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CHAPTER 1

A Challenge-Based Approach to Coaching

Coaching is one of the fastest growing forms of professional development across the United States (Darling-Hammond et al., 2009). Many districts have turned to instructional coaching to provide intensive one-on-one support to teachers as they grapple with planning and enacting lessons that are aligned with ambitious teaching. Indeed, one in four schools now has a mathematics coach (Hill & Papay, 2022). Although the number of studies that have focused on the effectiveness of coaching programs is small, research has found that coaching can lead to positive changes in mathematics teachers' knowledge, beliefs, instructional practices, and student achievement (e.g., Campbell & Malkus, 2011; Chapin, 1994; Kraft & Hill, 2020).

Research suggests that mathematics coaching is highly personal and idiosyncratic, with coaches' practice varying significantly from school to school and district to district (e.g., Coburn & Russell, 2008). This variety is due—in part—to the wide range of coaching materials available in the marketplace to which coaches can refer to guide their practice. For example, *Coaching for Equity* (Aguilar, 2020) provides advice on ways in which coaches can help teachers surface their implicit biases. A popular coaching model, *Cognitive Coaching: Developing Self-Directed Learners and Leaders* (Costa & Garmston, 2015), provides guidance for coaches to plan conversations that aim to support the cognitive development of teachers, including teacher values, beliefs, and identities. *Instructional Coaching: A Partnership Approach to Improving Instruction* (Knight, 2007) focuses on how coaches can help teachers improve their instruction through a variety of activities (e.g., building an emotional connection, observing and modeling classroom lessons, and collaboratively exploring data).

Resources specifically designed for *mathematics* coaches are also available. For example, Content Focused Coaching (West & Cameron, 2013; West & Staub, 2003) guides coaches of individuals or groups of teachers to plan, teach, and reflect on mathematics lessons. *Everything You Need for Mathematics Coaching* (McGatha et al., 2018) offers a plethora of tools to help busy coaches support mathematics teachers.

What is missing from this body of work is a coaching model designed to address the specific challenges teachers face as they are learning to support productive mathematics discussions. To address this gap, our coaching model creates opportunities for teacher learning through one-on-one coach–teacher interactions that focus on the challenges teachers encounter when engaging in the *5 Practices for Orchestrating Productive Mathematics Discussions* (Smith & Stein, 2011, 2018). As mentioned in the Preface, the 5 practices are a set of instructional practices intended to help teachers plan and enact productive mathematics discussions that build on student thinking. The 5 practices (including Practice Zero) are *Setting Goals and Selecting a Task*, *Anticipating*, *Monitoring*, *Selecting*, *Sequencing*, and *Connecting*. The challenges associated with the 5 practices and described in the *5 Practices in Practice* series (e.g., Smith & Sherin, 2019) are central to our coaching model, providing the focus for coach–teacher conversations. Each of these challenges, along with their descriptions, are given in Figure 1.1.

Power of Organizing Around Challenges

The teacher challenges associated with the 5 practices have been identified over the past decade from conversations with teachers, coaches, and professional developers, as well as from classroom observations. They have been further verified through surveys of 1,200 teachers in which each of the 19 challenges was selected by a subset of teachers. Although some challenges were identified more frequently than others (e.g., Challenges 10 and 16), every teacher—even those who were not familiar with the 5 practices—identified at least one of the challenges as something they struggled with in their teaching.

The challenges serve three purposes for our coaching model. First, they signal what is important. To ensure teacher engagement in the most critical aspects of ambitious teaching, we constrain the issues that are addressed during the coach–teacher conversations to a subset of 19 challenges shown in Figure 1.1. By asking teachers to identify the specific challenges with which they are struggling, we argue, coaches ensure that coach–teacher conversations will be devoted to issues that are at the heart of what matters most in achieving a rigorous and equitable learning environment.

Figure 1.1 • Teacher challenges associated with each of the 5 Practices

TEACHER CHALLENGE		DESCRIPTION
1. GOALS AND TASKS	(1) Identifying learning goals	Goal needs to focus on what students will learn as a result of engaging in the task, not on what students will do. Clarity on goals sets the stage for everything else!
	(2) Identifying a doing-mathematics task	While doing-mathematics tasks provide the greatest opportunities for student learning, they are not readily available in some textbooks. Teachers may need to adapt an existing task, find a task in another resource, or create a task.
	(3) Ensuring alignment between task and goals	Even with learning goals specified, teachers may select a task that does not allow students to make progress on those particular goals.
	(4) Launching a task to ensure student access	Teachers need to provide access to the context and the mathematics in the launch but not so much that the mathematical demands are reduced and key ideas are given away.
2. ANTICIPATING	(5) Moving beyond the way <i>you</i> solve a problem	Teachers often feel limited by their own experience. They know how to solve a task but may not have access to the array of strategies that students are likely to use.
	(6) Being prepared to help students who cannot get started on a task	Teachers need to be prepared to provide support to students who do not know how to begin work on the task so that they can make progress without being told exactly what to do and how.
	(7) Creating questions that move students toward the mathematical goals	The questions teachers ask need to be driven by the mathematical goals of the lesson. The focus needs to be on ensuring that students understand the key mathematical ideas, not just on producing a solution to the task.
3. MONITORING	(8) Trying to understand what students are thinking	Students do not always articulate their thinking clearly. It can be quite demanding for teachers, in the moment, to figure out what a student means or is trying to say. This requires teachers to listen carefully to what students are saying and to ask questions that help them better explain what they are thinking.
	(9) Keeping track of group progress—which groups you visited and what you left them to work on	As teachers are running from group to group, providing support, they need to be able to keep track of what each group is doing and what they left students to work on. Also, it is important for a teacher to return to a group in order to determine whether the advancing question given to them helped them make progress.
	(10) Involving all members of a group	All individuals in the group need to be challenged to answer assessing and advancing questions. For individuals to benefit from the thinking of their peers, they need to be held accountable for listening to and adding on, repeating and summarizing what others are saying.
4. SELECTING AND SEQUENCING	(11) Selecting only solutions that are most relevant to learning goals	Teachers need to select a limited number of solutions that will help achieve the mathematical goals of the lesson. Sharing solutions that are not directly relevant can take a discussion off track, and sharing too many solutions (even if they are relevant) can lead to student disengagement.
	(12) Expanding beyond the usual student presenters	Teachers often select students who are articulate and on whom they can count for a coherent explanation. Teachers need to look for opportunities to position each and every student as a presenter and help students develop their ability to explain their thinking.
	(13) Deciding what work to share when the majority of students were not able to solve the task and your initial goal no longer seems obtainable	Teachers may on occasion find that the task was too challenging for most students and that they were not able to engage as intended. This situation requires the teacher to modify her initial plan and determine how to focus the discussion so students can make progress.
	(14) Moving forward when a key strategy is not produced by students	In planning the lesson, a teacher may determine that a particular strategy is critical to accomplishing the lesson goals. If the success of a lesson hinges on the availability of a particular strategy, then the teacher needs to be prepared to introduce the strategy through some means.
	(15) Determining how to sequence incorrect and/or incomplete solutions	Teachers often choose not to share work that is not complete and correct for fear that students will remember incorrect methods. Sharing solutions that highlight key errors in a domain can provide all students with an opportunity to analyze why a particular approach does not work. Sharing incomplete or partial solutions can provide all students with the opportunity to consider how such work can be connected to more robust solutions.

TEACHER CHALLENGE		DESCRIPTION
5. CONNECTING	(16) Keeping the entire class engaged and accountable during individual presentations	Often, the sharing of solutions turns into a show and tell or a dialogue between the teacher and the presenter. The rest of the class needs to be held accountable for understanding and making sense of the solutions that are presented.
	(17) Ensuring key mathematical ideas are made public and remain the focus	It is possible to have students share and discuss a lot of interesting solutions and never get to the point of the lesson. It is critical that the key mathematical ideas that are being targeted in the lesson are explicitly discussed.
	(18) Making sure that you do not take over the discussion and do the explaining	As students are presenting their solutions, the teacher needs to ask questions that engage the presenters and the rest of the class in explaining and making sense of the solutions. There is a temptation for the teacher to take over and tell the students what they need to know. When this happens, opportunities for learning are diminished. Remember whoever is doing the talking is doing the thinking!
	(19) Running out of time	Teachers may not have enough time to conduct the whole class discussion the way they had planned it. In such cases it is important to come up with a Plan B that provides some closure to the lesson but does not turn into telling.

Source: From *The 5 Practices in Practice: Successfully Orchestrating Mathematics Discussions in Your Middle School Classroom* by M. S. Smith and M. G. Sherin, 2019, Corwin. Note that, in their work on *5 Practices in Practice*, the authors found the identification of challenges to be most meaningful when they considered *Selecting* and *Sequencing* practices together.

Second, the challenges explicate what is entailed in doing each practice well. For example, as shown in Figure 1.1, the practices of *Selecting and Sequencing* are further specified by five challenges, starting with “*Selecting only solutions that are most relevant to learning goals.*” Although this challenge often receives primary consideration in coach–teacher conversations, the subsequent challenges identify an array of additional features that must be attended to if the practice is to be done well. The challenge of “*Expanding beyond the usual student presenters*” keeps equity issues on teachers’ and coaches’ radar screens while working on this practice. Attending to the challenge “*Moving forward with the lesson when a key strategy is not produced by students*” further unpacks this practice to include being prepared to introduce the key strategy through some means.

Third, when coaches use the challenges with the 5 practices to guide their work with teachers, they provide learning opportunities for teachers paralleling the learning opportunities that cognitively challenging tasks provide for students. We conceptualize the effort that teachers expend when working on challenges regarding the 5 Practices as a process similar to the effort students expend when they work on challenging tasks in the classroom (Yurekli & Stein, in press). As a key element of ambitious teaching, engaging students with challenging tasks is necessary for the development of meaningful learning because it provides students with opportunities to struggle with important mathematical ideas and relationships (Hiebert & Grouws, 2007).

In terms of teacher learning, we argue that engaging teachers in their own instructional challenges is a process necessary to improve their learning. Coach–teacher conversations create more opportunities to learn when teachers question and reflect critically on their practices rather than just discussing *what* to do next (Witherspoon et al., 2021). In our coaching model, we aim to engage teachers in specific challenges that teachers must reason their way through as they make sense of what they should do to resolve them. Coaches who implemented our model have stated the advantages of focusing on challenges:

You can ask a teacher, “What do you find challenging about teaching mathematics?” It’s almost like they don’t know what they don’t know . . . I feel like the teacher challenges [associated with the 5 practices] opened the door. I absolutely loved that because it gave me some insight into what the teachers saw as a challenge. (Coach Drew)

So sometimes you ask teachers, “What is it you want to work on?” And you get broad amorphous answers. You might even have a teacher say, “I want to work on the debrief.” I love that in those [teacher] challenges, though, we’re really fine-tuning from the start. We’re picking a thread from the debrief. “What about that is challenging?” (Coach Shawn)

I think that the most helpful part for me was focusing on the teacher challenges . . . It just helped us to get a lot more specific. Because previously, it was like, “Well, this is happening and I don’t really know how to tell you how to fix it. I can show you. I can do a model lesson in your room of me doing it.” But the teacher challenges [associated with the 5 practices] was just super helpful to kind of lay that out and make it very specific feedback for them. (Coach Avery)

As illustrated in the above quotations, using challenges to organize your work can bring a deeper level of specificity to your interactions with teachers. Although there may be some value in discussing challenges in general (e.g., in Professional Learning Communities), our model calls for surfacing and addressing challenges within one-on-one coaching conversations that we believe are a more powerful catalyst for teacher learning.

Organization and Content

In subsequent chapters, we will dive into the details of coaching conversations and describe the specifics of our coaching model. In Chapter 2, we will introduce a routine that guides coach–teacher conversations while planning for and reflecting on a lesson. In Chapters 3 through 5, we will provide details regarding the activities in which coaches and teachers engage and the tools and guides that support their work—with an emphasis on the importance of preparation for coaching activities. We conclude the book with Chapter 6, which summarizes the key features of our coaching model that differentiate it from others and provides guidance on how to begin implementing our model (e.g., what you need to explain to the teacher before the coaching starts, how to plan the timing of a cycle, how often you should engage in a cycle with a teacher). We also interweave in these chapters the voices of our coaches who speak from their experiences in using the model.

Throughout the book, you will find examples that illustrate coaching the 5 practices. Most examples are based on the data and artifacts (e.g., tasks, lesson plans, coaching conversations) we collected from a group of eight coaches and the 16 teachers with whom they worked during the 2021–2022 school year. Each coach and teacher has been given a pseudonym. Coaches will be distinguished from teachers by the inclusion of title “Coach” in front of their first names (e.g., Coach Avery). The coaches and teachers worked in different contexts (urban, suburban, and rural), grade levels (3–8), and geographic regions in the United States (East, South, West, Mid-West). Although the examples are drawn from elementary and middle school contexts, the ideas represented in these examples transcend grade levels. The examples highlight what coaches did in their efforts to support teachers who were trying to improve the quality of discussions in their classrooms and how teachers responded to their efforts. The examples are not intended to be exemplars to be copied but opportunities for analysis, reflection, discussion, and learning.

Across the chapters, you will have the opportunity to actively engage in three types of activities: *Stop and Consider* questions (reflection), *Analyzing Coaching* (analysis), and *Putting into Practice* (implementation). The Stop and Consider questions give you the opportunity to think about what a coach should do in a particular situation. Analyzing Coaching activities engage you in examining aspects of a coach’s planning for and enactment of coach–teacher conversations. Putting into Practice provides you with the opportunity to try out the ideas, tools, and guides discussed in a chapter into your own coaching practice.

As you engage in these activities, we encourage you to keep a journal to write down your responses to questions that are posed and make note of questions that you have. You also may want to keep a record of your experiences in implementing the *Putting into Practice* recommendations. Such a journal can be helpful in reflecting from time to time on how your work and thinking about coaching is evolving and improving.



STOP AND CONSIDER

Imagine that you are coaching a sixth-grade teacher who decided to use the Max’s Dog Food task (Figure 1.2) as the basis for a lesson on fraction division.

- How would you prepare for a coach–teacher conversation to plan this lesson?
- What questions would you ask the teacher?
- What points would you hope to make?

Figure 1.2 • The Max’s Dog Food task

Dog food is sold in a $12\frac{1}{2}$ -pound bag. My dog, Max, eats a $\frac{3}{4}$ -pound serving every day. How many servings of dog food are in the bag?
Draw a picture, construct a number line, or make a table to explain your solution.

Source: Institute for Learning at the University of Pittsburgh (2016; as cited in Smith & Stein, 2018).

Getting Started

Before you begin to engage in the coaching model described in this book, you need to address several things. In the list that follows, we provide some thoughts about how to get started in your work.

1. If you are a first-time coach, if you are in a new school, or if there are new teachers with whom you will be working, you need to build trusting relationships with them. Teachers need to believe that you have a vested interest in their success and the success of their students and that you will do whatever you can to support them in their work. Although it is beyond the scope of this book to offer specific suggestions for how to go about building this trust, the following online resources can help you get started:
 - Learning Forward’s Tools for Learning Schools article “Teacher-coach relationships” by Joellen Killion, Cindy Harrison, Chris Bryan, and Heather Clifton: <https://bit.ly/48to3hd>
 - Knowles Teacher Initiative’s Kaleidoscope article “Building Relationships as an Instructional Coach” <https://bit.ly/3uISO3E>
 - ASCD’s article “How Good Coaches Build Alliance with Teachers” <https://bit.ly/3wsr580>
2. If the teachers you are coaching are not familiar with the 5 practices for orchestrating productive mathematics discussion, you might consider creating an opportunity for teachers to learn about them. As we suggested in the Preface, you might organize a book club (either face-to-face or virtually) around the *5 Practices* (Smith & Stein, 2018) to give teachers the opportunity to learn about and begin to implement the 5 practices and identify challenges they face in doing this work. Alternatively, you might host a few sessions in which you introduce the 5 practices and engage teachers in some activities from the *5 Practices in Practice* series (e.g., Smith & Sherin, 2019). Teachers could then engage in analyzing instruction, which might spark interest in implementing the 5 practices.
3. Carefully consider who you might coach. Which teachers seem most open to new learning, collaboration, and reflection? What about the teachers who are resistant to coaching? In *Moments in Mathematics Coaching*, Woleck (2010) provides some guidance for making these decisions and advice on how to engage all teachers in opportunities to learn.

As you continue to read this book, we encourage you to think about how you can use the coaching model in your work and, if you are currently working with teachers, who might be willing to engage in this process with you. We will provide additional details on implementing the model (e.g., the amount of time involved in and frequency of a cycle, the importance of video recording a lesson) in Chapter 6, once you have the whole picture of what is involved in the model.