Content-Focused Coaching Practices Implicated in Designing Potentially Productive Coaching Activities to Support Teachers’ Learning

Lynsey K. Gibbons
115 Miller, Box 353600
University of Washington
Seattle, WA 98195-3600
Phone: 206-221-9220
Fax: 206-543-1237
Email: lgibbons@uw.edu

Biographical Statement:
Lynsey Gibbons is a research associate in mathematics education at the University of Washington. Her research seeks to understand how the contexts in which teachers work can be reorganized to support their ongoing learning and development, and how instructional leaders’ and professional educators’ practices support teachers’ development of high-quality mathematics instruction.

Paul Cobb
Email: paul.cobb@vanderbilt.edu
Phone: 615-343-1492

Biographical Statement:
Paul Cobb is Professor of Mathematics Education at Vanderbilt University. His research focuses on improving the quality of mathematics teaching and thus student learning on a large scale, and on issues of equity in students’ access to significant mathematical ideas.
Abstract

Many districts are using content-focused coaching as a strategy to provide job-embedded support to teachers. However, the current coaching literature provides little guidance on what coaches need to know and be able to do to engage teachers in activities that will support their development of ambitious instructional practices. Furthermore, little is known about how and why effective coaches choose to design particular types of activities with certain teachers. In this article, we report an exploratory case study that examined a mathematics coach who, working with teachers in their classrooms, had consistently engaged them in coaching activities that had the potential to support their development. We describe five aspects of the coach’s practice, and the knowledge implicated in those practices, that were apparent in her design of coaching activities. The findings clarify goals for coaches’ professional learning, and therefore have implications for school and district coaching policies.
Many district reform initiatives include content-focused coaching as a primary form of job-embedded professional development, enabling teachers to work with a colleague who has already developed high-quality instructional practices (Coburn & Russell, 2008; Poglinco, Bach, Hovde, Rosenblum, Saunders & Supovitz, 2003; Neufeld & Roper, 2003; Darling-Hammond, Wei, Andree, Richardson & Orphanos, 2009; West & Staub, 2003). A growing body of evidence indicates that teachers’ engagement with colleagues who are more accomplished in activities directly relevant to their instructional practices can support their development of ambitious instructional practices (Coburn & Russell, 2008; Elmore, 1996; Frank, Zhao, & Borman, 2004; Louis, Marks, & Kruse, 1996; Penuel, Riel, Krause & Frank, 2009; Newmann, King, & Young, 2000). Ideally, content-focused coaches scaffold teachers’ development of high-quality instructional practices in a particular disciplinary area by engaging them in activities that focus on key disciplinary ideas, how students learn those ideas, and pedagogical principles to support students’ learning (Coburn & Russell, 2008). However, very few studies have examined what coaches should do and what they need to know to support teachers’ learning. In this analysis, we examine one aspect of coaches’ work: how coaches design activities to support individual teachers’ learning. We report an exploratory case that focuses on how an accomplished middle school mathematics coach designed coaching activities for individual teachers. This coach consistently engaged teachers in activities that were likely to support their development of ambitious instructional practices. In describing our findings, we report on five aspects of coach planning practices and the knowledge implicated in those practices. We hypothesize that the identified practices have implications across disciplines and grade levels for coaching that aims to support teachers’ development of ambitious instructional practices.

Ambitious Instruction

Because we are concerned with coaches supporting teachers’ development of ambitious instructional practices, we delineate an empirically grounded vision of high-quality instruction that constitutes the goal for teachers’ learning. Decisions about what counts as high quality teaching must be justified in relation to goals for student learning (Hiebert & Grouws, 2007). Over the past two decades, a number of prominent professional organizations have proposed ambitious goals for student learning across the disciplines of mathematics, science, and English language arts (e.g., Common Core State Standards Initiative for English Language Arts and for Mathematics, 2010; National Council of Teachers of Mathematics [NCTM], 1989, 2000; NGSS Lead States, 2013).

In mathematics, for example, these goals for students’ learning emphasize both conceptual understanding and procedural fluency in a range of mathematical domains, using multiple representations, making mathematical arguments to communicate mathematical ideas effectively, and developing productive dispositions towards mathematics (US Department of Education, 2008; Kilpatrick, Swafford & Findell, 2001; NCTM, 2000). These goals are demanding and have implications for appropriate forms of instruction that are justified in terms of student learning opportunities (Kazemi, Franke, Lampert, 2009). The resulting view of high-quality instruction has been referred to as ambitious teaching (Lampert & Graziani, 2009).

Ambitious teaching requires that teachers build on students’ reasoning as students solve challenging tasks while holding them accountable to learning goals (Kazemi et al., 2009). Recent research in mathematics, science, and literacy has begun to delineate a set of instructional practices that support students’ achievement of ambitious learning goals (Franke, Kazemi & Battey, 2007; NCTM, 2000; NRP, 2000; NGSS Lead States, 2013). In mathematics education, these instructional practices include launching challenging tasks so that all students can engage
substantially without reducing the cognitive demand of those tasks (Jackson, Garrison, Wilson, Gibbons, & Shahan, 2013; Stein, Smith, Henningsen, & Silver, 2000), monitoring the range of solutions that students produce as they work on tasks individually or in small groups (Horn, 2012; Lampert, 2001), and building on these solutions during a concluding whole-class discussion by pressing students to justify their reasoning and to make connections between their own and others’ solutions (Chapin, O’Conner, & Anderson, 2003; Smith, Bill, & Hughes, 2008; Staples, 2007; Stein, et al., 2000).

These instructional practices differ significantly from the current practices of most U.S. teachers and require that teachers reorganize rather than merely adjust or elaborate their current practices (Snow-Renner & Lauer, 2005). Teachers’ development of these instructional practices often requires significant learning that involves revising deeply held beliefs, knowledge, and routines (Stein, Smith, & Silver, 1999; Thompson & Zeuli, 1999). Substantial support is therefore required, and content-focused coaching has become an increasingly common way of providing such support. In the next section, we examine the types of coaching activities that have the potential to support teachers’ development of ambitious instructional practices.

**Content-Focused Coaching**

While there are many forms of coaching, we are concerned here with content-focused coaching, where coaches a) are more knowledgeable partners who have developed relatively accomplished instructional practices (Neufeld & Roper, 2003; Poglinco, et al., 2003; West & Staub, 2003) and b) aim to support teachers’ development of ambitious instructional practices in a particular discipline. Prior studies examining content-focused coaching have analyzed the conditions under which content-focused coaching can support teachers’ learning (cf. Coburn & Russell, 2008; Gibbons, Garrison, & Cobb, 2011; Mangin, 2007; Matsumura, Sartoris, Bickel, & Garnier, 2009). Prior research has also investigated whether content-focused coaching supports teachers’ development of specific instructional strategies (Campbell & Malkus, 2011; Cantrell & Hughes, 2008; Matsumura, Garnier, & Resnick, 2010; Ross, 1992; Sailors & Price, 2010; Van Keer & Verhaeghe, 2005). However, the findings of both sets of studies are mixed. A primary reason for this might be that the amount of coaching that teachers receive and the types of coaching activities in which they engage frequently vary significantly across schools (Bean, Draper, Hall, Vandermolen, & Zigmond 2010; Coburn & Russell, 2008; Matsumura, Sartoris, Bickel, & Garnier, 2009; Rainville & Jones, 2008). As a consequence, unanswered questions remain about what specifically coaches should do with teachers, and therefore what coaches need to know and be able to do to support teachers’ development of ambitious instructional practices.

**Potentially Productive Coaching Activities**

The goal of the analysis that we report was to understand how content-focused coaches can design coaching activities that have the potential to support teachers’ development of ambitious instructional practices. In order develop criteria for selecting an appropriate case in which to address this issue, we first examined the existing coaching literature in an attempt to identify types of coaching activities have the potential to support teachers’ development of ambitious instructional practices. Often when coaches begin working in a school, their initial aim is to build trust and cultivate productive relationships with teachers, who tend to be accustomed to working in isolation (Killion, 2008). Therefore, they may act to increase their perceived value to teachers by engaging in the following activities: providing resources, testing students, finding websites for student use, or sharing professional publications (Bean, et al., 2010; Killion, 2008). Although such activities do have value in forging relationships, they often stop at surface level routines and do not engender rich conversations about central aspects of instruction.
A number of studies have examined how coaches work with teachers (e.g., modeling instruction, or observing teachers’ instruction and providing feedback) (Bean et al., 2010; Deussen et al., 2007; Neufeld & Roper, 2003; Poglinco et al., 2003). However, these studies rarely justify particular types of coaching activities in terms of the learning opportunities provided to teachers. We therefore relied primarily on a prior analysis we conducted in which we drew on the teacher learning and professional development literatures to identify coaching activities that have the potential to support teachers’ development of ambitious instructional practices (Author, 2012). These literatures can inform coaching because a significant number of these studies examine a more knowledgeable other working with teachers to support their development of ambitious instructional practices. In that analysis, we used characteristics of effective professional development as analytic criteria for identifying potentially productive coaching activities. We then reviewed studies in which the analysis included a description of the professional development activities and specified what teachers had the opportunity to learn as they engaged in the activities. In doing so, we identified three potentially productive coaching activities intended to be enacted one-on-one with teachers in their classrooms: 1) co-teaching, 2) modeling, and 3) debriefing the challenges of implementation. We discuss each in turn in the following paragraphs.

In co-teaching, the coach partners with a teacher in an authentic instructional situation (Roth & McRobbie, 1999). Eick and colleagues examined how co-teaching with an experienced teacher influenced the knowledge and instructional practices of ten novice secondary science teachers over an eight-week period (Eick & Dias, 2005; Eick, Ware, & Williams, 2003). They found that the mentor’s co-teaching interventions and the in-depth verbal and written feedback provided after the lesson scaffolded the novice teachers’ understanding of how to support student learning. Co-teaching is a potentially productive activity because it enables coaches to influence teachers’ instructional practices in action by making moves that influence the course of the lesson and by providing suggestions that teachers can act on during the lesson (West & Cameron, 2013).

There is evidence that observing a more accomplished colleague as he or she models particular instructional practices can also be productive. One of the benefits of modeling instruction in teachers’ own classrooms when compared with viewing classroom video-recordings is that it allows teachers to see the type of disciplinary thinking that their students are capable of. Several studies have examined teacher educators modeling aspects of ambitious instruction for pre-service and novice teachers (e.g., Bronkhorst, Meijer, Koster, & Vermunt, 2011; Loughran & Berry, 2005; Lundenberg, Korthagen, & Swennen, 2007). For example, Feiman-Nemser (2001) examined how an accomplished teacher’s mentoring practices, including modeling, supported eight novice elementary teachers in a two-year induction program. The mentor hoped that, through his modeling, the novices would begin to identify characteristics of good teaching. To cultivate the teachers’ awareness of his choices, he often paused during the lesson to highlight key aspects of his instructional practice and to explain what he was doing and why. After the lesson, the mentor asked the beginning teachers to interpret what they saw. Unfortunately, Feiman-Nemser did not ask the beginning teachers what they learned from observing the mentor teacher. Nonetheless, the findings suggest that modeling might be a potentially productive as it can support teachers’ development of an image of what the accomplished enactment of particular instructional practices looks like (Feiman-Nemser, 2001; West & Staub, 2003). It might therefore be a particularly appropriate coaching activity for teachers who are beginning to develop a particular instructional practice.
The third potentially productive coaching activity that we identified is classroom observation followed by a debriefing on challenges of implementation. Typically, in this activity, coaches observe and take notes on how aspects of the lesson are playing out. Sociocultural learning theorists describe learning as a process of moving from assisted performance to unassisted performance (Brown, Stein, & Forman, 1996; Lave & Wenger, 1991; Tharp & Gallimore, 1988). Observing and debriefing is an important support for this transition as coaches can engage teachers in post-observation dialogues in which they focus on issues that impact students’ learning and collectively generating solutions to problems of teaching practice (Roth & Tobin, 2001; Scantlebury, Gallo-Fox, & Wassell, 2008). In general, the professional development and teacher education literature indicates that observation and debriefing with a more knowledgeable other can support teachers’ in improving their enactment of particular instructional practices (Garet, Porter, Desimone, Biram, & Yoon, 2001; Grossman et al., 2009; Putnam & Borko, 2000).

**Identifying Coaching Practices**

In the remainder of this article, we report an analysis of the planning practices of a middle-grades mathematics coach who consistently engaged teachers in potentially productive types of coaching activities when she worked with them individually in their classrooms. We use the term coach planning practices to refer to the coordinated actions of the coach as she designed coaching activities in which to engage particular teachers (cf. Lampert, 2009). Our goal in conducting this analysis was to identify the specialized coach planning practices that underpin relatively accomplished coaching. Although the analysis focuses on supporting mathematics teachers, we contend that the findings have implications for content-focused coaching in other subject matter areas when the goal is to support teachers’ development of ambitious instructional practices.

**Methods**

The case study that we report examines a mathematics coach’s work with seven middle grades mathematics teachers over a four-year period. The data for this analysis came from a larger study that investigated what it takes to support mathematics teachers’ development of ambitious and equitable instructional practices on a large scale (Author, 2011). We first provide background information on the collaborating school district and then describe the selection of the focal coach before detailing the methods used to document and analyze the coach’s planning practices.

**Background: The Collaborating District**

The focal coach was a middle school mathematics coach in a large urban district (District B) and worked with grade 6-8 teachers. During the 2007-2008 school year, District B implemented an inquiry-oriented curriculum for middle-school mathematics, Connected Mathematics Project 2 (CMP2), that aims at ambitious goals for students’ learning. The district began implementing a school-based, content-focused coaching design during the prior year to support teachers in using this curriculum effectively. In this design, a mathematics coach in each middle school taught for half of the school day and coached for the other half. One of the primary goals for the coaches’ work described by district leaders was to provide one-on-one instructional support to their colleagues in their classrooms. The district contracted with curriculum publishers to provide sustained professional development for the teachers who were selected to become coaches. The intent of this professional development was to support the coaches in developing both an overview of the curriculum and an understanding of what a high-quality implementation looks like. In preparation for working with teachers, district leaders also
provided the coaches with training on how to engage in instructional conversations with teachers, including asking questions designed to help teachers reflect on their instructional practices. The coaches were also encouraged to seek advice from the district mathematics specialists whenever questions related to the curriculum or supporting teachers arose.

**Participating Schools**

The researcher team that conduct the larger study consulted with District B leaders to select a sample of seven middle schools that would be representative of district schools in terms of their capacity for instructional improvement. The participants in each school comprised approximately five randomly selected mathematics teachers, the principal, the assistant principal responsible for monitoring mathematics instruction, and the school-based mathematics coach. The initial analysis conducted to select the focal coach drew on interviews with teachers and coaches across the seven schools.

**Data for Case Selection**

We drew on audio-recordings of the interviews conducted with the seven coaches and the 28 participating mathematics teachers in the second year of the study to determine which of the coaches engaged teachers in potentially productive coaching activities (Author, 2012). The coach interviews lasted approximately 60 minutes and the teacher interviews approximately 45 minutes. One purpose of the coach interviews was to document the types of activities in which coaches engaged teachers when working with them individually in their classrooms. In addition to describing general types of activities, coaches were asked to provide recent examples of specific activities in which they engaged teachers. In the teacher interviews, we asked teachers about the types of activities in which they had engaged with their coach in general, and about what they had learned as a result. Additionally, we asked teachers to describe their interactions with the coach during a recent activity. These interview data do not allow us to document how the activities were enacted and thus to assess the learning opportunities that might have arisen for teachers. However, the teachers’ accounts of what they learned as a result of engaging in the activities do give us some insight into the quality of the enactments.

**Analysis for Case Selection**

The first author used NVIVO software to code transcripts of the interviews conducted with the seven coaches and 28 teachers for the types of activities in which each of the coaches engaged individual teachers. We coded for co-teaching, modeling, observing instruction and debriefing challenges of implementation, as well as for additional activities such as providing resources, being an extra set of hands in classroom, tutoring or testing students, and sharing resources (e.g., manipulatives, websites for students, or professional publications). The coding process was open so that additional types of activities could be added based on participants’ responses.

To assess how each coach was supporting teachers, we developed analytic memos for each school where we recorded the types of activities in which the coach engaged each teacher, how frequently they engaged in each type of activity, the focus of their interactions, and the extent to which the activities were likely to support the development of ambitious teaching practices. In writing these memos, we triangulated the teachers’ and the coaches’ accounts of the activities to ensure that we did not privilege any one participant’s account. For each school, we noted when both coach and teacher accounts were consistent in describing the coaching activities in which each engaged. When only a teacher mentioned a coaching activity, we looked to see if other teachers mentioned engaging in the same activity with the coach. If other teachers gave accounts for engaging in similar activities, we counted the activity as something the coach
engaged in with teachers. If an activity was mentioned by only one teacher or by only the coach within a school, we did not take this activity into account when selecting cases. We did not find any conflicts in the activities reported by the coaches and teachers.

Case Selection Findings

We found considerable variation in the extent to which the seven coaches worked with teachers and in the types of activities in which they engaged. This finding is consistent with prior studies that reported significant variation in the implementation of coaching designs (Coburn & Russell, 2008; Matsumura, et al., 2009). Three of the coaches did not work consistently with individual teachers. One of these coaches was recruited by her principal to teach full-time, a second was repeatedly absent due to poor health, and the third was new to the school and reported that she had yet to establish relationships with teachers that would enable her to work with them productively. Two of the remaining four coaches worked primarily with groups of teachers during department and grade-level meetings, rather than with individual teachers. We note in passing that the activities in which teachers engaged during these meetings did not include the types of activities that we had previously identified as potentially productive in supporting the development of ambitious instructional practices (Author, 2012).

A sixth coach worked routinely with teachers in their classrooms but focused primarily on classroom management. She explained that all the mathematics teachers at her school were in their first year of teaching and needed this type of support before they could move on to more substantial conversations about key aspects of ambitious mathematics instruction such as questioning techniques. Although classroom management is an important aspect of effective teaching, in our assessment, an almost exclusive emphasis on this aspect of instruction is unlikely to support teacher development of ambitious instructional practices.

The final coach, whom we call Alice, worked regularly with individual teachers and engaged them in a range of activities that included the activities that we had previously determined were likely to support the teachers’ development of ambitious instructional practices: co-teaching, modeling, observing and debriefing. We therefore selected Alice to serve as the focal teacher for our study because investigating how she designed activities in which to engage teachers would enable us to clarify productive coach planning practices.

Prior to becoming a part-time coach in the 2006-2007 school year, Alice had taught middle school mathematics for 10 years at the same school where she was assigned to coach. For the first three years of the study, Alice taught 8th grade half-time and coached half-time. In the fourth year of the study, when external funds became available, she became a full-time coach. The middle school served approximately 500 grade 6-8 students. Approximately 95% of students were Latino, 20% were classified as English Language Learners, 10% received special education services, and 95% received free or reduced-price lunch. There were 7 mathematics teachers who participated in the study over four years, 5 of whom participated in the larger study for 4 consecutive years. Their teaching experience ranged from 2 to 12 years with an average of 5.6 years (calculated during the 2nd year of the larger study). None the 7 mathematics teachers had a degree in mathematics and none had more than 12 credit hours of mathematics and/or mathematics methods courses.

Data for the Analysis of the Focal Coach’s Knowledge and Practices

We analyzed 20 transcribed interviews conducted with the participating teachers each January for 4 years (2008-2011; approximately 45 minutes in length), and 4 audio-recorded interviews conducted with the coach each January for 4 years (2008-2011; approximately 60 minutes in length) to solidify our understand the types of activities in which the coach engaged
individual teachers, and the teachers’ assessments of what they learned as a result. We assessed the coach’s expertise as a mathematics teacher by drawing on video-recordings of two lessons she taught during the second and third years of the larger study. Below, we describe how these data were analyzed.

In addition, we assessed her vision of high-quality mathematics instruction that oriented her design of activities in which to engage teachers by asking her: “If you were asked to go into a teacher’s classroom for one or more lessons, what would you look for to see if the instruction was of high quality? What would the teacher be doing? Please describe what classroom discussion would look and sound like if instruction were of high quality.” We also assessed her view of the mathematical capabilities of students in the school by asking, “What are the most important challenges of teaching mathematics in your school?” and whether she considered the inquiry-oriented curriculum to be appropriate for all students.

In December 2011 and in March 2012 (Year 5, after the completion of the larger study), we conducted two additional follow-up interviews with the coach (each lasting approximately 30 minutes). We asked her to describe and give examples of her goals for teachers’ learning, whether she worked with all teachers in the same way, and how she made decisions about how to work with particular teachers. When she mentioned specific coaching activities, we asked her to elaborate on what she believed teachers would learn as a result of engaging in the activity.

**Analysis of the Focal Coach’s Knowledge and Practices**

The first author coded the annual teacher interviews (20 total, across years 1-4 of the study) and the annual coach interviews (4 total). While coding, we further clarified the extent to which the focal coach engaged teachers in potentially productive activities across the four years of the study, and to whether the types of activities changed during these four years. We amended the previous analytic memo (used in selecting the case) and recorded additional activities in which the coach and teachers engaged, and the potential of the activities to support the teachers’ development.

To assess the focal coach’s expertise as a mathematics teacher, we relied on video-recordings of four mathematics lessons conducted in years 2 and 3 that were coded as part of the larger study using an instrument consistent with ambitious instruction, the **Instructional Quality Assessment** (IQA) (Boston, 2012). The IQA comprises eight rubrics that assess the cognitive demand of the instructional tasks selected for the lesson, the extent to which the level of cognitive demand is maintained through successive phases of a lesson, and the overall quality of classroom discourse (Stein, et al., 2000). Coders were trained to use the rubrics and achieved 80% reliability before they were allowed to code. Ongoing coding reliability was assessed by double-coding 20% of the video-recorded lessons.

The transcripts of the additional two interviews conducted with the coach in year 5 were analyzed to document: (a) the coach’s vision of high-quality mathematics instruction (coded using the rubrics developed by Munter (2014) for assessing the sophistication of teachers’ and others’ instructional visions), (b) the coach’s goals for the teachers’ learning, and (c) the coach’s understanding of how particular types of activities might support the teachers’ development. The coding process was open to allow for additional insights into the coach’s practices.

**Findings**

In the course of the analysis, we identified five aspects of the focal coach’s planning practices that were implicated in her design of coaching activities: (a) identifying long-term goals for teachers’ development; (b) assessing teachers’ current instructional practices (c) locating teachers’ current instructional practices on general trajectories of teachers’ development;
(d) identifying next steps for teachers’ development, and (e) designing activities to support teachers’ learning. We also identified two aspects of coaching knowledge inherent in carrying out these planning practices, namely: (a) coach’s knowledge of ambitious mathematics instruction and (b) knowledge of general trajectories of teacher’s development of ambitious instructional practices. We first examine her classroom instructional practices because, as mentioned previously, there is broad agreement that content-focused coaches need to have developed relatively accomplished instructional practices. We will then look beyond her being an accomplished teacher and examine the five aspects of her coaching practice that were implicated in her design of activities in which to engage individual teachers.

Classroom Instructional Practices

The IQA scores for the four video-recorded lessons that Alice conducted indicate that she had developed relatively sophisticated inquiry-oriented instructional practices. The potential of the tasks she chose to implement were cognitively demanding (Academic Rigor Potential of the Task rubric, level 4) and asked students to engage in the disciplinary activities of explanation, justification, and generalization (Boston, 2012). Alice consistently maintained the high-level cognitive demands of tasks throughout the lessons (Academic Rigor Maintenance of the Task rubric, level 3). She was especially effective at leading a whole class discussion in which she supported multiple students in explaining and justifying their mathematical reasoning (Academic Rigor, Rigor of the Discussion, level 3; Accountable Talk Participation, level 3). She did so by pressing students to provide evidence for their contributions (Accountable Talk Teacher’s Press, level 3; Accountable Talk Students’ Providing, level 3). Crucially, Alice’s IQA scores were higher than all other participating teachers in her school, indicating that she was a more knowledgeable other with regard to ambitious instruction. Her relatively accomplished practices as a mathematics teacher grounded her practices as a coach. For example, when she co-taught with and modeled particular instructional practices for teachers, she was able to respond to students in ways that supported their learning and could steer lessons in productive directions, thereby enabling teachers to participate in or observe ambitious instruction.

Coaching Practice I: Identifying Long-Term Goals for Teachers’ Development

In the interviews conducted with Alice, she was asked to describe her goals for supporting teachers. In Year 2, she replied that “one of [my goals] is to help improve their mathematical content knowledge…and [another is] improving their delivery as far as the [new curriculum] program goes.” She consistently named these two long-term goals for teachers’ development each year she was interviewed.

Improving teachers’ mathematical content knowledge. Alice’s focus on teachers’ mathematical content knowledge reflected her concern that some teachers had a limited mathematics background and experience teaching mathematics. For example, Alice observed: “[One] teacher that just came to math this year; she had been teaching English for eight years and didn’t really know a lot of the math content” [Year 2]. As we have noted, none the seven mathematics teachers in Alice’s school had completed more than four higher education courses in mathematics or mathematics methods.

Improving teachers’ implementation of the curriculum. As noted above, the district had adopted CMP2 in the 2006-2007 school year, having previously used a more traditional textbook series. Alice’s efforts to support teachers in using this ambitious curriculum effectively were oriented by her image of what high-quality inquiry-oriented instruction looks like. We refer to this image as her instructional vision. A coach’s instructional vision encompasses her articulated view of aspects of classroom instruction that she considers important, together with a
rationale for each aspect (Munter, 2014). As the instructional vision that Alice articulated in the interviews remained remarkably stable across years, we synthesize these interviews into a single account.

**View of the role of the teacher.** Alice described the role of the teacher as “not being directive in front of the room,” but instead “being off to the side, facilitating.” According to Alice, the teacher should begin the lesson by leading students into the task through addressing key terms of the task and “activating students’ prior knowledge” while being careful not to reduce the level of cognitive demand by furnishing a solution method. She indicated that once the task has been introduced, students should work in groups while the teacher moves around the room in order to “probe and push on students’ thinking, without giving the mathematics away.” The teacher should then lead a whole class discussion during which (s)he encourages students to come to the board and explain their solutions. In this phase of the lesson, the teacher should ask questions that “sum up what was learned in the lesson.” Alice also explained that it is important for the teacher to assess students’ understanding during the discussion by “listening to their talk about the task.”

**View of the role of discourse.** Alice indicated that students should have opportunities to discuss mathematical ideas and to “voice out” their thinking. During the concluding whole class discussion, the teacher should ask groups of students to explain how they solved the task and press other students to “restate what the presenting student said in their own words” in order to “strengthen understanding,” because students “need opportunities to hear someone else’s way of working through a problem that they may not have thought of themselves.” She clarified that these discussions enable teachers to assess whether a student “truly understands” the mathematical ideas and thus determine whether it is necessary to go back and clarify some of the ideas. Furthermore, the teacher should “model how to have these interactions” by asking question such as, “Do you agree with what they said? Why do you agree with them?” In addition, the teacher should press students to clarify their reasoning so that other students can better understand how they solved tasks: “Say more,” “Tell me why you thought it was this way,” “Where did that 3 come from?”

We hypothesize that the forms of knowledge inherent in Alice’s identification of the first goal of improving teachers’ mathematical content knowledge included her relatively deep knowledge of mathematics for teaching across the middle grades, her knowledge of the mathematical ideas that could come to the fore when the new curriculum was used effectively, and her knowledge of students’ mathematical reasoning. The knowledge associated with the second goal of improving teachers’ implementation of the curriculum included her relatively sophisticated vision of ambitious mathematics instruction. Thus, Alice had not merely developed accomplished ambitious instructional practices, but could reflect on those practices and identify key aspects of her expertise that could then constituted goals for other teachers’ learning. This suggests that the development of ambitious instructional practices is necessary but not sufficient basis for accomplished coaching practices. It is also indicates the importance of coaches make their instructional practices objects of reflection and analysis.

**Coaching Practice II: Assessing Teachers’ Current Instructional Practices**

Alice reported that her specific goals for individual teacher’s learning were based on her “knowledge of [the] teachers and their strengths and weaknesses,” which she identified by “going in their rooms [and] watching them teach” [Year 2]. When she observed a teacher’s instruction, Alice reported looking for whether the teacher made any mathematical errors and how they dealt with students’ mistakes:
If I’m in a classroom and I’m observing, [I notice if] they are…or a child is…making a [mathematical] mistake and they’re not going back and correcting it or say[ing], ‘Oh, wait a minute here, we’ve got a mistake.’ [Year 2]

Alice went on to clarify that her intent in taking this focus was to assess the teacher’s current content knowledge, thereby informing her long-term goal of supporting the development of this knowledge.

Alice also reported that she also focused on whether “all students were able to work on the task” and had opportunities to “share their work with the whole class” [Year 4]. In addition, she assessed how the teacher supported students through “questioning strategies,” “talk moves,” and setting “clear expectations” [Year 5]. In focusing on these aspects of instruction, Alice was able to assess teachers’ current practices with respect to her long-term goal of improving their implementation of the curriculum. Furthermore, it is apparent that Alice’s sophisticated vision of ambitious instruction influenced her assessments of teachers’ current practices. For example, her instructional vision emphasized classroom discourse that supported students’ mathematical learning. This aspect of her vision oriented her assessment of teachers’ talk moves and questioning strategies.

It is important to note that what Alice noticed in her role as a coach when she observed classroom instruction differ from what an accomplished teacher might notice (Sherin, 2001). An accomplished teacher might focus on the forms of reasoning that students’ are developing in relation to the instruction in which they are participating (Horn & Little, 2010). When Alice observed a teacher’s instruction, she interpreted what was going on in the classroom with an eye toward supporting not merely students’ learning, but the learning of the teacher. Thus, in addition to focusing on what students were doing, Alice assessed the effectiveness of the teacher’s current practices in supporting students’ learning, while identifying problems of practice on which she could work with the teacher. The following excerpt, in which she described a debriefing conversation she had conducted with a seventh grade teacher after observing her instruction, is representative in this regard.

I had gone to observe, and during our post-conference, some questions [were] “How did you know this kid understood because they didn’t say a peep the whole time during class?” And then, “Did you notice this child over here was quick to respond to every single question without giving the other kids a chance to think?” [Year 5]

In this instance, Alice noticed that the teacher did not support all students in communicating their mathematical reasoning, inferred that the teacher was not aware of this limitation of her current practices, and framed it as a problem of practice on which to work with the teacher. Thus, Alice assessed teachers’ current instructional practices not merely in terms of student learning opportunities, but also in terms of potential teacher learning opportunities. In this regard, a professional vision for coaching builds on but is distinct from what Sherin and Han (2004) termed a professional vision for teaching.

**Coaching Practice III: Locating Teachers’ Current Instructional Practices on Developmental Trajectories for Teachers’ Learning**

Alice’s identification of potential teacher learning opportunities was informed by her knowledge of general trajectories for teachers’ development. This form of knowledge would appear to be specific to coaching, and serves to further differentiate accomplished coaching from just good teaching. The developmental trajectories that Alice had delineated were grounded in her understanding of the teachers’ practices when they used the prior traditional curriculum, and of the learning demands inherent in reorganizing those practices. We call these general
Trajectories because her identification of specific learning goals for individual teachers’ learning (coaching practice IV) was informed by her assessment of their current instructional practices (coaching practice II).

**Teachers’ prior instructional practices.** Alice explained that the new curriculum series differed significantly from the instructional materials that the teachers had used previously:

[The new curriculum] is a very different resource than what a lot of the teachers are used to in the past. With a regular textbook, they followed a Madeline Hunter-type style. [That style was] here’s the notes; let’s practice them together; now you do some on your own and here’s your homework. And they were very used to that before we got the [new curriculum]. With [the new curriculum], it’s more of, we launch [tasks], let’s talk about it a bit, you go try it, let’s come together as a whole group. [Year 5]

Alice characterized the teachers’ prior instructional practices as “stand and deliver” with “lecturing, doing some guided practice, and then letting students practice on their own,” rather than letting the students “discover the math” [Year 5]. She also indicated that when teachers first attempted to use CMP2 and saw students struggling, they wanted to offer a “quick fix” rather than letting students “wade through” challenges. She attributed this to teachers’ views of their students’ mathematical capabilities: “I think the teachers need to set their expectations higher, because they are so quick when a student struggles to bring the [level of] rigor down. And sometimes they bring it down too low for the students” [Year 5]. In addition to making these general observations that took account of the teachers’ professional histories, Alice differentiated between the learning demands for new and for veteran teachers.

**Learning Demands for New and Veteran Teachers.** Alice explained that new teachers “typically struggle with the pacing of [the phases of] the [CMP2] lesson” [Year 5]. She typically focused on pacing with new teachers initially because she had observed that they often did not leave sufficient time for a whole class discussion. Alice indicated that when a new teacher was able to pace the phases of lessons adequately, she next supported their development of questioning strategies that would “deepen students’ thinking.” She clarified that the questions that new teachers initially ask often require only a “one-word” answers, such as, “What was the value you got for x?” Her intent was to support novice teachers to ask questions that “push kids’ thinking,” such as “Well, I didn’t see where you got that 3 from. Can you show me where it came from?” or, “Why did you do it this way instead of this way?” (Year 2).

As we have already indicated, veteran teachers had previously taught mathematics by demonstrating methods for solving particular types of tasks and then providing guided practice and answering individual students’ questions. Alice explained that, against this background, veteran teachers typically thought that they needed to “hold their [students’] hand through” CMP2 lessons [Year 5]. Effective use of the new curriculum required that teachers introduce cognitively demanding task and then support students’ exploration of the mathematics. Alice explained that veteran teachers were often uncomfortable with allowing students to explore the mathematical and often demonstrated procedure for solving tasks, thus lowering the level of mathematical rigor for students. Alice’s goal was to support these teachers in “activating [students’] prior knowledge” during the introductory launch so that they could begin to solve the task without the teacher guiding them each step of the way. Alice indicated that her subsequent goals for new and for veteran teachers’ learning “varied depending on their [individual] practices.”

**Coaching Practice IV: Identifying Immediate Goals for Individual Teacher’s Learning**
Alice identified problems of instructional practice that constituted immediate goals for individual teachers’ learning by locating her assessments of their current instructional practices on the general trajectories that she had delineated for teachers’ learning. Consider the example from a previous section in which Alice negotiated a problem of practice with a seventh grade teacher: supporting all students to communicate their mathematical reasoning. In the debriefing conversation that she conducted with the teacher after the observation, she pressed the teacher to consider whether all students understood the big mathematical ideas of the lesson. Alice and the teacher then determined that the teacher should focus on “get[ting] more kids involved in answering questions” [Year 5]. The teacher gave a similar account:

We were thinking about what types of questions I was asking them, and if it was just one person always answering, or… was it the whole class answering? And so it really helped me realize that it was one person usually answering questions. So to do it a different way, give ‘em a little more think time before one person is always shouting out. [Year 4]

This debriefing conversation focused on the content of questions as well as how to manage the discussion. The immediate goal that Alice identified for the teacher’s learning was informed by her general trajectory for new teachers’ learning (coaching practice III), which included supporting teachers’ improvement of questioning strategies. As a consequence, the short-term goals on which she focused on this and in other cases were steps toward supporting the teachers in using the new curriculum effectively. These immediate goals then oriented her decisions about the types of activities in which to engage individual teachers.

Coaching Practice V: Designing Activities to Support Teachers’ Learning

Alice had developed conjectures about how different types of activities could support teachers’ improvement of specific aspects of their instruction. In the following paragraphs, we focus on Alice’s rationales for these activities and draw on the teachers’ accounts of their participation in these activities to clarify the potential learning opportunities. The activities in which Alice engaged individual teachers were: modeling, co-teaching, and observing and debriefing (see Table 1).

Modeling. When asked what teachers might learn from watching her modeling instruction, Alice replied, “Hopefully…they would see differently the [way] of doing things in the classroom and they would change their practice… [It gives] teachers an example of how a strategy can be done within their own classroom, with their own students” [Year 5]. She then gave an example:

If a teacher was taking too long on a warm-up, if they were taking 20 to 30 minutes on one problem that was supposed to be a five-minute problem, I could model that for them and show them how to transition into the next part of the lesson. [Year 5]

Alice clarified that whenever she modeled instruction, she consulted with the teacher in advance to identify the lesson that she would model, and requested that the teacher focus on the specific aspects of instruction that reflected the immediate goals for that teachers’ learning. In orienting the teacher’s observations in this way, she increased the likelihood that their subsequent conversation would be productive (West & Cameron, 2013).

Most of the teachers (5 out of 7) reported that they had observed Alice model instruction in their classrooms multiple times over the course of the four years of the study. About half indicated that they had improved their understanding of how the successive phases of lessons should unfold. For example, an experienced eighth grade teacher gave the following reply when asked what he “got out of” observing Alice model instruction:
A more thorough understanding of, I guess, the focus, if you will, of CMP2. Basically, I would say [I learned about] how you would structure a class like that. Like I said before, I am used to being the one in charge of saying, ‘This is what we are going to do.’ She taught a very short lesson and the kids worked the rest of the time. If I had not seen that, I would still be up here talking to kids, you know, and giving them maybe 10 minutes at the end of the period to work on it. [Year 1]

As this teacher’s response indicates, developing an initial understanding of ambitious instruction was challenging for the teachers, given their prior instructional histories. In this case, modeling followed by a debriefing conversation proved useful because the teacher was able to appreciate the benefits of allowing the students to engage in the task much earlier in the lesson, and attempted to adjust his instruction accordingly.

In addition to helping teachers develop an image of ambitious instruction, Alice aimed to support their development of high expectations for their students. A sixth grade teacher recounted that at the beginning of her career she would “do a lot of the work and explanation for the students.” However, after watching Alice model instruction in her classroom, she realized that students were capable of doing the mathematics themselves:

[Now] I get the kids to come up and do the problem piece by piece and I'm not actually the one doing any of the work… I learned that slowly, but surely. Seeing [Alice] model that in my class, definitely helped me to realize – Oh okay, well, the kids can do the work. [Year 3]

In this and other cases, Alice challenged the teachers’ view of their students’ mathematical capabilities by demonstrating that the students could work through challenging mathematical tasks with limited guidance. In this example, Alice used modeling to show a teacher what her own students were capable of doing.

**Summary.** Alice characterized modeling as a way of supporting teachers in developing an image of high-quality instruction that aims at ambitious learning goals. It is important to note that modeling included an explicit discussion of what she did instructionally and why. One deeply held belief that Alice sought to challenge was that ambitious instruction is not feasible with their students. Challenging this belief is important, as ambitious instruction requires that teachers develop productive stances about what their students are able to do (see Coburn, 2003; Cobb, Zhao, & Dean, 2009; Jackson & Gibbons, 2014). The teachers’ accounts indicate that modeling supported them in understanding how to organize lessons in the new curriculum, in developing an image of ambitious instruction, and in developing a more productive view of their students’ mathematical capabilities.

**Co-teaching.** Alice indicated that her conception of co-teaching had changed over the four years of the study:

Co-teaching in the beginning… I did it more as, ‘Let me be your assistant. How can I help you in the classroom facilitate things; [do] different activities?’ So I think that helped with just having an extra person in the room to get around to all the kids in the groups. To help [students] with their questioning, push their thinking further when the teacher may have been held up with a particular student or another group that was struggling. Over time… I would find myself planning more with the teachers and taking more of an active role in the classroom as far as helping with the instruction. So it went more from an aid role during co-teaching to more of I’m also helping your teaching. [Year 5]
Alice further explained that she had to establish a relationship of trust with the teacher in order for co-teaching to be successful: “Some teacher[s] – based on our past history together and being comfortable with each other – I knew that if I had a question that I wanted to pose to the kids that I could just jump in and ask it to the class. And we would feed off each other” [Year 5].

When asked what she hoped teachers would learn from co-teaching, Alice responded, “Mainly, I would say coming up with questioning strategies that [teachers] may not have thought of on their own…and in subsequent lessons] when I wasn’t there, they could bring those questions in their discussions” [Year 5]. The value of this activity for Alice was that it enabled her to work with teachers on key aspects of ambitious instruction that were critical to the effective implementation of the new curriculum, such as questioning strategies. Her intent in co-teaching was that teachers would experience and come to appreciate the contributions of particular instructional practices, and would subsequently attempt to enact these practices on their own.

A majority of teachers (5 out of 7) reported engaging in co-teaching with Alice across multiple years. For example, a sixth grade teacher reported that Alice had assisted her in orchestrating whole class discussions:

If [Alice] sees that a student has done [the task] a different way, she’ll point it out [to me]… So whenever we go over the answers or talk about what we’ve done, she’ll say, ‘Oh, so-and-so did it this way, you know, why don’t you go up to the board?’ So she knows the kids in my classroom… she’ll help me out and call up the kids. [Year 4]

In this instance, Alice supported the teacher by selecting students to share their thinking based on whether their solutions would lead to discussions of mathematically significant issues.

**Summary.** Co-teaching supported the teachers with whom Alice worked in appreciating the value of and learning to enact particular aspects of ambitious instruction such as questioning strategies and selecting students to call on during whole class discussions. Co-teaching enabled teachers to try out instructional practices and analyze their impact on student learning with a more accomplished colleague (Ericsson, Krampe, & Tesch-Romer, 1993; Schön, 1987).

**Observing classroom instruction and debriefing.** As we have indicated, Alice routinely observed teachers’ instruction in order to assess their current classroom practices. Observations also served as a means of supporting the teachers’ learning as she usually identified problems of practice on which to work with the teacher, and sometimes gave feedback to assist in the teacher in refining the enactments of particular practices.

Alice and the teachers consistently reported that they had follow-up debriefing conversations after Alice made a classroom observation as well as after modeling and co-teaching. Alice’s accounts of how she typically structured debriefing conversations were remarkably stable across the 4 years:

After I go observe them, and then we’ll sit down together and I’ll ask them, ‘What went well? What do you think didn’t go well?’ And then we’ll talk about it and come up with some goals for them to try and achieve and work on. [Year 2]

As Alice indicated, in the course of debriefing, she and the teacher typically negotiated a goal for instructional improvement and made a plan for how to proceed. The examples we have presented of debriefing conversations (e.g., “How did you know this kid understood because they didn’t say a peep the whole time during class?” [Year 5]) are representative and make it clear that she did not merely encourage teachers to reflect on their classroom practices. Instead, based on her observations and her immediate goals for teachers’ learning, she negotiated specific aspects of instruction with individual teachers.
During the interviews, the teachers did not talk specifically about what they learned from these debriefing conversations. However, Alice’s description of a debriefing conversation that she had with a teacher about pacing the phases of lessons is relevant in this regard:

Another teacher, their specific goal was transition and pacing… if you tell the kids you’ve got five minutes to do a task but then you end up giving ‘em 15 because you’ve lost track of time, it kind of throws everything of course. So helping that teacher stick to the five minutes… [I said], ‘Hey, I noticed you know you told them five minutes but you gave ‘em 15, you know. Have you [ever] used a timer? … How has that worked for you?’

In this instance, Alice focused the conversation on specific aspects of practice that the teacher could improve and offered suggestions for how she could do so.

**Summary.** Debriefing was an important aspect of Alice’s repertoire and occurred after modeling, co-teaching, and observing instruction. Alice’s intent in debriefing with teachers was to negotiate a focus on particular problems of practice that then constituted immediate goals for the individual teachers’ learning, and to support them in addressing these problem and in assessing the progress they were making.

**Discussion**

The intent of content-focused coaching designs is to provide teachers with ongoing, job-embedded support for improving the quality of their instruction and their students’ learning. The purpose of the study that we have reported was to identify aspects of coaching knowledge and practices that are implicated in designing potentially productive activities in which to engage individual teachers to support the development of ambitious instructional practices. We examined the case of a coach who consistently engaged teachers in potentially productive coaching activities and identified five coaching practices that account for her design of activities. These five practices are: (a) identifying long-term goals for teachers’ development; (b) assessing teachers’ current instructional practices; (c) locating teachers’ current instructional practices on general trajectories of teachers’ development; (d) identifying next steps for teachers’ development, and (e) designing activities to support teachers’ learning. We also identified two forms of knowledge that were implicated in the coach’s enactment of these practices: (a) knowledge of ambitious mathematics instruction, and (b) knowledge of general trajectories of teacher’s development of ambitious instructional practices.

This latter form of knowledge serves to clarify what coaches might need to know to be effective beyond being accomplished teachers. In this regard we also distinguished between the professional visions of an accomplished teacher and an accomplished coach. When observing instruction, an accomplished teacher might focus on the forms of reasoning that students’ are developing in relation to the instruction in which they are participating. In contrast, the focal coach interpreted classroom actions and interactions with an eye toward supporting the teacher in supporting students’ learning more effectively. As we illustrated, she assessed teachers’ current instructional practices not merely in terms of student learning opportunities, but also to identify potential teacher learning opportunities. We therefore suggested that a professional vision for coaching builds on but is distinct from a professional vision for teaching, therefore further clarifying what effective coaches need to know and be able to do in addition to having a relatively deep understanding of content and being an accomplished teacher (cf. Elliott, et al., 2009).

As we have described the focal coach’s decision making in linear terms for the purpose of explication, it is tempting to assume that coaches first establish goals for individual teachers’
learning and then select activities in which to engage individual teachers. However, following Suchman (1987), we suggest that in practice their repertoire of coaching activities constrains the learning goals they establish for particular teachers, and that they revise those goals based on how teachers engage in the activities they select. If this is the case, then it is more reasonable to view the immediate learning goals they establish and activities they select for achieving those goals as mutually constitutive.

Although we have analyzed the coaching practices of only one coach, we anticipate that our findings will have some generality in informing investigations of the practices of other coaches who are accomplished in supporting teachers’ development of ambitious instructional practices, both in mathematics and in other content areas. There is little prior work on coaching on which to draw to substantiate our claim, as few previous studies have framed the formulation and enactment of designs for supporting teachers’ learning as a core aspect of coaching expertise. However, we realized after completing the analysis that our account of the focal coach’s development of designs for supporting teachers’ learning is generally consistent with the substantial body of work in mathematics education, science education, and the learning sciences on the process of developing, testing, and revising designs for supporting student learning in (Cobb & Gravemeijer, 2008; Simon, 1995; Simon & Tzur, 2004; Lehrer & Schaubule, 2004). The set of coaching practices we have identified has strong parallels with analyses of how instructional designers develop designs to support the learning of mathematics or science students. These accounts clarify that accomplished designers specify long-term goals for student learning, assess students’ current understandings to determine the instructional starting points, and formulate learning trajectories that comprise conjectures about both successive developments in students’ reasoning and the specific means of supporting those developments. As we have indicated, differences between designing to support students’ and teachers’ learning concerns the forms of knowledge inherent in the enactment of the design practices. Instructional designers formulate trajectories for students’ learning in a particular content domain, whereas the focal coach drew on trajectories for teachers’ learning that she delineated previously. We reiterate this point to lest we be misinterpreted as suggesting that coaching practices and the associated forms of knowledge are the same as those of accomplished teachers, and that accomplishment as a coach requires little beyond being and accomplished teacher. We contend that the practices and forms of knowledge identified in this analysis constitute a first step in clarifying what content-focused coaches need to know and be able to do if they are to support teachers’ development of ambitious instructional practices beyond being an accomplished teacher.

Our findings have implications for policy makers and for district leaders charged with developing and implementing coaching designs as they not only indicate potentially productive types of activities in which coaches should engage teacher but also specify provisional goals for coaches’ learning. In particular, the forms of coaching knowledge and practice we identified can inform the selection and hiring of coaches and orient the design of activities for supporting coaches’ learning. For example, an accomplished coach might support novice coaches in observing teachers’ instruction and assessing their current instructional practices with respect to a trajectory of teachers’ development, identifying short-term goals for individual teachers’ learning, and selecting activities in which to engage particular teachers.

Because this analysis was exploratory, additional research is needed to further clarify what coaches need to know and be able to do when working with individual teachers. A limitation of our analysis is that we examined the practices of only one coach as she designed
activities to support teachers’ development of ambitious instructional practices. We were not able to examine how she enacted various types of activities with teachers. Additional studies that might scrutinize and build on our findings are therefore called for to directly investigate how accomplished content-focused coaches design and enact various types of activities with teachers.
References

Author, 2011
Author, 2012


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Notes

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i As a result of the analysis we conducted previously (Author, 2012), we also identified four potentially productive activities in which coaches work with groups of teachers: 1) doing mathematics, 2) examining student work, 3) analyzing classroom video, and 4) rehearsing aspects of practice. Because the analysis at hand focuses on coaching activities between coaches and individual teachers, we only review the literature for those coaching activities.

ii We used interviews conducted in the second year of the study because it coincided with the second year of the implementation of the new curriculum and the second year of the implementation of the coaching design. We were curious what types of activities coaches and teachers engaged in after they had a year to become familiar with the new curriculum and coaching.

iii These data are for the 2010-2011 school year and were obtained from the National Center for Education Statistics website (http://nces.ed.gov/ccd/). Conversations with school leaders indicate that the student population was similar for 2007-2011.