

Identifying Productive One-on-One Coaching Practices

Abstract

Despite recent advances in research on coaching, gaps remain in our understanding of effective coaching. We conducted a narrative review of a purposefully selected set of research reports on content-focused coaching to identify one-on-one coaching practices that can support teachers' development of ambitious and equitable instructional practices. Each of the resulting eight practices consists of three elements: a coaching activity, the purpose the activity serves in supporting teachers' learning, and the knowledge and perspectives implicated in enacting the activity. The practices clarify when, why, and how coaches might engage teachers in different coaching activities.

Keywords: Coaching (performance), content-focused coaching, professional development, teacher improvement

Introduction

Student learning goals have become increasingly rigorous in many countries, including in the United States (Stage et al., 2013). Students are now expected to make meaning of key disciplinary ideas and develop discipline-specific practices, such as constructing viable arguments and critiquing the reasoning of others. Supporting students' attainment of these rigorous learning goals is challenging work. It involves selecting, adapting, and designing instructional tasks that align with student learning goals; eliciting and responding to students' thinking as they engage in those tasks; and facilitating discussions in which students are supported to build from their current ways of reasoning toward more sophisticated ideas (Franke et al., 2007; Lampert, 2001; Windschitl et al., 2012). Often termed *ambitious and equitable instructional practices* (Franke et al., 2007; Windschitl et al., 2012), these practices mark a significant departure from many teachers' current ways of teaching, as well as from the teaching they experienced as students in school (Cobb et al., 2018). Many teachers will therefore require sustained, job-embedded support if they are to develop ambitious and equitable instructional practices (Cohen & Hill, 2001; Darling-Hammond & Richardson, 2009).

In this article, we focus on one specific a type of support that is becoming increasingly common in schools and districts: one-on-one content-focused coaching (Kraft et al., 2018). In content-focused coaching, an accomplished educator works directly with teachers individually in their classrooms to support them in improving instruction and thus students' learning in a particular a content area (Matsumura et al., 2019; Russell et al., 2020; West & Staub, 2003). For the purposes of this paper, we use the term *coach* to refer to educators who work primarily with teachers in their classrooms to support their learning. We define *productive* one-on-one content-

focused coaching (*productive coaching* for short) as coaching for which there is evidence that it can support teachers' development of ambitious and equitable instructional practices.

Research on productive coaching has made significant progress in recent years, leading to the identification of several types of one-on-one coaching activities that have the potential to support teachers' development of ambitious and equitable instructional practices. These potentially productive coaching activities include modeling instruction, co-teaching, and conducting one-on-one coaching cycles with teachers (Gibbons & Cobb, 2017; Russell et al., 2020). The extent to which the learning potential of these activities is realized depends on coaches' decisions about when specific activities are appropriate for supporting individual teachers' learning given their current knowledge, practices, and contexts (Gibbons & Cobb, 2016). Their potential also depends on how coaches then enact the activities with teachers (Gibbons & Cobb, 2016).

An increasing number of studies have examined the work of coaches as they enact potentially productive one-on-one coaching activities with teachers (e.g., Gibbons & Cobb, 2016; Haneda et al., 2017; Olson & Barrett, 2004; Russell et al., 2020). The findings of these studies clarify what productive enactments of specific coaching activities look like. However, far fewer studies have attended to coaches' *purposes* for engaging teachers in specific coaching activities (e.g., Gibbons & Cobb, 2016; Olson & Barrett, 2004), and thus to their decisions about when and why specific coaching activities might be appropriate to support teachers in making specific developments. Further, while several studies note the knowledge and perspectives central to productive coaching in general (e.g., Campbell & Malkus, 2014; Gibbons et al., 2017; Jackson et al., 2015), the literature provides very limited guidance regarding the knowledge and perspectives necessary to enact *specific* one-on-one coaching activities for *particular purposes* in

supporting teachers' development. Addressing these gaps in the literature is an important step in clarifying what coaches need to know and be able to do to support teachers' learning.

We sought to address these gaps in the coaching literature by **conducting a non-systematic, narrative review of a purposefully selected** set of research reports on productive coaching. The aim of this **review** was **to synthesize findings from these reports to** identify a set of *productive one-on-one coaching practices* for which there is evidence that they can support teachers' development of ambitious and equitable instructional practices. As we note below, each of the identified practices consist of a potentially productive coaching activity, the function the activity serves in supporting teachers' development, and the knowledge and perspectives that inform the productive enactment of the activity to accomplish the function. The identification of these practices enables us to better understand the purposes that specific coaching activities can serve in supporting teachers' development, how coaches can enact the activities productively to achieve those purposes, and the knowledge and perspectives involved in enacting specific activities for particular purposes.

Theoretical Framework

Rationale for One-on-one Content-Focused Coaching

The theoretical rationale for coaching reflects an apprenticeship perspective on professional learning that prioritizes ongoing interactions with an accomplished colleague in contexts close to practice (e.g., Lave & Wenger, 1991). In the case of one-on-one content-focused coaching, these interactions typically involve a teacher working closely with a coach to improve students' content learning by developing increasingly sophisticated instructional practices. For example, a teacher might work closely with a coach to plan an upcoming lesson, in the process developing more sophisticated instructional planning practices. The empirical

warrant for one-on-one coaching is grounded in a growing body of evidence that indicates it can support teachers' development of ambitious and equitable instructional practices (Kraft et al., 2018; Mok & Staub, 2021; Teemant, Wink, & Tyra, 2011) and thus improve students' attainment of challenging content learning goals (Campbell & Malkus, 2011; Russell et al., 2020).

Productive Coaching Practices

Our effort to characterize the work of productive coaching by decomposing it into distinct practices draws inspiration from similar efforts in teacher education that aimed to characterize the work of effective teaching by decomposing it into productive instructional practices (e.g., Ball & Forzani, 2011; Grossman et al., 2009). We conceptualize a coaching practice as consisting of three elements. The first element concerns the function or the purpose the practice serves in supporting teachers' development. The second core element concerns the effective enactment of a specific type of coaching activity for the identified purpose. The final element concerns the perspectives and knowledge involved in enacting the core activity effectively for the identified purpose. Identifying productive coaching practices links specific coaching activities with their purposes in supporting teachers' development and clarifies the perspectives and knowledge involved in enacting specific coaching activities for those purposes. Below, we elaborate on and justify each element of a coaching practice.

Functions of Coaching Practices

Paralleling scholarship in practice-based teacher education (e.g., Gibbons et al., 2021; Janssen et al., 2015), the first element of a practice concerns the function or purpose that the core activity serves in supporting teachers' development. In leading with the purposes of specific coaching activities, we clarify the range of developments that the activities can support, and thus when and why specific coaching activities might prove beneficial in supporting teachers'

learning. For example, we found that a coach might model instruction to accomplish two different purposes: (1) to orient a teacher to students' current capabilities in a content area, or (2) to support a teacher in developing an image of a specific instructional practice. This example highlights that a coach might enact the same activity with a teacher for different purposes at different points in the teacher's development.

Effective Enactment of Coaching Activity

The second element of a coaching practice is the effective enactment of a specific type of potentially productive coaching activity for a particular purpose. This element foregrounds what coaches *do* when working with teachers to support their development of ambitious instructional practices. This element is therefore directly observable and constitutes the core of a practice. The focus on effective enactments underscores that the quality of the enactment of a particular coaching activity has significant implications for teachers' learning (Blazar & Kraft, 2015; Russell et al., 2020).

Knowledge and Perspectives

The final element of a coaching practice concerns the perspectives and knowledge implicated in effective enactments of the activity at the core of the practice for a particular purpose. The inclusion of this third element parallels research on teacher education and teachers' learning. Work in this area demonstrates that effective teaching implicates specialized knowledge, such as forms of content knowledge that are specific to teaching (Hill et al., 2008), and sophisticated perspectives on teaching and learning, such as productive views of students' current capabilities in a content area (Jackson et al., 2017). Similarly, enacting productive coaching practices effectively implicates specialized forms of knowledge and perspectives. Here, we draw an analytic distinction between knowledge and perspectives. The term "perspectives"

refers to the ways in which coaches frame aspects of their work. In contrast, “knowledge” refers to the interpretations, decisions, and judgments that coaches make within (or based on) a particular framing. For example, framing teachers’ learning as a developmental process implicates knowledge of potential developmental trajectories from teachers’ current practices to more ambitious practices. On the other hand, framing teachers’ learning as a process of remediation implicates knowledge of both weaknesses in teachers’ current practices and how those deficits can be addressed.

Methods

The following questions guided our **narrative** review of research on content-focused coaching: (1) *What are coaches’ purposes in enacting potentially productive one-on-one coaching activities with teachers?* (2) *What does it look like to enact the coaching activities productively for the specific purposes?* (3) *What knowledge and perspectives inform the productive enactment of the activities for the identified purposes?*

Identifying Instances of Productive One-on-One Coaching

To address our research questions, we first identified research reports that described one-on-one content-focused coaching and that contained evidence that the participating teachers developed ambitious and equitable instructional practices. We began this process by conducting a broad search of the ERIC (www.eric.gov) and Google Scholar (scholar.google.com) databases to identify an initial set of coaching studies. Our search terms included references to coaching (e.g., coaching, one-on-one coaching), references to specific one-on-one coaching activities (e.g., modeling, co-teaching, or coaching cycle), and references to teachers’ learning (e.g., instructional improvement, teachers’ learning). The time frame for our search was from 2001 to the present. We started in 2001 because No Child Left Behind (NCLB) was passed in this year,

and its passing resulted in increased attention on coaching. As part of our initial search of the literature, we included several research reports that were written by one or both of us. While we were obviously aware of these reports prior to conducting our broad literature search, we made every effort to analyze these reports in the same way as the other reports we identified.

We then narrowed the resulting set of studies to only those that focused on one-on-one content-focused coaching. Although we intended to focus solely on mathematics coaching, there were not enough studies in this content area to enable us to address our research questions adequately. We therefore retained studies that focused on coaches working with teachers *in schools* in additional content areas including English Language Arts, science, and mathematics. We excluded studies of *peer coaching* because they involve teachers working with other teachers and excluded studies of *reform coaching* (or leadership coaching) because they do not focus on supporting teachers' development of ambitious instructional practices. Further, in line with our definition of coaching as a school-based support for teachers, we excluded papers in which a teacher educator coached pre-service teachers (e.g., Kazemi et al., 2016). This resulted in a set of 67 research reports.

Consistent with our definition of productive coaching, we then analyzed the resulting reports to identify those in which there was evidence of coaching that supported teachers' development of ambitious and equitable instructional practices. We first looked for evidence in each research report that the participating teachers made a change in their instruction, and then documented that evidence (or lack therefor) in a series of memos. Next, we compared the changes the teachers made against what is known about ambitious and equitable instructional practices in the relevant content areas. We retained only those reports in which there was evidence that the participating teachers made changes that indicated process toward the kinds of

ambitious instructional practices that can support students' attainment of rigorous learning goals. The resulting 13 research reports (denoted by an asterisk in the reference list) constituted a reasonably robust dataset on which to draw to answer our research questions.

Analyzing Instances of Productive One-on-One Coaching

Next, we examined the 13 research reports in relation to our three research questions, in the process identifying a set of productive coaching practices. This involved coding the research reports for the activities the coaches enacted, coaches' purposes in enacting the activities, and the knowledge and perspectives implicated in the enactment of the activities for those purposes. We then synthesized the results of this analysis to specify the three elements of productive coaching practices.

We began the analysis by first coding the coaching activities described in each report. When we could not use codes based on prior research that described coaching activities, we used grounded methods (Corbin & Strauss, 2015) to develop inductive codes to describe the coaching activities. Next, we coded the relevant research reports for coaches' purposes for engaging teachers in the activities. When applicable, we used codes developed in prior research on coaching. However, because there are gaps in the literature on coaches' purposes for enacting specific types of activities with teachers, we used grounded methods to develop inductive codes to describe the purposes the activities might serve in supporting teachers' development.

As an added complication, the authors of some research reports did not always make the coaches' purposes for enacting the described activities clear. In these instances, we inferred the purposes that the activities might serve in supporting teachers' development by drawing on the purposes more explicitly stated in the other studies in our dataset. For example, Haneda et al. (2017) describe how an accomplished coach engaged a teacher in ongoing conversations about

the teacher's instruction when debriefing after lessons. In these conversations, the coach elicited and then reframed the teacher's views about a specific instructional practice that the coach appeared to see as beneficial for students' learning. The findings reported in this paper indicate that, over the course of these conversations, the coach and teacher reached a shared understanding of the focal practice and why it would enhance students' learning. The teacher then agreed to work to enact the instructional practice effectively in her classroom. Though the report does not explicitly state the purpose of the conversations, we inferred that it was to negotiate an instructional improvement goal. We made this inference based on findings from two other research reports (Kochmanski & Cobb, in press; Teemant et al., 2011), both of which describe the importance of coaches negotiating instructional improvement goals with teachers when debriefing after a lesson.

We inferred the third and final element of each practice, the knowledge and perspectives implicated in enacting the activity effectively for a particular purpose, by examining both the criteria researchers used to select coaches for their studies and what they did to support coaches in working productively with teachers. Although very few of the study reports discuss the knowledge and perspectives implicated in enacting of the specific coaching activities, almost all include accounts of principled decisions about selecting coaches and/or supporting their development. When relevant, we used constructs from prior research, including codes for content knowledge for teaching (Hill et al., 2008), vision of high-quality instruction (Munter, 2014), views of students' current capabilities in a content area (Jackson et al., 2017), and developmental or remedial perspectives on teachers' learning (Jackson et al., 2015).

As an illustration, Matsumura et al. (2012) explain that, as part of their study, they provided the participating coaches with professional development (PD) prior to working with

teachers. The goal of the PD was to support the coaches in understanding specific instructional practices and how those practices might support students' learning in a content area. While not explicitly stated, these two goals for coaches learning appear to implicate both content knowledge for teaching and vision of high-quality instruction. We therefore applied the codes "content knowledge for teaching" and "vision of high-quality instruction" to the coaching activities described in this study. Given the inferential nature of our conclusions about the knowledge and perspectives implicated in coaches' effective enactment of specific coaching activities, our claims are best viewed as provisional conjectures that future research might investigate.

To conclude our analysis, we linked the codes for knowledge and perspectives with our codes for the associated coaching activities and for the purposes for enacting those activities in a series of memos. In doing so, we specified a set of productive coaching practices. We treated instances in which the same activity served different purposes as different practices.

Findings

We identified eight one-on-one coaching practices, each of which consists of the three elements noted above. Because the functions of some of the eight practices are the same, we have organized our findings according to six distinct functions. As a point of clarification, all 13 studies that we reviewed indicate the importance of coaches' instructional expertise. We therefore take it as a given that the coaching practices described below implicate the knowledge and perspectives central to ambitious teaching. Consequently, with a few exceptions, we limit our descriptions below to the *coaching-specific* knowledge and perspectives that go above and beyond those integral to ambitious instruction. Further, we take it as a given that coaches should

establish productive, trusting relationships with teachers, as there is extensive research indicating this is an essential component of effective coaching (Finkelstein, 2019; Knight, 2007)

Function 1: Identifying Productive Goals for Individual Teachers' Improvement of Their Instructional Practices

We identified two activities that are associated with identifying productive goals for individual teachers' improvement of their instructional practices, and thus two distinct practices: (a) observing classroom instruction, and (b) eliciting teachers' reasoning about instruction. In enacting these activities, coaches can identify goals for individual teachers' learning that are based on an analysis of teachers' current perspectives, knowledge, and practices. In line with Kochmanski and Cobb's (in press) analysis, we stress the importance of coaches identifying *productive* goals for teachers' learning. We define productive instructional improvement goals as those that are (a) feasible for the teacher to attain and (b) likely to improve students' learning, if attained. This first coaching function is a key aspect productive coaching because the goal(s) that coaches identify for individual teachers' learning orient their decisions about how best to support those (Gibbons & Cobb, 2016). However, as we discuss and illustrate below, it is also essential that coaches engage *teachers* in the goal setting process.

Observing classroom instruction

Four of the studies that we reviewed include examples of coaches observing classroom instruction to understand individual teachers' current practices and then, based on their analysis of those practices, identifying goals for a teacher's learning (Kochmanski & Cobb, in press; Haneda et al., 2017; Olson & Barrett, 2004; Teemant et al., 2011). While the study by Kochmanski and Cobb was the only one to explicitly address whether the identified goals were productive, all four studies illustrate what is involved in observing instruction for this purpose.

For example, Olson and Barrett (2004) describe how a coach began her work with a teacher by observing two lessons, taking notes during the lessons, and then analyzing the notes to identify a goal for the teacher's improvement of her instruction. In the notes, the coach indicated that the teacher "typically modeled a solution strategy whenever students were frustrated" (p. 68). Based on this analysis, the coach determined that maintaining the cognitive demand of tasks was an appropriate goal for the teacher's development. Teemant et al. (2011) also illustrate what is involved in enacting this activity for this purpose, noting that each of the ELA coaches in their study conducted baseline observations of teachers' instruction "to establish where the teacher was developmentally" on an observation rubric (p. 688). The coaches then used this information to identify instructional improvement goals for individual teachers.

Kochmanski & Cobb's (in press) study further clarifies what it means to enact this activity to identify *productive* instructional improvement goals. This study compared the goal identification processes of mathematics coaches who identified productive versus unproductive goals. The results of this study indicate that coaches who identified productive goals first analyzed students' learning during the observed lesson and only then the teacher's instruction not as an end in itself but in order to account for that learning. In contrast, coaches who did not identify productive goals only analyzed the teacher's instruction and did so by comparing the teachers' instruction to their own views of high-quality instruction.

We conjecture that the practice of observing instruction to identify productive improvement goals implicates two coaching specific perspectives. First, our review of the relevant literature indicates that it implicates a developmental perspective on teachers' learning. This perspective frames teachers' learning as a process of making successive improvements in instructional practice rather than as a process of acquiring discrete skills (Gibbons et al., 2017;

Jackson et al., 2015). Absent this developmental perspective, a coach might attempt to remediate identified weaknesses in a teacher's current instruction by focusing on isolated skills, rather than by supporting the teacher in building from current practice toward more ambitious instructional practices (Kochmanski & Cobb, in press). Second, our analysis suggests that it implicates a functional perspective on teaching in which coaches connect instruction to students' learning, in the process justifying the instructional changes that a teacher might make in terms of their potential to improve students' learning.

Eliciting teachers' reasoning about instruction

Three research reports include examples of coaches eliciting teachers' current thinking to plan for their subsequent coaching decisions (Kochmanski & Cobb, in press; Haneda et al., 2017; Olson & Barrett, 2004). Haneda et al. (2017) describe how a coach elicited a teacher's reasoning about an important pedagogical principle for English Language Arts instruction, critical stance, to assess both the teacher's understanding of the principle and the extent to which the teacher saw it as relevant to improving classroom practice. To elicit the teacher's reasoning, the coach first described the principle and then asked the teacher to consider how it might apply to her classroom teaching. Based on the teacher's responses, the coach then adapted her approach to supporting the teacher in incorporating the pedagogical principle into her instruction. In this illustration, the coaches' elicitation of the teacher's reasoning informed the focus of her subsequent work with the teacher, and thus the immediate goals she identified for the teacher's learning.

Olson and Barrett (2004) also illustrate this practice, describing how a mathematics coach questioned a teacher about her classroom practice to better understand the teacher's rationale for her instructional decisions. The teacher's responses then informed the coach's identification of a

goal for this teacher's learning. In this case, the teacher's responses indicated that she often modeled mathematics strategies for her students because, as the teacher put it, many students in her class would never figure out the mathematics otherwise. Thus, eliciting the teachers' rationale for this instructional strategy revealed "a belief that her students could not independently solve mathematical problems and that understanding was demonstrated by correct answers" (p. 69). Based on this insight, the coach decided that it was essential to support the teacher in developing a more productive view of her students' mathematical capabilities.

In both illustrations, eliciting a teacher's reasoning about instruction enabled a coach to infer aspects of a teacher's current knowledge and perspectives that are implicit in the enactment of specific instructional practices and that might be difficult to assess solely based on observation of the teachers' instruction. The resulting insights enabled the coaches to make informed decisions about appropriate next steps for their partner teachers' learning. It is important to note that eliciting a teacher's current reasoning about instruction may, by itself, be insufficient to identify a productive improvement goal, as teachers' accounts of their instruction may differ from their actual classroom practices. Therefore, this practice complements the practice of observing classroom instruction to identify productive instructional improvement goals. Enacting the practices in tandem can enable coaches to develop a deeper understanding of individual teachers' instruction by attending both to observable aspects of teachers' classroom practices and to the knowledge and perspectives inherent in the enactment of those practice.

We conjecture that enacting this activity implicates two coaching perspectives. First, as with observing instruction, it likely implicates a developmental perspective on teachers' learning. Second, it likely implicates an understanding of the kinds of knowledge and perspectives that are implicit in teachers' enactment of instructional practices. For example, Olson and Barrett (2004)

describe how a coach recognized that it was essential for the partner teacher to see her students as capable of engaging in and learning from ambitious mathematics instruction. This recognition indicates that the coach understood the importance of this perspective for teachers' development of ambitious instructional practices and therefore considered it essential to support the teacher's development of a more productive perspective on her students' current mathematical capabilities.

Function 2: Supporting Teachers in Seeing Productive Instructional Improvement Goals as Worthwhile

Several studies in the coaching literature indicate that it is essential for teachers to view instructional improvement goals as feasible and worthwhile if they are to make the sustained effort necessary to attain those goals (e.g., Olson & Barrett, 2004; Atteberry & Bryk, 2011). Additionally, many studies, including seven of the 13 that we analyzed, reference the importance of ensuring that teachers to have a voice in setting instructional improvement goals (Kochmanski & Cobb, in press; Haneda et al., 2017; Kraft & Hill, 2020; Matsumura et al., 2019; Olson & Barrett, 2004; Russell et al., 2020; Teemant et al., 2011). This second coaching function builds on the first and involves coaches collaborating with individual teachers to set productive instructional improvement goals that both teachers and coaches see as worthwhile.

Negotiating Instructional Improvement Goals

Two of the reports we reviewed suggest that coaches can accomplish this function by negotiating instructional improvement goals with teachers (Kochmanski & Cobb, in press; Haneda et al., 2017). We use the term *negotiate* to indicate that the intent is for the teacher and coach to agree upon an immediate instructional improvement goal that the teacher sees as worthwhile, that is consistent with coaches' assessments of teachers' current instructional practices, and that is productive. This coaching function is complementary to coaches' efforts to

identify productive instructional improvement goals because coaches can use the goals they identify as the basis for negotiations.

Kochmanski & Cobb's (in press) study of one-on-one mathematics coaching provides a clear description of how coaches can enact this practice. As described in this research report, negotiating goals effectively with teachers involves three steps: (1) asking the teacher about the aspect of practice that he or she wants to change; (2) asking the teacher to clarify why he or she wants to focus on this aspect of practice, thereby clarifying a desired student development that the teacher intends to support; and (3) if the instructional change the teacher proposes is unproductive, acknowledging the importance of the teacher's desired student development while suggesting an alternative instructional change that is productive and that would address the development. In enacting this activity, coaches legitimize teachers concerns while also suggesting specific changes that are both feasible and likely to improve students' learning. This can support teachers in coming to see a productive improvement goal as worth pursuing.

We did not identify any coaching-specific forms of knowledge or perspectives implicated in the productive enactment of this activity, perhaps because only a few studies examined how coaches can negotiate goals successfully. However, because the productive goals that coaches identify for teachers' improvement is the starting point for the negotiation process, enacting this activity likely implicates a developmental perspective on teachers' learning. Further, it likely implicates a functional vision of high-quality instruction, as it foregrounds the connection between instruction and students' learning.

Function 3: Supporting Teachers' Development of Productive Views of Their Students'

Current Capabilities

The third coaching function we identified involves coaches supporting teachers in coming to see their students as capable of engaging in and learning from ambitious instruction. This coaching function is essential as teachers are unlikely to develop ambitious instructional practices unless they think their students can engage in and learn from that kind of instruction (Sharpe, 2016). There is evidence that teachers are likely to limit students' opportunities to engage in rigorous instructional activities if they think that some or all students are unable to learn from those activities (Jackson et al., 2017). Additionally, teachers may reduce the rigor of tasks and activities at the first sign of student difficulties, thereby limiting students' learning opportunities.

Modeling instruction

Olson and Barrett's (2004) findings indicate that coaches can support teachers in developing productive views of their students' capabilities by modeling ambitious instruction with their students. However, this is the only instance we identified for this practice, suggesting that the content-focused coaching literature has yet to make issues of equity in students' content learning opportunities an explicit focus of investigation.

Olson and Barrett (2004) describe how a coach modeled instruction to provide a teacher with opportunities to investigate how the teacher's students can engage in ambitious instruction when they are supported appropriately. The coach's intent in doing so was to problematize the teacher's view that her students could not participate productively in inquiry-oriented mathematics instruction. The coach first met with the teacher to plan the modeled lesson. In the planning meeting, the coach explicitly directed the teacher to attend to how her students engaged with the mathematics during the lesson. Then, the coach taught the lesson while the teacher focused on how the students' participated in the instructional tasks. It appeared important that the

coach modeled ambitious instructional practices with the teacher's own students rather than, for example, showing the teacher a videorecording of other students engaging in rigorous mathematics instruction.

The coach and teacher subsequently met to debrief and focused on whether and how the students were able to engage in and learn from the modeled lesson. The coach and teacher first focused on the students' mathematical thinking and learning during the lesson, and only then analyzed instruction to explain the students' learning). Engaging in this debrief in which the coach foregrounded the student' participation and learning appeared to be crucial in supporting the teacher to recognize her students' current capabilities (Olson & Barrett, 2004).

Turning now to knowledge and perspectives, we emphasize that modeling instruction for this purpose implicates a productive view of students' current capabilities in a content area. Specifically, it likely requires that coaches see prior and current instruction as the primary source of students' current difficulties.

Function 4: Supporting Teachers' Development of Functional Visions of Ambitious and Equitable Instruction

The fourth coaching function involves supporting teachers in developing an image (or vision) of what effective enactments of specific instructional practices look like. Accomplishing this function is a necessary precursor to supporting teachers in enacting those instructional practices effectively as it is unlikely that teachers will develop particular practices if they do not know what those practices look like (Munter & Correnti, 2017). Importantly, and as we touch on below, we emphasize that the intent of modeling is to support teachers in developing a clearer and more sophisticated vision of a specific practice and to also understand why the practice is

important for supporting teachers' learning. Therefore, this function goes beyond asking teachers to imitate or copy what the coach models.

Modeling instruction

Five of the research reports we reviewed indicate that a coach can model instruction in a teacher's classroom to support that teacher in developing an image of specific instructional practices (Hindman & Wasik, 2012; Knapp et al., 2016; Matsumura et al., 2012; Olson & Barrett, 2004; Polly, 2012). In these five reports, modeling instruction appeared to be an initial step in supporting the teachers' development of ambitious instructional practices. This purpose for modeling differentiates this practice from modeling instruction to support teachers in developing productive views of their students' capabilities.

When coaches model instruction to support teachers in developing a vision of a high-quality practice, it is essential that they orient their partner teacher to focus on how they enact the focal practice. The intent is not that teachers will then imitate coaches' enactment of the practice but that teachers might begin to understand both what a high-quality enactment looks like and why it is important for students' learning. For example, Hindman and Wasik (2012) describe how four literacy coaches first introduced early language and literacy teachers to new instructional practices in a professional development session and then "visited each teacher's classroom to model the instructional [practices] targeted in the workshop" (p. 136). To underscore the purpose of the classroom visits, the coaches asked teachers to complete a checklist that oriented the teacher to attend to specific features of the focal instructional practice during the modeled lesson. Orienting teachers in this manner contrasts sharply with modeling instruction to support a teacher in developing more productive views of students' capabilities. In

this latter case, it is important that coaches orient teachers to focus primarily on the students' participation and reasoning during the lesson.

Knapp et al. (2016) describe a modeling routine in which a coach and teacher collaboratively plan a lesson, then the coach models instruction, and finally the coach and teacher analyze the lesson together. We described a similar routine when we discuss modeling to support teachers' development of productive views of their students' current capabilities. Here, however, the focus is on the modeled instructional practices and the support they provide for students' learning. Modeling for this purpose can support teachers in seeing how the enactment of specific instructional practices can support students' learning. Understanding this relationship between instruction and learning underpins a functional vision of high-quality instruction that is justified in terms of its potential to support students' learning (Munter, 2014). As an additional observation, Knapp et al. noted that meeting to debrief the modeled lesson can also support the development of teachers' content knowledge for teaching when a coach and teacher discuss the content taught in a modeled lesson.

We conjecture that modeling for this purpose involves a developmental perspective on teachers' learning. Specifically, it involves an understanding that it is important for teachers to develop a functional image of an instructional practice prior to supporting them in learning to enact that practice effectively. This conjecture reflects the view that that it is hard for teachers to learn to enact a practice well if they do not know what the practice looks like.

Function 5: Supporting Teachers in Improving their Enactment of Specific Instructional Practices

The fifth function we identified builds on the prior function of supporting teachers' development of functional visions of high-quality instruction and involves supporting teachers to

improve how they enact specific instructional practices. We identified two coaching activities that address this function, and thus two distinct coaching practices: (a) co-teaching to support teachers' enactment of ambitious and equitable instructional practices and (b) observing and providing teachers with evidence-based feedback on their enactments of specific practices.

Co-teaching

Five research reports describe cases in which a coach supported a teacher's efforts to enact specific instructional practices by co-teaching with them (Matsumura et al., 2012; Olson & Barrett, 2004; Polly, 2012; Russell, 2015). Here, we use the term co-teaching to refer to a range of activities that includes both (a) formal arrangements in which a coach and teacher agree to share full responsibility either for an entire lesson or for a specific phase of a lesson; and, (b) informal arrangements in which the coach intervenes to lead a portion of the lesson or to discuss a particular instructional decision or idea with the teacher and then relinquishes responsibility back to the teacher.

Polly (2012) and Russell (2015) both provide illustrations of how informal co-teaching arrangements can support teachers in learning to enact ambitious and equitable instructional practices. In both instances, the coach intervened to provide just-in-time support. For example, Polly describes how informal co-teaching appeared to support to the teachers with whom he worked in selecting more rigorous instructional tasks and in asking more challenging questions during class discussions. He clarifies that he posed mathematics tasks to students during lessons, asked students questions during class discussions, and looked "at specific students' work" and discussed "students' error patterns" with the teacher during the lesson. In the case that Russell (2015) reports, a coach supported a teacher by making "on-the-fly suggestions" and by engaging the teacher in impromptu "check-ins" during the lesson (Russell, 2015, p. 35). These suggestions

and check-ins took several forms, including asking questions as a student and conferring with the teacher to suggest adjustments she might make to a lesson to improve students' learning.

Olson and Barrett (2004) provide a clear illustration of a more formal co-teaching arrangement in which a coach taught a mathematics lesson with a teacher to support her in maintaining the rigor of the tasks throughout the lesson. Crucially, the co-teaching arrangement included a collaborative planning meeting in which the coach and teacher “discussed the mathematical concepts of the lesson and crafted questions” to ask during the lesson (p. 72). When they taught the lesson, the teacher introduced the instructional tasks and then the coach supported students as they worked on the tasks. This arrangement appeared to support the teacher in seeing how to maintain the rigor of mathematics tasks, and thus served as a scaffold for enacting ambitious instructional practices.

The coach and teacher met to debrief after they had co-taught the lesson and in doing so linked evidence of students' learning to instruction. Thus, like modeling, formal co-teaching appears to involve both an initial planning meeting and a follow-up debriefing conversation. In contrast, the reports of informal co-teaching arrangements that we reviewed did not describe accompanying planning and debrief meetings.

We conjecture that co-teaching likely involves knowing when to interject in a lesson, which implicates a developmental view of teachers' learning as it involves judging when it would be beneficial to provide a teacher with just-in-time support, likely based on the coach's view of productive next steps in the teacher's learning. In other words, it is likely essential that a coach sees co-teaching as an opportunity to support a teacher in improving instruction, and not merely an opportunity to make a specific lesson better.

Observing and Providing Feedback

All 13 research reports make at least passing reference to coaches observing instruction and then providing teachers with evidence-based feedback on their enactment of specific instructional practices. In contrast to modeling and co-teaching, the coach does not directly support a teacher in enacting a lesson with students when observing to provide feedback. In many ways, this practice constitutes the endpoint of a handover of responsibility from a coach to a teacher for enacting lessons. In this process, a coach might first model instruction to support a teacher in understanding what it looks like to enact a specific instructional practice effectively. Next, the coach might directly support the teacher's initial attempts to enact the practice by first co-teaching an entire lesson, and later by intervening as needed more informally. Finally, the coach might observation and provide evidence-based feedback to support the teacher in refining the enactment the practice.

While all 13 research reports refer to observation and feedback, only three go into detail about how coaches can provide teachers with productive feedback that can support them in improving their enactment of ambitious and equitable instructional practices (Garet et al, 2016; Kraft & Hill, 2020; Teemant et al., 2011). Kraft and Hill (2020), for example, describe a process by which coaches can provide teachers with feedback after a lesson. In this process, a coach first observes a lesson and collects data (e.g., video of the lesson, field notes) to document strengths and weaknesses in individual teachers' current practices. The coach then uses the data to discuss the strengths and weaknesses with the teacher in an evidence-based manner. Finally, the coach supports the teacher in considering how he or she might address those weaknesses in future lessons. This process is consistent with that described by Garet et al. (2016) and by Teemant et al. (2011). However, although each of these reports describe a routine for providing feedback, they do not directly address the content of the feedback. We conjecture that much like debrief

conversations conducted following modeling and co-teaching, it is likely important for coaches and teachers to link instruction with students' learning as they engage in these feedback conversations. In doing so, coaches can support teachers in seeing how aspects of their instruction support or impede students' learning.

Our analysis did not reveal any coaching-specific perspectives implicated in the effective enactment of this activity for the focal purpose. However, we surmise that this practice includes a functional and ambitious vision of high-quality instruction, as such a perspective is likely necessary to provide teachers with appropriate feedback. It also likely includes a developmental perspective on teachers' learning because the feedback a coach provides is likely to be most beneficial when it aims to support a teacher in improving instruction, and not just improve the quality of a specific lesson.

Function 6: Support teachers in learning to design rigorous lessons

The sixth function coaching we identified involves supporting teachers' development of effective planning practices, such as articulating clear student learning goals and selecting rigorous instructional tasks that align with those goals (e.g., Windschitl et al., 2012). These planning practices are central to designing and preparing to implement rigorous lessons that build on students' current thinking and focus on central disciplinary ideas (Russell et al., 2020).

Co-planning

Each of the 13 research reports made at least some reference to coaches planning lesson with teachers. Further, almost all the studies indicate that the goal of such planning is to support teachers in improving their planning practices. Three of the 13 studies (Knapp et al., 2016; Russell et al., 2020; Russell et al., 2016) describe coaches' effective enactment of this activity in detail.

In their investigation of a mathematics coaching program, Russell et al. (2020) found that coaches who were able to support teachers in planning rigorous lessons engaged those teachers in deep and specific planning conversations that linked content learning goals, students' thinking, and instruction. The authors report that these types of planning conversations involve: (a) setting or clarifying the content learning goals for the lesson, (b) selecting tasks or activities that are appropriate for the grade level and provide students with opportunities to make progress toward the lesson goals, (c) anticipating and discussing potential student solution strategies, and (d) discussing how to support students in making progress towards the learning goals by, for example, asking targeted questions..

Unfortunately, Russell et al. do not provide a detailed illustration of planning conversations that includes all these elements. However, Knapp et al. (2016) describe a planning conversation between a mathematics coach and a mathematics teacher that includes many of these features. In this conversation, the coach and teacher first discussed the learning goal for the lesson and decided that it should be to support students to “describe relationships within a taxonomy of quadrilaterals” (p. 332). The coach and teacher then selected instructional tasks that the teacher would use as the basis for the lesson. In doing so, the coach supported the teacher in anticipating the range of student ideas about quadrilaterals that might emerge during the lesson. Finally, the coach and teacher discussed the ways in which the teacher might represent students' ideas during the lesson to support them in making sense of relationships between different types of quadrilaterals. Thus, the coach and teacher connected the content learning goal for the lesson, the instructional tasks they planned to use, the ways in which students might attempt to solve the tasks, and how the teacher might build on students' solutions to support them in making progress toward the learning goal. Knapp et al. clarify that in addition to supporting the teacher in

improving her planning practices, conversations of this type can also support the development of teachers' content knowledge for teaching.

Turning now to knowledge and perspectives, co-planning likely implicates coaches' knowledge of the instructional materials to which the teacher has access as well as knowledge of students' reasoning in the relevant content domain. More specifically, it is likely important for coaches to have a clear sense of the student learning goals targeted by the instructional materials available to the teacher and of how an effective implementation of the materials can support students' learning. In line with this conjecture, Knapp et al. describe how the coaches who participated in their study had a deep familiarity with the geometry materials that they were supporting teachers in using effectively with their students.

Russell et al.'s (2020) findings indicate it also is important for coaches to have a clear understanding of the distinction between two broad types of student learning goals: (a) student performance goals, which describe what students will *do* in a lesson, and (b) student learning goals, which describe what a teacher would want students to “know or understand as a result of implementing” the task(s) in a lesson (p. 17). As Russell et al. note, student learning goals that are framed around what students should know or understand “provide greater guidance for teachers as they teach for conceptual understanding,” and are thus more useful in informing the design of ambitious lessons (p. 17). We therefore conjecture that it is important for coaches to understand this distinction between student performance and student learning goals as they will likely have to press their partner teachers to articulate conceptual learning goals as a key step in supporting their development of effective planning practices.

Discussion

The purpose of our conceptual review was to clarify key aspects of productive one-on-one content focused coaching. The review resulted in the identification of eight productive one-on-one coaching practices that evidence indicates can support teachers' development of ambitious and equitable instructional practices. We organized the eight practices according to the six distinct coaching functions that they addressed.

Taken together, the practices provide a relatively comprehensive description of what coaches need to know and do to support teachers' development of ambitious and equitable instructional practices, and thus advance the field's understanding of what productive one-on-one coaching looks like. To illustrate this point, we turn to a common coaching routine, one-on-one coaching cycles. As they are typically described in the literature, coaching cycles consists of three phases: (a) the co-planning phase, in which a coach and teacher plan a lesson together; (b) the lesson enactment phase, in which a coach and teacher implement the collaboratively planned lesson; and (c) the lesson debrief phase, in which a coach and teacher analyze the lesson (West & Staub, 2003). Mapping the eight practices onto the coaching cycle clarifies what coaches need to know and be able to do to enact each phase of the routine productively.

[Insert figure 1: One-on-one Coaching Cycle]

For example, prior to a first coaching cycle, it is important for a coach to identify a productive instructional improvement goal and then support the teacher in seeing that goal as worth pursuing, as the agreed upon goal will orient the first phase of the cycle (Kochmanski & Cobb, in press). The first two practices identified in our analysis indicate that coaches can identify productive instructional improvement goals by observing instruction and by eliciting teachers' reasoning about instruction. The third practice we identified, negotiating instructional improvement goals, indicates how coaches can support teachers in coming to see productive

goals as worthwhile. The first three practices therefore clarify what coaches need to learn to do if they are to *begin* their work with a teacher in a productive manner, and why it is important to do so. Further, the three practices clarify the knowledge and perspectives involved in doing that work well, such as a developmental perspective on teachers' learning.

Having determined a goal for the first coaching cycle, a coach would then enact another practice identified in our analysis: co-planning to support teachers in learning to design rigorous lessons. This practice clarifies how coaches can support teachers in learning to plan rigorous lessons, rather than merely producing a single rigorous lesson. Further, linking this practice with those for identifying and negotiating goals suggests that a coach might consider the agreed-upon goal for the teacher's learning and give particular attention to the goal when planning. Thus, the practices clarify why the co-planning phase of a coaching cycle is important for teachers' long-term development. Again, this practice also highlights the forms of knowledge and perspectives involved, such as knowledge of the available curricular tools and materials.

Coaches would also take account of the agreed-upon goals for teachers' learning when they prepare for the enactment phase of the coaching cycle, thereby making principled decisions about whether to model, co-teach, or observe and collect evidence for feedback. Depending on this decision, they would enact one of several practices we identified in this phase of the cycle. In the subsequent debrief phase, a coach and teacher analyze the lesson together, in the process connecting student learning and instruction. They might also negotiate a new instructional improvement goal that will orient the next coaching cycle. Thus, mapping the practices onto the cycle describes what it looks like to enact the routine productively.

The results of our review also make a couple more specific contributions to research on content-focused coaching. First, our findings address a significant gap in the current literature by

clarifying when and why coaches might engage teachers in particular coaching activities. In this study, we build on prior research on potentially productive coaching activities (e.g., Gibbons & Cobb, 2017; Russell et al., 2020) and on the effects of coaching (Kraft et al., 2018; Mok & Staub, 2021) by linking coaching activities with the purposes they might serve in supporting teachers' development. In doing so, we highlight the specific developments that particular coaching activities can support teachers in making, thereby specifying the functions of the coaching activities. For example, the activity of observing instruction is central to two of the eight coaching practices. The importance of this activity is not new to research on coaching, as classroom observations are a key component of almost all coaching models and prior research on coaching underscores the importance of coaches collecting data on a teacher's instruction while observing a lesson (e.g., Teemant et al., 2011). However, our findings highlight the importance of observing instruction *for specific purposes*, such as identifying a productive instructional improvement goal.

The second contribution concerns our conjectures about the *coaching-specific* perspectives and forms of knowledge that might be integral to eight practices. There is broad consensus in the literature that productive coaching requires the knowledge and perspectives associated with being an accomplished teacher. However, apart from occasional references to a developmental perspective on teachers' learning, the studies analyzed in this review made few concrete suggestions about coaching-specific perspectives and forms of knowledge. In framing our proposals on this issue as conjectures, we hope to initiate a conversation about the perspectives and knowledge involved in productive coaching that go beyond those involved in accomplished teaching.

Additionally, the analysis we have reported points to areas for future research. As noted immediately above, our conjectures regarding the coaching-specific perspectives and forms of knowledge warrant further investigation. As several studies indicate (e.g., Gallucci et al., 2010; Gibbons & Cobb, 2016; Stein et al., 2021), learning to coach requires the development of expertise beyond that involved in effective teaching. Further clarifying the coaching-specific knowledge and perspectives that are integral to productive coaching is a key next step in research related to supporting coaches' learning. Additionally, fewer than half of the research reports that we analyzed were explicit about coaches' purposes for enacting coaching activities. We therefore had to make inferences about the purposes based on other research reports that we reviewed. This suggests that future investigations might attend closely to coaches' purposes for engaging teachers in specific coaching activities.

We also identified only a few studies in the content-focused coaching literature that foreground issues related to equity and diversity, indicating that there is a pressing need for research in this as an area. In our case, issues related to equity came to the fore primarily with regard to supporting teachers' development of productive views of students' capabilities. Future research might address issues of equity in other ways, such as by investigating how coaches can support teachers to better support the learning of English language learners, or by investigating how coaches can support teachers in developing more justice-oriented ways of teaching (Marshall & Buenrostro, 2021).

Turning now to practice, our findings can inform how individual coaches work with teachers. They are also relevant to the design of supports for coaches' learning. Coaching, like teaching, is challenging, complex work (Gallucci et al., 2010; Stein et al., 2021), and many coaches will require significant support if they are to do it productively. The eight practices we

identified go beyond descriptions of observable forms of coaching activity and they can thus serve as goals for coaches' learning. For example, the practices might serve as goals for a professional development (PD) aimed at supporting coaches in learning to enact one-on-one coaching cycles productively.

Additionally, our focus on the function of coaching activities has implications for how PD designers might intentionally *sequence* those learning goals. Returning to the example of coaching cycles, it might be tempting for PD designers to begin a PD sequence by focusing on co-planning with teachers, as this is the first phase in a coaching cycle. However, mapping the eight practices onto coaching cycles illustrates that coaches' facilitation of the co-planning phase depends, in part, on their goals for teachers' development. As such, designers might choose to begin coach PD by focusing on how coaches can identify productive goals for individual teachers' development, as opposed to co-planning. The justification for this sequence is made clear by foregrounding the functions of coaching activities in supporting teachers' development.

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