics specialists are frequently engaged in conversations with teachers about how to interpret student work or results from standardized assessments. In many schools, elementary mathematics specialists are expected to work with their principals to effect schoolwide change across the mathematics program. This frequently means that a specialist will be expected to work with teachers on cross-grade mathematics education issues spanning curriculum and assessment. But one constant in all of these programmatic roles is that the elementary mathematics specialist serves as a school's ready resource for mathematics, providing on-site, collegial professional development while at the same time serving as the "community organizer" for mathematics in a school (Neufeld and Roper 2003).

Allow teachers to grow, just as teachers allow students to grow.

When we work with teachers, we are encouraging them to allow their students to grapple with mathematical ideas while working on rich tasks. We urge teachers to ask questions as they foster the growth of a mathematical environment where students are expected to offer their ideas, to explain their thinking, and to defend their responses, while providing wait time and not stepping in to tell the class the answer. But we as specialists must take this same approach when we work with teachers. We need to model this approach not only when we are working with their students in co-teaching or demonstration settings, but also when we are co-planning and debriefing with the teachers as we seek their thinking, foster their reflection, and raise questions about their ideas.

—Advice from a mathematics specialist



School-Based Professional Development

Year after year, top-down efforts to reform education and improve student achievement seem to blossom and fade. Although education policy frequently emphasizes the definition and alignment of curriculum standards and standardized assessments, compelling evidence also suggests that "teachers are crucial to students' opportunities to learn and to their learning of mathematics" (National Mathematics Advisory Panel 2008, p. 35). In other words, what and whether students learn are ultimately dependent on their daily classroom instruction. But teachers need continuing opportunities to improve their teaching practice and to increase their knowledge if they are to inspire and ignite learning in all their students over the course of their career.

Infrequent teacher workshops addressing unrelated topics do not foster professional growth. Instead, professional development occurs when teachers come together regularly, over an extended period of time, to examine their students' learning and engage in the work of planning for and discussing their own teaching. This type of collaboration allows teachers to learn from one another. This does not simply mean that teachers should come together periodically to share instructional activities that other teachers may or may not decide to add to their repertoire. Rather, effective professional development encourages teachers to examine their instructional practice, to consider the needs of

their students, and to try a modified approach, returning again to repeat the cycle as they examine what did or did not work, in part by considering how and why the instructional approach supported or failed to support student learning.

This image of professional development sounds worthwhile, but how can it be carried out? Teachers are very busy people, and they cannot be regularly released from their classrooms to attend professional development sessions. Nor should they be expected to volunteer their personal time to attend sessions in their school district or at a local college.

One solution to this problem is to think of schools as places where not only students but also teachers learn (Hawley and Valli 1999). The elementary mathematics specialist enables this vision of job-embedded professional development within schools as she serves as the on-site resource for teachers. She is the approachable leader whom teachers can see as “being in this together with us.”

At the same time, the elementary mathematics specialist brings both instructional expertise and a deep knowledge of mathematics and of students to his interactions with teachers. It is the specialist who works “to support change, to foster implementation, to promote reflection, to applaud efforts, and to challenge further growth” (Campbell 1996, p. 462). By doing so, the specialist assists teachers in their efforts to implement new approaches and enhance their teaching practice in the real environments of their classrooms.

A Knowledgeable Colleague Who Facilitates Job-Embedded Professional Learning

The vignette portraying the interaction between Ms. Doyle and Ms. Crane illustrates some aspects of coaching an individual teacher: The specialist met with the teacher in a pre-observation conference, observed instruction, and then conversed with the teacher in a post-observation debriefing. But this vignette reveals only the beginning of the relationship that Ms. Doyle and Ms. Crane established as their partnership evolved and matured.

Coaching individual teachers

As a specialist and a teacher work together on their shared goal of advancing student learning, their interactions during pre-observation conferences, lesson observations, and post-observation debriefings will deepen and become more focused. In addition, the elementary mathematics specialist's work with an individual teacher may also encompass the following:

- Modeling or demonstration teaching. The specialist may teach the students in a teacher's classroom while the teacher observes, or the specialist and a teacher may visit another teacher's classroom to observe skillful instruction that all three staff members can discuss at a later time.
- Co-planning. The specialist and the teacher may jointly design lessons, perhaps targeting specific instructional strategies or anticipated concerns about student learning.
- Co-teaching. The teacher and the specialist may simultaneously or sequentially implement a lesson that they have designed together.
- Reviewing student work. The specialist and the teacher may interpret the mathematical performance or understanding revealed in assessments or assignments completed by the teacher's students.
- Mentoring. The specialist and the teacher may address the teacher's mathematical understanding, consider aspects of the mathematics curriculum, discuss instructional approaches, or talk about change-related concerns.

- **Learning.** The specialist may freely admit to the teacher that she is not an expert with experience in or a deep understanding about teaching mathematics at all grade levels, while emphasizing a willingness to work together with the teacher to advance their shared understanding of mathematics content and curricular materials to support productive mathematics teaching and learning in the teacher's classroom.

Seize available moments.

Teachers do not have a lot of time. I have found that informal lunch discussions or a quick conversation in the hall can yield results because the teacher and I are able to talk while the information is still fresh. Teachers are so busy that they don't often take the time to reflect. Prompting teachers with reflective questions is a great way to keep them thinking about the mathematics and where they might go next.

—Advice from a mathematics specialist



When listed in this way, the performance expectations for an elementary mathematics specialist may appear intimidating, but no specialist completes all of these coaching activities every day with each individual teacher in the school. Rather, these are the varied approaches that an elementary mathematics specialist may engage in as he works with an individual teacher. Specialists and teachers decide what coaching activity to undertake and when to do so by talking with and listening to one another. The intent over time is for the specialist and the teacher to establish a trusting interaction within which the teacher feels safe enough to explain a rationale, contribute ideas, ask questions, provide information, admit frustration, offer alternatives, seek help, and discuss approaches—all with the aim of improving his instructional practice. In this way, the elementary mathematics specialist supports the professional development of the teacher with the intended effect of enhancing the mathematical understanding of the teacher's students.

A number of these coaching activities—modeling, observing, co-teaching—occur in a teacher's classroom. Teachers are more likely to come to accept their specialist as someone who understands the daily and cumulative challenges of teaching when they see that she conducts herself comfortably in their classrooms. Other coaching activities—co-planning, debriefing, reviewing student work—target the day-to-day professional demands and expectations of teaching. Teachers are more likely to accept their specialist as a knowledgeable and accessible resource when they see that the specialist can supply or locate information about mathematics content, curriculum, and instructional materials without threatening the teachers' standing. Similarly, teachers are more likely to accept their specialist as a valuable consultant when they see that she can recognize gaps in a lesson, think aloud about cause-and-effect relationships, and seek the teachers' opinions regarding possible instructional alternatives or student needs.

Coaching small groups or grade-level teams of teachers

In addition to working with individual teachers, elementary mathematics specialists often work with small groups of teachers. Frequently these are grade-level teams. All teachers who are responsible for teaching students the same grade-level curriculum in mathematics meet with the specialist to address curriculum and instruction. Particularly in large schools, this is an efficient way for the mathematics

specialist to interact with teachers regarding curricular meaning, instructional materials, and assessment expectations. The advantage of the small-group format is that it allows teachers to learn from one another, as well as from their collective interactions with the specialist. The intent is for small groups of teachers to meet regularly with the specialist to address a shared agenda so that together they may establish a sense of community and gradually transform their understanding and their teaching practices in ways that yield benefits.

For this small-group approach to be beneficial, the elementary mathematics specialist and the teachers must first agree on what needs or instructional challenges to address and verify that they have some control over these within the mathematics program. Then their subsequent discussion and activities can focus directly on these needs and challenges. When working with a small group of teachers, the elementary mathematics specialist's role is to address needs and support the professional interaction of the teachers. It is the specialist who will guide the team in framing a common goal, despite differing perspectives. It is also the specialist who will help the members of the group establish norms for their meetings and determine who will facilitate positive discussion so that the group operates without stress or divisiveness. Many novice mathematics specialists find this area particularly challenging. For that reason, chapter 4, "Supporting Grade-Level Teams," and chapter 5, "Supporting Groups of Teachers across Grades," address ways of working with and supporting groups of teachers.

Teachers who come together in small groups vary in their focus, and, as a result, so do the groups' emphases. But typically the agenda reflects a shared commitment to addressing the teaching of mathematics in an effort to improve student learning. Thus, many times a small group of teachers will begin by examining curricular documents to identify learning targets for their students, as specified in mathematical objectives and standards. This permits the elementary mathematics specialist to focus the discussion on the meaning of the mathematics that the teachers are teaching, while considering mathematical connections that might lead teachers to deepen their understanding.

A grade-level team of teachers may work with the elementary mathematics specialist to consider not only the pacing and ordering of mathematics objectives over a unit or period of time, but also the mathematical emphasis. What are the critical big ideas in a particular unit or grade? What ideas do students commonly develop in relation to this mathematical content, and how can an awareness of these ideas help teachers when they plan, teach, and assess? What are typical misconceptions, incomplete understandings, or points of confusion that students often experience when considering these mathematical ideas? What are some instructional materials or approaches that a teacher might use to support students' consideration of the big ideas of mathematics addressed in this unit? How might these materials be used? What instructional strategies or key questions might focus or foster student discussion during this unit? How might a teacher informally assess student learning during instruction? By considering these questions, teachers are more likely to design and deliver instruction that supports the learning of all students.

Support collective learning.

When a mathematics specialist can bring a team of teachers together, even when perspectives differ, great things happen to mathematics thinking and learning. I love what happens when one teacher discusses a lesson and then the others join in, asking questions and sharing ideas. It's a chance for the mathematics specialist to sit back, facilitate discussion, and watch learning happen among the teachers.

—Reflections from a mathematics specialist



The elementary mathematics specialist serves as the catalyst in these small-group sessions. Frequently when working in planning teams, teachers come up with a teaching idea that all agree is worth pursuing, but no one has the time to develop a necessary component or to collect the required materials. When the specialist steps up and volunteers to do this, the potential for productive collaboration surges. But a specialist needs to do so with the understanding that a number of teachers in the group will then try the approach in their classrooms and that some of them will invite the specialist or others to observe the lesson. These final steps help establish the specialist as a partner, not a subordinate. After the teaching of the co-developed lesson has occurred, the entire group meets again for a debriefing. At this time, the teachers who taught or observed the lesson share their experiences and might share examples of student work, completed either during or as a result of the lesson. This is an opportunity for those teachers and the other teachers to ask questions and reflect on implications. This debriefing session allows the group to consider what worked or did not work in the lesson and how this information might inform future planning.

Small groups of teachers may also meet with the elementary mathematics specialist to review and interpret assessment results. Teachers receive and collect achievement data about their students every year, but often they do not know how to use these data reports. The elementary mathematics specialist can organize the data so that teachers can raise questions about their meaning as they discuss implications. This process in turn may create a demand to examine the data further. The specialist can then work with small groups of teachers, defined by grade-level teams or simply by interest, to interpret relevant data to gain a better understanding of what students have or have not learned. As the teachers and the specialist clarify what student-centered concerns the data indicate, they can prioritize problems, set goals, and make plans for addressing those concerns.

Advanced study-group options

After the elementary mathematics specialist has become established in a school, an atmosphere of trust and support can emerge. At this point, typically after a specialist has been working in a school for a year or two, some teachers may express an interest in doing more work with the specialist. These may be teachers who have always been very interested in teaching and learning mathematics. Other teachers, after working with the mathematics specialist to change their mathematics teaching, may find that now that they understand more about their students' learning, they want to know more. In either case, the specialist may address this need by leading an inquiry or lesson-study group.

These advanced study groups take many forms and define their own interest. A group may decide to develop and use common tasks and then analyze student work. When small groups of teachers do this with the specialist, they typically develop a shared interpretation of the mathematics that the tasks elicited from the students, which may or may not have been the mathematical applications that the teachers initially thought the tasks would prompt. Joint review of student work may also lead the teachers and the specialist to discuss their interpretations of the differing levels of student performance and understanding revealed in the work. The specialist and the teachers may also consider common misconceptions that students have and reflect on how their current instructional strategies may be influencing or related to student work.

Alternatively, a group of teachers may decide to form an inquiry group in which they read and discuss particular educational references or resources with the specialist. These teachers then take what they learned from their discussion and work together with the specialist to modify some aspect of their teaching. This may mean that they collaborate to change their assessment practices, modify their instructional routines, or change how they interpret curriculum standards to raise expectations for their students.

A group of teachers from different grades may decide to meet with the specialist to discuss the trajectory of mathematics learning across the grades for some mathematical topic, referring both to

their curriculum and to educational references to extend their understanding of ways to support their students' learning of a big idea in mathematics. Some teachers may decide to form a lesson-study group with the elementary mathematics specialist.

Lesson study is a process through which teachers, often from differing grade levels, act together in a group to identify a mathematical skill or understanding that they want their students to develop. The mathematics specialist can bring information about the mathematics and research-based best practices to the group discussions. The teachers then define and investigate questions regarding how their students develop that knowledge and how their instruction might foster student understanding. The group then jointly develops a detailed lesson plan that targets that issue, and one teacher carries out the plan in her classroom while some of the others observe. The entire group of teachers then comes back together with the mathematics specialist to discuss observations and revise the lesson plan, repeating the cycle of observed teaching and discussion. On the basis of their experience, the group produces a report, referring back to their original questions and describing what they have learned.

Provide support for teachers' efforts to collaborate.

Mathematics specialists can work with teachers to plan a lesson and then teach a teacher's class so that the released teacher may observe another teacher teaching the co-planned lesson. This process may not have the impact of a full-scale lesson study, but I have teachers begging for this opportunity because it gives them a chance to collaborate and to discuss the mathematics and student learning.

—Advice from a mathematics specialist



Programmatic Responsibilities

Although working with teachers, either individually or in small groups, consumes large portions of an elementary mathematics specialist's day, specialists are also called on to provide programmatic leadership for mathematics in their schools. This is not a completely new phenomenon, since for many years particular teachers have served as informal leaders in their schools. Indeed, researchers (for example, Danielson [2006] and Killion and Harrison [2006]) have studied the roles that teacher leaders assume. They define a school's informal teacher leaders as those faculty members who take initiative, who act as liaisons between their faculty peers and their school administration, or who serve as instructional resources in their schools, mentoring other teachers about possible teaching practices. An elementary mathematics specialist fits each of these descriptors. But the specialist is assuming these roles as assigned responsibilities of the specialist's position.

If a group of elementary mathematics specialists compared their responsibilities for the mathematics programs in their assigned schools, they would quickly identify differences. These differences would reflect the fact that the programmatic responsibilities associated with this role are determined to some extent by the school district and to a large part by the plan of action established by a specialist and her principal.

School district expectations

Certainly, many factors affect the elementary mathematics specialist's work with teachers. These include district decisions regarding curriculum pacing and district expectations for local assessments or benchmarks for student progress. But the district also determines the limits and latitude within which a specialist will work. For example, school districts establish the duration of a specialist's workday and the length of her school-year contract. These decisions communicate expectations regarding when the specialist will be available to work with teachers and to meet with the principal. The central administration in a school district typically determines whether an elementary mathematics specialist will be assigned to work with one school or with a number of schools. School districts also set policy clarifying whether the elementary mathematics specialist has any role that could be perceived as encompassing teacher evaluation. Generally the elementary mathematics specialist is not viewed as a supervisor of teachers and therefore is not responsible for teacher evaluation. However, districts may expect specialists to provide their principals with information describing the focus of their work with identified teachers, without evaluating any teachers' progress toward change. This policy is in place in some districts so that when a principal observes teachers teaching, the principal does not "mistake fledgling attempts at change for poor teaching" (West and Staub 2003, p. 132).

Other key factors in the influence that school district policy has on the role of the elementary mathematics specialist are whether and how the district provides principals with professional development addressing the roles that a specialist is expected to assume and what approaches a principal might take to create a school climate that is supportive of the work of the specialist. When a principal understands the specialist's role and shares accountability for the implementation of that role, the principal and the elementary mathematics specialist have the basis for a collaboration that can advance a school's mathematics program. The role of the elementary mathematics specialist boils down to supporting schoolwide instructional change to facilitate increased student learning. When school district policies recognize the potential of elementary mathematics specialists and provide professional development for principals and specialists, specialists can fulfill the responsibilities of this role.

The elementary mathematics specialist serves as the liaison for mathematics between her school and the school district's curriculum or administrative offices. She attends update sessions at the district's central office. She is expected to know and clarify district-level policy regarding mathematics assessment, curricular focus and pacing, and commercial textbook adoption for both the teachers and the principal in her school.

In some school districts, the mathematics specialist is also part of a team that provides professional development for groups of teachers at the district level for the purpose of addressing particular curriculum needs. No matter what policies are set in place by a school district, the elementary mathematics specialist will be viewed as a member of the organizational structure of the district and must work within the system.

The local school's mathematics program

The principal is the accountable educational leader in a school. The principal's views about mathematics teaching and learning, priorities for improvement, goals for mathematics instruction, and preferences for communication and interaction all affect a specialist's work. Because of this, an elementary mathematics specialist's programmatic responsibilities for mathematics are negotiated and agreed on through conversations with the principal. Often, the principal and the specialist have conversations in which they discuss a vision for the school's mathematics program and the principal's thoughts about the role of an elementary mathematics specialist. This interaction allows them

to set common goals, enabling them to work collaboratively to support the program. The principal will probably let the specialist know how often they should meet to discuss the specialist's work or whether and how often the principal expects to receive updates on the specialist's activities.

Be aware that the work of mathematics specialists will vary.

The mathematics specialist's role will be different across schools and school districts because no two schools have exactly the same needs. Focus on what your school's needs are, and don't worry about whether your schedule looks the same as that of another mathematics specialist.

—Advice from a mathematics specialist



The elementary mathematics specialist may be a member of a school's leadership or school-improvement team. Although the specialist naturally considers all administrative decisions in terms of their impact on the mathematics program in a school, he may need to step back at times. The elementary mathematics specialist must work with other school-level leaders as a member of the school's organizational structure, recognizing that mathematics may not always be the priority.

An elementary mathematics specialist's programmatic responsibilities take many forms. One common duty involves assisting both administrators and teachers in interpreting mathematics assessment data. Specialists often are expected to reorganize charts or tables of end-of-the-prior-year mathematics achievement data by topic, grade, and student demographics so that the data can provide information in a more accessible form. Specialists may be expected to serve on a school's leadership team, examining data and formulating plans for improvement. Specialists may be expected to lead grade-level teams or across-grade groups of teachers who are charged with designing or suggesting approaches that will target identified student needs in mathematics. To determine whether new and existing approaches are effective, the specialist should know how to use formative assessments during mathematics instruction and how to work with teachers so that formative assessments are not simply "more testing."

The principal may expect the elementary mathematics specialist to ensure that the curriculum delivered in the school is aligned with the intended curriculum distributed by the school district. To fulfill this expectation, the specialist must meet not only with grade-level teams, but also with across-grade teams to promote teachers' understanding of how the curriculum introduces and develops particular big ideas of mathematics across the grades. This work frequently expands to include work with teachers on collaborative long-term planning.

Another programmatic role that specialists frequently assume involves resource management. This includes the identification, organization, storage, and distribution of supplies for mathematics instruction, including both manipulative materials for students and instructional resources for teachers. Elementary mathematics specialists determine what instructional materials and resources are available for teachers to use to meet curricular demands in advance of their need, while also knowing what materials and resources will be needed. Further, the specialist must know how to offer a rationale for buying those supplies and how to organize all information that will ease the logistics related to purchasing so that the items can be secured. Before delivery of the materials and resources, the specialist needs to educate herself about their use and then outline possible activities linked to the curriculum. In this way, the specialist will be ready to work with teachers on techniques for using the new resources and materials when they arrive.

In a school, the elementary mathematics specialist is viewed as the go-to person for questions about mathematics and mathematics teaching from parents, teachers, and community leaders. She may work with parents and community leaders to foster continuing home-school-community partnerships focused on supporting students' learning of mathematics. For example, an elementary mathematics specialist may team with teachers to organize a math night—a setting that not only permits interaction between the parents, students, and teachers, but also introduces the mathematics specialist to the community.

Building Instructional Capacity

Recognize your impact while stepping back.

We are the ultimate diplomats. We will never have the spotlight, since our job is to make everyone else look good. So take time for yourself, and take time to interact with other mathematics specialists. Share stories with them—of both successes and challenges. They will understand and appreciate your perspective. And recognize that while the job sometimes seems thankless, nothing can beat the aha moment of a teacher starting to recognize and feel comfortable with her own instructional progress. Well, maybe that is topped by the joy she will later share about her students' mathematical successes.

—Advice from a mathematics specialist



The critical role that an elementary mathematics specialist assumes is contributing to the growth of instructional capacity—the instructional capacity of the teachers in a school and of a school's mathematics program. The position of an elementary mathematics specialist in a school will evolve over time as a direct result of the groundwork that a specialist lays by building relationships and respectfully interacting with coworkers and community members. The specialist will inevitably encounter temporary setbacks, but by staying positive, focusing on the goal of improved instruction, and working collaboratively with the instructional and administrative staff in her assigned school or schools, she and her colleagues will learn together as they take up the challenge to “emancipate, empower and transform both themselves and their students” (Ladson-Billings 1992, p. 109).

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