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How do mathematics coaches learn about coaching?: An analysis using the system of negotiation

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ABSTRACT

Background: With the widespread implementation of coaching programs in United States schools, it is important that coaches are provided with ongoing professional learning opportunities to learn how to be effective coaches. This study contributes to the field's emerging understanding of coaches' job-embedded opportunities to learn about coaching.

Methods: This analysis rests on transcribed video recordings of coaches' professional development (PD) sessions. The system of negotiation was used to code interactions. Specifically, the negotiation move and object of negotiation were applied to each speaker move.

Findings: Several key findings emerged. First, the use of K1 moves far outpaced any other type of negotiation move, which shows that coaches constructed meaning by building upon one another's ideas. Second, although the PD sessions included 11 coaches, the findings reflect the contributions of a small handful of more active participants. Last, three levels of coaching discussion were identified that characterize coaches' learning opportunities about coaching: (a) brief discussions of coaching, (b) moderate discussions of coaching, and (c) extended discussions of coaching.

Contribution: The overarching contribution of the present study is that is forwards an understanding of coaches' job-embedded professional learning opportunities about coaching. Implications for research are discussed.

Keywords: system of negotiation, professional development, coaching

INTRODUCTION

Coaching is a widely adopted professional development (PD) approach to improve teaching and learning in United States schools (Russell et al., 2020; Woulfin & Rigby, 2017). The word coach refers to individuals with part- or full-time release from teaching who provide PD to teachers to enhance teaching and learning (Baker et al., 2021). The rapidity with which coaching has spread throughout the United States is not surprising. As a job-embedded PD structure that is responsive to teachers' needs, coaching has garnered strong theoretical (Desimone & Pak, 2017; Gibbons & Cobb, 2017) and growing empirical (Campbell & Malkus, 2011; Harbour et al., 2018; Kraft et al., 2018) support, which has further bolstered its appeal.

While much of the extant coaching research has explored how coaches can provide PD for teachers (Gillespie & Amador, 2024; Kochmanski & Cobb, 2024), there is an emerging research base examining coaches' own PD opportunities (Jarry-Shore et al., 2023; Saclarides & Kane, 2021; Stein et al., 2022). Indeed, there are myriad reasons why coaches must be provided with ongoing PD once they assume their coaching roles. For one, coaches' work is multifaceted, complex, and takes years to learn how to do well (Kane & Saclarides, 2023). Furthermore, funding coaches' positions is expensive (Knight, 2012); hence, districts want to ensure they are adequately supporting coaches so that they may see a return on their financial investment. Additionally, coaches are often "annointed and/or appointed without the proper background related to their content, pedagogical, and leadership knowledge and skills" (Fennell, 2017, p. 9). Relatedly, it is often assumed that "effective teachers will be effective coaches and that these teachers will need little support as they transition into their new roles" (Chval et al., 2010, p. 192). In sum, as coaching is both a complex and expensive PD structure, coaches must be provided with ongoing learning opportunities so that they can be effective in their positions.

To be successful in their roles, coaches must have expertise in content, pedagogical, and leadership knowledge domains (Association of Mathematics Teacher Educators [AMTE], 2024; Polly et al., 2013). Here, we elevate the importance of coaches being provided with opportunities to deepen their leadership knowledge to learn about the art of coaching. This is particularly pressing because as classroom teachers, coaches likely had opportunities to deepen their understanding of content, pedagogy, and

student thinking; however, coaches likely had very few (if any) opportunities to learn how to coach adult peers. Hence, the overarching purpose of this discourse analysis is to contribute to the nascent research base exploring how coaches learn about coaching. Specifically, when our coach participants created opportunities to talk about coaching, we ask:

(a) What was the substance of coaches' talk? and

(b) How did the coaches position themselves relative to one another and, respectively, relative to the facilitator, depending on the substance of their talk?

LITERATURE REVIEW

We begin by discussing the growing research base about coaches' ongoing professional learning opportunities. Then we summarize research for the two activity structures in which our mathematics coaches participated: book club and doing the math.

Professional Learning for Coaches

There is a small yet growing research base exploring coaches' own opportunities for PD. However, there has been little attention devoted to understanding coaches' embedded PD opportunities in school districts, which is one contribution this study seeks to make.

One body of literature has focused on preparation programs at institutions of higher education that support coach learning (Baker, 2022; Myers et al, 2020; Strutchens & Martin, 2017; Swars et al., 2018; Swars Auslander et al., 2024). Such literature has explored the modalities that might best support coach learning, such as having preparation programs that are completely in person, completely online, or a combination of both in person and online (Spangler & Ovrich, 2017). Literature has also explored how to provide coaches with meaningful field experiences to enhance their learning, as well as whether to utilize cohort models for admitting students into preparation programs (Spangler & Ovrich, 2017). Additionally, such literature has sought to understand whether particular program assignments and/or components spurred changes in coaches' knowledge, practices, and/or beliefs (Baker, 2022; Myers et al., 2020; Swars et al., 2018; Swars Auslander et al., 2024).

An additional body of literature has explored coaches' opportunities for PD as embedded in grant-funded research projects (Campbell & Malkus, 2011; Gningue et al., 2013; Jackson et al., 2015; Russell et al., 2020). To illustrate, in the context of their large-scale National Science Foundation (NSF) funded project, Campbell and Malkus (2011) examined relationships between student achievement and elementary mathematics coaching. The participating coaches were provided with "substantive academic coursework" (p. 452), which encompassed two leadership courses and five mathematics courses. Furthermore, as part of a different NSF-funded project, Gningue et al. (2013) explored mathematics teacher leader learning by providing participants with ongoing coursework focusing on leadership, pedagogy, and content.

Taken together, the existing literature seeking to unpack coaches' ongoing PD opportunities reflect best-case scenarios. That is, the research highlighted above showcases what is possible when coaches are supported in preparation programs at institutions of higher education, as well as through federally funded research projects. While such research importantly contributes to the field, questions remain regarding how school districts can support coach learning through PD as an embedded part of coaches' day-to-day work.

Activity Structures That Might Support Coach Learning

Here, we discuss the two activity structures in which our mathematics coaches engaged in the context of our study:

(a) book club, and

(b) doing the math.

Given the limited research discussing these activity structures with coaches as participants, we draw upon teacher education literature more broadly where pre-service and/or in-service teachers were participants.

Book club

A book club is "a series of meetings where teachers discuss a common professional text read for the purpose of developing pedagogical understandings and considering how these understandings impact student learning" (Andrei et al., 2015, pp. 3-4). To date, most of the extant research base has explored the use of book clubs to support pre-service teacher (e.g., Burbank et al., 2010; Hall, 2009; Mensah, 2009) and in-service teacher (e.g., Andrei et al., 2015; Gardiner et al., 2013; Kooy, 2006) learning. We underscore Andrei et al.'s (2015) observation that "More research needs to be done with a variety of teacher populations in other US contexts." In lifting this activity structure (Prediger et al., 2019) and applying it to coaches, a book club might involve coaches reading a common professional text to deepen their understanding of content, pedagogy, students, adult learning, and coaching activities.

The benefits of book clubs are well-documented in the research literature. By engaging in a book club, participants can: deepen their understanding of pedagogy (Andrei et al., 2015); engage in reflective thought (Kooy, 2006; Mensah, 2009; Pretorius & Knoetze, 2013); be supported to experiment with new, ambitious pedagogies (Gardiner et al., 2013); and form community with co-participants (Andrei et al, 2015; Riley, 2021). In spite of the benefits that book clubs may afford their participants, this activity structure does not come without challenges. For example, in their study with secondary pre-service teachers and practicing teachers, Burbank et al. (2010) observed that many participants faced structural challenges, such as a lack of sufficient time to engage in their respective book clubs.

Last, research points to dimensions along which book clubs might vary (Kooy, 2006), including their purpose, duration, text, and the use of protocols to guide conversations. Of particular interest to the current investigation is the use of protocols, given their influence on the learning opportunities that become available to participants as they co-engage in learning activities (Elliott et al., 2009; Lesseig et al., 2017). Hence, we elaborate upon that dimension here. Some studies featured book clubs that were loosely structured as participants' comments, questions, and interests guided the discussion (e.g., Mensah, 2009; Riley, 2021). Other studies featured book clubs in which the facilitator pre-prepared questions to help facilitate a conversation about the main book themes (e.g., Lyons & Ray, 2014).

Doing the math

While doing the math, participants (e.g., pre-service teachers, in-service teachers, coaches, etc.) engage in "guided investigations of disciplinary content" through a high-cognitive demand mathematics task (Gibbons & Cobb, 2017, p. 417). The overarching purpose is to support participants to experience mathematical processes and content (Loucks-Horsley et al., 2009, p. 178) and foster a stance of inquiry (Gibbons & Cobb, 2017, p. 417).

The research base on doing the math has chiefly featured in-service teachers (Borko et al., 2005; Koellner et al., 2011; Taton, 2015). Across this literature, findings indicate that doing the math can support the development of participants' mathematical knowledge for teaching (Borko et al., 2005; Elliott et al., 2009; Lesseig et al., 2017). For example, Borko et al. (2005) partnered with 16 in-service teachers through a two-week PD project that sought to enhance teachers' understanding of algebraic concepts using various activities, including doing the math. Findings indicate a slight difference between teachers' pre- and post-test scores on content knowledge assessments administered at the project's start and conclusion. Findings also indicate that teachers enhanced their ability to offer diverse solution strategies for solving the test's problems. Furthermore, findings indicate that while doing the math, participants' confidence as doers of mathematics and self-efficacy can be enhanced as participants are provided with opportunities to confront their own gaps in mathematical understanding.

Last, research has also explored how doing the math sessions might be facilitated to maximize participant learning. For example, Elliott et al. (2009) provided 36 facilitators of mathematics teachers' PD with six days of learning activities that were designed to support them in facilitating mathematically rich environments for teachers while doing the math. One salient finding was the importance of facilitators slowing down to pose questions and press (Andrews-Larson et al., 2017) at key moments while doing the math to enhance participant learning. Another important finding was facilitators' reluctance to make participants' misconceptions about mathematics public, and address participants' negative perceptions of their own mathematical competence. Regarding effective facilitation, other research has explored the use of protocols while doing the math (Elliott et al., 2009; Lesseig et al., 2017). Overall, findings indicate that protocol questions influence participants' learning opportunities. We now discuss the system of negotiation, which was our analytic lens to examine coaches' micro-interactions.

Framework: System of Negotiation

Systemic functional linguistics (SFL) is a theory to describe language through systems of choices that serve different functions towards what and how meaning is constructed (Halliday & Matthiessen, 2014; Martin & Rose, 2007). A defining feature of SFL is the recognition that language varies across genres and disciplines, and those variations create opportunities for learning. To this end, SFL has increasingly provided a framework for teacher education and PD (e.g., Chang, 2024; Troyan et al., 2022), although it is not yet widely used for the development of coaches. "Language" is broadly defined to include spoken and written text in addition to other modes of communication (e.g., gesture, images). The potential for creating shared meaning is realized through the choices speakers make, and those choices can be thought of as a "toolkit" (Humphrey & Feez, 2024). Our purpose in this study is to document the tools from the toolkit coaches use to better understand their work. As we noted above, much existing research on coach learning has focused on different activity structures and whether those structures might lead to changes in practice. Techniques of SFL help illuminate the learning that happens in between, as coaches construct their own understandings of their discipline.

The *system of negotiation* is an analytic tool of SFL to describe a system of choices speakers have related to how interpersonal relationships get constructed through speech (DeJarnette, 2022; DeJarnette & González, 2015; González & DeJarnette, 2015; Love & Suherdi, 1996; Martin & Rose, 2007; Ventola, 1987). The system of negotiation is an extension of Halliday's (1984) proposition that language is built on four interpersonal speech functions–giving or receiving either information or action. In interaction, there are two basic types of exchanges: *Knowledge* exchanges occur when a speaker requests (e.g., "what are the coaching implications?") or provides (e.g., "the chapter describes the importance of PD") information. *Action* exchanges occur when someone requests (e.g., "would you write our ideas on the board?") or provides (e.g., "I'll take notes here") an action. Interactions among individuals can be organized according to these four basic moves, with a range of dynamic moves speakers use when messages are misheard, misunderstood, or become a matter of disagreement (DeJarnette & González, 2015; Love & Suherdi, 1996). Individuals are positioned relative to one another according to who is giving information or action (a *primary* knower or actor) or requesting information or action (a *secondary* knower or actor). This framework is consistent with theorizations that acknowledge the complementary and reciprocal nature of positioning (Davies, 2023). In particular, the system of negotiation is a tool to document how positions are enacted on a moment-by-moment basis through talk.

The system of negotiation has been useful in mathematics classroom research to document how students and teachers position themselves relative to one another while learning together (DeJarnette, 2018, 2022; González & DeJarnette, 2015). More broadly, techniques of SFL have illuminated how facilitators create community in virtual learning environments (de Oliveira et al., 2013; Lander, 2015), how language shifts in classroom settings (Kartika-Ningsih, 2020), and how students develop consensus through scientific argumentation (Governor et al., 2021). The focus of the present study applies to the framework of SFL at the level of coaches, rather than teachers and students, to describe how coaches position themselves and one another when learning

Table 1. Participant information

Participant	Years taught	Grade levels previously taught	Years coached
Facilitator Beth	13	5th, 6th	4.0
Coach Aubrey	4	5th, 6th	1.5
Coach Chloe	4	4th	4.5
Coach Cora	18	1st, interventionist for 4th & 5th	1.5
Coach Josie	22	1st, 3rd	4.5
Coach Kayla	15	3rd, 4th	4.5
Coach Lauren	18	5th	4.5
Coach Lola	25	Kindergarten, 3rd	4.5
Coach Maggie	8	4th, 5th	4.5
Coach Maya	26	2nd, 4th, 5th	4.5
Coach Nicole	30	3rd, 4th, 5th, middle school	2.5
Coach Nora	13	1st, 2nd, 3rd	4.5
Coach Riley	12	Kindergarten, 1st	0.0

the work of coaching. Coaching literature has characterized some of the tensions in how coaches are positioned over time with respect to teachers (Hibbert et al., 2008; Hunt & Handsfield, 2013; Lorentzen, 2022), but there is less understanding of how they learn together. Expanding techniques that have been applied in teaching and learning contexts, this study documents the dynamic ways that coaches position themselves and construct meaning together when engaged in their own PD.

METHOD

Context and Participants

This study was situated in a public school district, which we refer to as Hamilton, which is located in a southeastern, metropolitan United States area. Hamilton has content-focused coaches who provide PD in a single academic discipline (e.g., mathematics, English language arts), and we partnered with the elementary mathematics coaches for this study. Each elementary mathematics coach is stationed at a single elementary school, does not evaluate teachers, reports to their building principal, and has full-time teaching release. The primary responsibility of each elementary mathematics coach is to provide PD to teachers to support the teaching and learning of mathematics. As a group, the elementary mathematics coaches met twice a month to participate in PD that was planned and facilitated by a district-level administrator, who we refer to as facilitator Beth.

We selected Hamilton as our participating district for several reasons. The overarching purpose of this investigation was to better understand how school districts provide job-embedded and ongoing PD for coaches to learn about coaching. At the time of the study, the Hamilton coaches were not simultaneously enrolled in preparation programs at institutions of higher education, nor were they participating in PD as part of a grant-funded initiative. Instead, PD for Hamilton coaches was embedded into the district-wide schedule as all coaches participated in professional learning opportunities twice every month, as facilitated by a district-level administrator. In this way, we believed the Hamilton coaches presented us with a unique opportunity to learn more about our phenomenon of interest.

Our participants included 12 elementary mathematics coaches and one district-level administrator. All participants identified as female, 10 identified as White, and three identified as Black. Collectively, our participants had between four and 40 years of experience as classroom teachers. Additionally, eight coaches had been elementary mathematics coaches in Hamilton since the initiation of its coaching program, four years prior to this study's inception, which made them veteran coaches by Hamilton's standards. Three other elementary mathematics coaches were entering their first or second year as coaches. Facilitator Beth, a former Hamilton elementary mathematics coach, was entering the spring semester of the first full year in her current administrative role. Additional participant information can be found in **Table 1**.

Data Sources

We primarily drew upon transcribed video recordings of the coaches' PD sessions. From January to March of 2019, the first author attended, observed, and video-recorded six of the eight full-day PD sessions for the Hamilton elementary mathematics coaches. During this time, she also recorded field notes. Each full-day session encompassed five activities:

(a) doing the math,

(b) successes and challenges,

(c) logistics,

(d) book study, and

(e) curriculum guide writing.

All session recordings were professionally transcribed and segmented according to the activity that took place, and the doing the math and book study transcripts are the focus of this analysis.

The doing the math segments lasted from 20 to 40 minutes (28 minute mean). Facilitator Beth utilized a protocol that had been developed by her predecessors to structure these segments. The protocol questions, included in each week's agenda, were:

(a) How would you approach this problem?,

Table 2. Information about observed book club and doing the math segments

SN	Date	Book club time (min)[a]	Doing the math time (min)	Chapters read from book[b]	Name of math task completed
1	1/18/19	9	40	NA	Basketball bargain
2	2/1/19	31	39	NA	Super bowl cheesy pretzel poppers
3	2/15/19	40	20	1, 2	Valentine probability
4	3/1/19	87	26	3, 4	Pocket change
5	3/15/19	132	20	5, 6, 7	March madness
6	5/3/19	76	22	8, 9	Birthday beach bash

Note. We only have field notes for session 1 of doing the math. Given that the first activity in which coaches participated was doing the math, and that session 1 marked the first day of data collection, the first author wanted to wait to introduce herself and the study during a natural break before turning on all audio and video recording devices; [a]Session 1 for the book club session was short because the coaches only voted for and selected the book they would read during their book club; [b]The coaches did not read any chapters from the book during session 1 because they were selecting their book, nor did they read any chapters during session 2 because they engaged in a previewing notice and wonder activity; & SN: Session number

(b) What grade level/standard do you think this addresses?,

(c) Does this task have a low floor and/or a high ceiling?, Justify your response., and

(d) Is this or is this not a good task? Justify your response.

Facilitator Beth selected all mathematics tasks, which came from the National Council of Teachers of Mathematics' problem of the week, or yummymath.com.

The book study segments lasted from 9 to 132 minutes (63 minute mean), with some sessions taking longer because facilitator Beth embedded time for the coaches to read. The coaches elected to read the book *Becoming the math teacher you wish you'd had* by Tracy Zager. Unlike the doing the math sessions, the book study sessions were not facilitated with a particular protocol and instead open-ended questions were loosely used to guide the conversation such as "I'd love for you to share your thoughts, your interactions with the chapter, things that you thought would be worthwhile to share, overall reactions" and "Take a minute to reacquaint yourself with the chapter. And then we'll share some ideas and feedback from that chapter." Additional details about the doing the math and book study sessions can be found in **Table 2**.

Given that the first author collected data for this study, her position warrants explicit consideration. The first author has prior experience as a public school mathematics teacher, instructional coach, and administrator, and identifies as a mathematics education researcher. While this background provided helpful contextual knowledge, during data collection, it may have shaped what she noticed during observations and attended to in her field notes. Additionally, the lead author's presence during the mathematics coaches' PD sessions may have shaped the coaches' interactions during these sessions by influencing their talk and/or patterns of engagement. She attempted to mitigate these issues by maintaining a non-evaluative presence, conducting multiple site visits to establish familiarity and trust, and reflect on how her presence and prior experiences could shape the study.

Analytic Technique

After all sessions were transcribed, the relevant segments for further analysis were identified. To achieve this, the first author began by reading all transcripts to identify instances in which an opportunity was presented to discuss coaching work. For example, a coach may have initiated the segment by discussing a resistant teacher or a time they provided PD for teachers. Or the segment may have been initiated by the facilitator with a direct question about how the book's content could be applied at the coaches' schools. Nevertheless, when an opportunity discursively surfaced that provided the coaches with an invitation to talk about coaching, the entire episode was coded and separated for further analysis.

Next, we used the system of negotiation to code interactions. The system of negotiation organizes speech into negotiation *moves* that are grouped into negotiation *exchanges*. Coding the transcripts involved an iterative process of

(1) parsing turns of speech into negotiation moves,

(2) coding moves according to their speech function, and

(3) grouping moves into negotiation exchanges.

A move, within the system of negotiation, is "the smallest unit of speech after which a speaker change could occur" (DeJarnette, 2022, p. 520). A move could be an entire turn of speech, or a turn of speech could be divided into multiple moves if there are natural breaks. We coded moves according to the interpersonal function they served in interaction. Although the full system of negotiation includes over 20 move types (see, e.g., González & DeJarnette, 2015), we focused our analysis on the four predictable speech functions defined by Halliday (1984) and a small subset of dynamic moves (**Table 3**). The four basic speech functions, which provide the building blocks of most interactions, describe whether a speaker's move positions them as a primary knower (K1), secondary knower (K2), primary actor (A1), or secondary actor (A2).

In addition to the four speech functions, we coded "follow up" moves when speakers acknowledged a prior statement. We also coded "challenge" moves when speakers challenged a prior statement and "clarifying" moves when speakers responded to a K1 move by adding clarification. The purpose for coding challenge (ch) and, respectively, clarifying (clfy) moves was to document potential sources of disagreement or new understanding, which we viewed as opportunities for learning. We coded follow up moves (K2f) because they were useful for marking the end of one exchange and the transition to a new exchange, which we describe more in the following paragraph. As we parsed the transcript and coded moves, any move that did not fit one of the descriptions included in **Table 3** was left blank.

Table 3. Codes from the system of negotiation

Code	Move	Description
K1	Primary knower	Speaker makes a statement of information, positioning oneself as a *primary knower*.
K2	Secondary knower	Speaker poses a question or, alternatively, suggests an idea to be evaluated by someone else, positioning oneself as a *secondary knower*.
A1	Primary actor	Speaker performs an action or denotes performing an action, positioning oneself as a *primary actor*.
A2	Secondary actor	Speaker requests an action, positioning oneself as a *secondary actor*.
K2f	Follow up by secondary knower	Speaker performs a "follow up" move (e.g., "mm hmm," "okay") after information has been provided through a K1 move.
ch	Challenge	Speaker challenges the prior move.
rch	Respond to challenge	Speaker responds to a challenge move.
clfy	Clarification	Speaker clarifies something another speaker has said.

Table 4. An example of our analysis using the system of negotiation

Speaker	Move	Negotiation move	Object of negotiation
Beth	And your teachers, as you said, Riley, they can't be experts in every area. But they need to have content knowledge in order to instruct appropriately.	K1	Teaching
Lauren	I would go beyond that and say not just content knowledge, but content confidence.	ch	Teaching
Beth	Yes.	rch	Teaching
	So that's an implication for your PD, too—is to hold sessions in your school for your building content confidence.	K1	Coaching
	What might that look like?	K2	Coaching
Lola	I think doing math.	K1	Coaching
Beth	I think so too.	K2f	Coaching

Note. K1: Primary knower move; K2: Secondary knower move; A1: Primary actor move; A2: Secondary actor move; K2f: Follow up by secondary knower; ch: Challenge move; rch: Respond to challenge move; & clfy: clarification move

As we parsed turns of speech into negotiation moves and coded those moves according to **Table 3**, we also grouped moves into negotiation exchanges. A negotiation exchange consists of a set of moves contributing to the exchange of a specific piece of information or action. It is defined according to the "object of negotiation"––by which we mean the information or action at stake––and the positioning of speakers (Halliday, 1984). An exchange can be as short as a single move (e.g., a speaker performs a K1 move to state information), or it can be several moves long (e.g., a speaker performs a K2 move to pose a question, another speaker performs a K1 move to respond, someone challenges or clarifies, then there is a response to the challenge). By definition, a single person can only perform one type of speech function in a single negotiation exchange. The same person cannot, for example, perform a K1 move and a K2 move within a single exchange. If a person performed a K1 move followed by a K2 move, it would reflect the start of a new exchange because of the repositioning of speakers. Also, different speakers cannot perform the same type of move within a single exchange. So, for example, if one person performed a K1 move, and then another person performed a K1 move with the same object of negotiation, those two moves would constitute two exchanges. Grouping moves into exchanges helped document how speakers built upon one another's ideas in their talk, as well as how the substance of an interaction changed over time.

Table 4 includes an example of our analysis using the system of negotiation. The excerpt in **Table 4** comes from the book club discussion in Session 3. The group had been discussing the anxiety that some elementary teachers experience related to teaching math. At the beginning of **Table 4**, facilitator Beth performed a K1 move to state that teachers–although they cannot be experts in everything–need content knowledge. Beth's move at the start of **Table 4** is coded as a K1 move because it was a statement of information. Coach Lauren, in direct response to Beth, said, "not just content knowledge, but content confidence." We coded Lauren's move as a challenge move, because she challenged the completeness of Beth's statement. When Beth responded, "yes," we coded that as a response to Lauren's challenge. Beth's following move, about the implications for PD, reflects the start of a new exchange–Beth performed another K1 move, but it was a new statement about PD rather than a statement about teaching. Following her statement, Beth posed a question, "what might that look like?" Her question was coded as a K2 move and, because Beth shifted positions (from K1 to K2), it initiated the start of a new exchange. Lola performed a K1 move to respond to Beth's question, and Beth followed up.

As we coded negotiation moves and grouped them into exchanges, the final phase of our analysis was to code exchanges according to the object of negotiation. The unit of analysis for the object of negotiation was the exchange. For this final step of coding, we developed categories based on prior literature documenting the foci of coach talk during PD. Specifically, we coded objects of negotiation according to whether an exchange was focused on

(a) math,

(b) students,

(c) teaching, or

(d) coaching (see **Table 5**).

In **Table 4**, the first exchange was coded as "teaching," because the substance of Beth's statement was teachers' needs. In the second exchange, Beth shifted to talking about the implications for coaches conducting PD with teachers, and therefore we coded this exchange as "coaching." In the third exchange, because "that" in Beth's question referred to the PD she brought up in her

Table 5. Foci of coach talk

Code	Definition
Coaching	This code involves instances in which the participants discuss the work of coaching. This may encompass instances in which the participant discusses a time they provided PD for a teacher or discusses PD implications from the book for their school sites.
Math	This code encompasses instances in which the participants discuss mathematics as a discipline. This involves discussion of: their perceptions of mathematics, their perceptions of mathematicians, mathematics anxiety, the standards and/or grade-level at which certain standards are taught, their personal experiences learning mathematics, their process for doing mathematics, teachers' processes for doing mathematics, the rigor of a mathematics task, and the importance of particular mathematics concepts.
Process	This code encompasses instances in which the participants discuss the process, actions, and/or next steps for the conversation. This includes open-ended invitations or prompts from the facilitator to other coaches to share their thoughts, as well as instances in which the participants discuss how they annotated, highlighted and/or otherwise engaged with the texts.
Students	This code encompasses instances in which the participants discuss student learning foundations, student engagement, students' mathematical capabilities, student risk-taking in the mathematics classroom, as well as the particular grade-level for a group of students.
Teaching	This code encompasses instances in which the participants discuss: the mathematics content knowledge teachers need to effectively teach mathematics, their perceptions of teaching mathematics, teaching for conceptual vs. procedural understanding, instructional routines, features of a high-quality mathematics task, the participants' prior teaching experiences, discourse and differentiation in the mathematics classroom, and any references to classroom culture and community.
Other	This code encompasses instances that do not map onto the other categories.

Table 6. A comparison of negotiation exchanges during book club and doing the math segments

Session type	Math	Students	Teaching	Coaching	Other
Book club	104	57	224	250	69
Doing the math	18	4	47	34	2

Note. Values represent the frequency of coded negotiation moves by object of negotiation within each session type

prior move, we also coded that exchange as focused on coaching. Overall, the excerpt includes one exchange in which the participants spoke about teaching followed by two exchanges about coaching.

To achieve reliability in our coding, we first parsed transcripts into moves and coded moves according to the speech function. After several iterations of coding together, we independently coded six discussion segments, totaling 48 turns of speech, from book club session 3. Of those 48 turns of speech, we reliably parsed 40 turns into negotiation moves, for 83% reliability in our parsing. The 40 turns that we parsed identically resulted in 47 negotiation moves. We reliably coded 42 of those moves, for 89% reliability in our coding of negotiation moves. Based on that outcome, the three authors divided the rest of the transcripts to parse and code moves, and we discussed ambiguous cases during our regular meetings. Because the object of negotiation used a larger unit of analysis and fewer codes, we divided this coding and shared it during meetings to come to consensus.

FINDINGS

We organize our findings into two subsections. First, we provide a high-level overview of our analysis, summarizing the substance of coaches' talk and, respectively, the positioning we observed among participants during the two activity structures. Then, we further characterize different patterns of interaction we documented among participants to describe how talk about coaching became integrated with other objects of talk and, relatedly, how the coaches' and the facilitator's positioning supported this work.

Overview of Negotiation Exchanges and Moves During the Two Activity Structures

When opportunities surfaced to talk about the work of coaching, those conversations persisted longer during book club segments compared to doing the math segments. Our analysis of book club segments yielded 704 total negotiation exchanges, while our analysis of doing the math segments yielded 105 exchanges. The mean length of an exchange in book club segments was 1.5 moves, with exchanges varying from one to six moves. The mean length of an exchange in doing the math segments was 1.6 moves, with exchanges varying from one to eight moves. Within the book club segments, when opportunities to talk about coaching surfaced, the majority of exchanges were coded as having "coaching" as the object of negotiation (**Table 6**). In 250 exchanges, the coaches and facilitator Beth exchanged knowledge or action directly related to the work of coaching. Exchanges coded as "teaching" were also relatively frequent during book club segments. Exchanges about math or, respectively, students, occurred less than half as often as teaching or coaching exchanges. Overall, when participants of the PD initiated conversations about coaching during book club segments, the substance of their talk traversed the four levels of their work–math content, students, teaching, and coaching–but they most frequently stayed on the work of coaching and, respectively, teaching.

Doing the math segments were similar in their distribution of negotiation exchanges, even though the overall number of exchanges was smaller. During doing the math segments, when opportunities surfaced to talk about the work of coaching, most exchanges had teaching as an object of negotiation, followed by coaching (**Table 6**). Exchanges about mathematics and, respectively, students were far less frequent. This outcome implies that, when opportunities surfaced to talk about coaching, participants in the conversations most frequently shifted to talk about the work of teaching.

Table 7 and **Table 8** summarize the types of negotiation moves performed by each participant for each category of negotiation exchange during the book club and, respectively, doing the math segments.

Table 7. A summary of moves by speaker during book club segments

Speaker	Math			Students			Teaching			Coaching		
	K1	K2	ch/clfy	K1	K2	ch/clfy	K1	K2	ch/clfy	K1	K2	ch/clfy
Aubrey	1	1	0	1	0	0	21	0	0	17	1	0
Beth	6	1	0	0	0	0	41	2	1	36	12	2
Josie	0	0	0	0	0	0	15	0	0	17	1	1
Kayla	0	0	0	0	0	0	8	0	0	10	0	0
Khloe	0	0	0	1	0	0	0	0	0	4	0	0
Lauren	3	0	0	0	0	0	5	2	1	18	0	0
Lola	0	0	0	0	0	0	25	0	1	30	1	0
Maggie	1	0	0	0	0	0	45	2	1	26	0	1
Maya	0	0	0	1	0	0	6	0	0	9	0	0
Michelle	0	0	0	0	0	0	2	0	0	1	0	0
Nicole	0	0	0	0	0	0	2	0	0	14	0	1
Riley	0	0	0	0	0	0	1	0	0	2	0	0
Total[a]	11	2	0	3	0	1	171	6	4	184	15	5

Note. For each object of negotiation category (math, students, teaching, and coaching), columns report counts of primary knower moves (K1), secondary knower moves (K2), and combined challenge (ch)/clarification (clfy) moves & [a]Total represents the sum of coded moves across all speakers during book club segments

Table 8. A summary of moves by speaker during doing the math segments

Speaker	Math			Students			Teaching			Coaching		
	K1	K2	ch/clfy	K1	K2	ch/clfy	K1	K2	ch/clfy	K1	K2	ch/clfy
Aubrey	1	1	0	1	0	0	3	0	0	1	0	1
Beth	6	1	0	0	0	0	16	2	0	8	0	3
Josie	0	0	0	0	0	0	0	0	0	0	0	0
Kayla	0	0	0	0	0	0	0	0	0	0	0	0
Khloe	0	0	0	1	0	0	0	0	0	1	0	0
Lauren	3	0	0	0	0	0	8	0	1	12	0	0
Lola	0	0	0	0	0	0	6	0	0	2	0	1
Maggie	0	0	0	0	0	0	2	0	1	0	0	0
Maya	0	0	0	1	0	0	2	0	0	0	0	0
Michelle	0	0	0	0	0	0	0	0	0	0	0	0
Nicole	0	0	0	0	0	0	0	0	0	0	0	0
Riley	0	0	0	0	0	0	0	0	0	0	0	0
Total[a]	11	2	0	3	0	0	37	2	2	24	0	5

Note. For each object of negotiation category (math, students, teaching, and coaching), columns report counts of primary knower moves (K1), secondary knower moves (K2), and combined challenge (ch)/clarification (clfy) moves & [a]Total represents the sum of coded moves across all speakers during doing the math segments

Several patterns emerge from **Table 7** and **Table 8** that are consistent across the two activity structures. First, regardless of the object of negotiation (i.e., the substance of participants' talk), the use of K1 moves far outpaced any other type of negotiation move. In other words, coaches constructed meaning by building upon one another's ideas. Exchanges that included K2, challenge, or clarifying moves tended to be more extended discussions of a topic, and we provide examples of those in the following section. It is also noteworthy that most negotiation moves during book club segments came from four coaches–Aubry, Josie, Lola, and Maggie–and facilitator Beth, indicating these were the most talkative participants of the discussions. Facilitator Beth talked more than any of the coaches during Doing Math segments, with Lauren and Lola making some contributions as well. Although the PD included 11 coaches, our findings related to what coaches talked about, and how they were positioned during that talk, primarily reflects the experiences of these more active participants.

With respect to our two research questions, the substance of coaches' talk was most often the work of coaching or the work of teaching. Additionally, although facilitator Beth tended to talk more than the coaches, the coaches also mostly positioned themselves as primary knowers, indicating their authority to contribute knowledge. These findings provide a high-level picture of the patterns in participants' talk, but there is more insight to be gained about how coaches learn about the work of coaching from investigating some of the variation within this pattern.

Levels of Coaching Discussion

A primary contribution of the system of negotiation is to articulate how meaning gets made through the integration of individuals' positioning and the objects of negotiation. Using this lens, after coding segments and aggregating types of moves and objects of negotiation, we reviewed each segment to help characterize the prevalence of coaching talk and how coaches used K2, challenge, or clarifying moves to facilitate that talk. The segments in our data set can be divided according to three levels of coaching discussion (**Table 9**):

(a) brief discussions of coaching,

(b) moderate discussions of coaching, and

(c) extended discussions of coaching.

Table 9. Number of conversational episodes based on level of coaching discussion

Session type	Extended	Moderate	Brief
Book club	3	9	29
Doing the math	0	3	5

Table 10. Brief conversation about coaching in the book club session

Exchange	Speaker	Move	Negotiation move	Object of negotiation
1	Lola	… I think that came out. I loved that often when she says, and the teacher did such and such with the best intentions. She always says that we really are—and I mean that's just a great reminder for us to remember that the teachers that we're working with are … they have the best intentions when they're doing what they're doing with their students.	K1	Coaching

Note. K1: Primary knower move; K2: Secondary knower move; A1: Primary actor move; A2: Secondary actor move; K2f: Follow up by secondary knower; ch: Challenge move; rch: Respond to challenge move; & clfy: clarification move

Table 11. Moderate conversation about coaching in the book club session

Exchange	Speaker	Move	Negotiation move	Object of negotiation
1	Josie	We do not expect [teachers] to be experts in math. But, we … no, I wouldn't say that. I wouldn't say that. I would say, I don't know what I would say.	K1	Coaching
	Maggie	Well I think you were saying …	K1	Coaching
	Riley	Teachers are the experts at teaching.	K1	Coaching
	Josie	Right, in instruction.	K1	Coaching
2	Maggie	I think that we were having a conversation similar to this at lunch [...] [Teacher] said, going through training and honing my own math understanding has made me a better teacher of the math that I'm expected to teach. Because I had to grapple with these concepts myself before … and that was profound and that's what we want people to say.	K1	Teaching
	Beth	Right	K2f	Teaching
3	Beth	And that's what Lauren just said. She thinks the way to change that is professional development.	K1	Coaching
	Maggie	Right	K2f	Coaching
4	Beth	And I think [the author of the text] even went on to say that -	K1	Coaching
5	Josie	Yeah. On the next page where it talks about … it's in the next to the last paragraph. It says, the problem, though, is that we've skipped a step. We moved right into a new way to teach math without addressing teachers' personal histories with, and understanding of, mathematics. That says to me, we need more PD as it relates to content.	K1	Coaching
	Beth	Exactly	K2f	Coaching

Note. K1: Primary knower move; K2: Secondary knower move; A1: Primary actor move; A2: Secondary actor move; K2f: Follow up by secondary knower; ch: Challenge move; rch: Respond to challenge move; & clfy: clarification move

We explain each of these categories, and provide examples, in the subsections below.

Brief discussion of coaching

Our analytical process revealed five segments during the doing the math sessions and 29 segments during the book club sessions in which coaches engaged in *brief discussion of coaching*. Such episodes featured

(a) a single exchange that contained "coaching" as the object of negotiation or

(b) K1 moves with "coaching" as the object from only one coach.

To illustrate *brief discussions of coaching*, we provide one example, a book club excerpt (see **Table 10**). Here, Lola pivots the object of negotiation to "coaching" for a single exchange through the use of a K1 move. In the move, she connects the ideas about teaching in the text to her work with teachers as a coach. After this single exchange, the object of negotiation shifts away from "coaching" and does not return in the episode.

Moderate discussion of coaching

Our analytical process revealed three episodes during the doing the math sessions and nine episodes during the book club sessions in which coaches engaged in *moderate discussion of coaching*. Such episodes featured

(a) more than one exchange that contained "coaching" as the object of negotiation and

(b) K1 moves with "coaching" as the object from at least two coaches not including facilitator Beth.

To illustrate *moderate discussions of coaching*, we provide one book club excerpt (see **Table 11**). Here, Josie initiates a coaching conversation with a K1 move in which she ponders the necessity of mathematical expertise for teachers from her position as a coach. In this same exchange, with "coaching" as the object of negotiation, Riley and Maggie each contribute a K1 move that builds upon Josie's wondering. In the second exchange, Maggie shifts the object of negotiation to "teaching" as she considers her own experiences as a teacher. In exchanges three and four, Beth returns to "coaching" as the object of negotiation as she connects the conversation to Lauren's prior ideas (earlier in the episode but not part of this excerpt) about PD and the text. This prompts a

Table 12. First portion of the extended conversation about coaching

Exchange	Speaker	Move	Negotiation move	Object of negotiation
1	Lola	I think it's just important that the professional development is to recognize that this is what we're dealing with. People have such deep-seeded feelings about this, and true anxiety. They can't think about it because it makes them anxious. So I think that sometimes, we have to remember and recognize that.	K1	Coaching
	Beth	Yes	K2f	Coaching
2	Beth	People sweat to think about math. There are true physical reactions that people have to the anxiety that they have around math. And the fact that you, as coaches, especially with elementary teachers, there are many more elementary teachers that will tell you they can't do math than a middle school or a high school teacher, because they're gonna say that's what they do—is math.	K1	Coaching
3	Beth	And your teachers, as you said, Riley, they can't be experts in every area. But they need to have content knowledge in order to instruct appropriately.	K1	Teaching
	Lauren	I would go beyond that and say not just content knowledge, but content confidence.	ch	Teaching
	Beth	Yes	rch	Teaching
4	Beth	So that's an implication for your professional development, too—is to hold sessions in your school for your building content confidence.	K1	Coaching
5	Beth	What might that look like?	K2	Coaching
	Lola	I think doing math.	K1	Coaching

Note. K1: Primary knower move; K2: Secondary knower move; A1: Primary actor move; A2: Secondary actor move; K2f: Follow up by secondary knower; ch: Challenge move; rch: Respond to challenge move; & clfy: clarification move

final K1 move with "coaching" as the object of negotiation from Josie (exchange five) who explicitly connects ideas in the text to offering more PD that address teachers' personal histories with mathematics. After exchange five, the conversation moves away from coaching and does not return for the remainder of the episode.

Extended discussion of coaching

Our analytical process revealed three episodes during the book club session in which coaches engaged in *extended discussion of coaching*. Such episodes featured

(a) greater than 10 exchanges that contained "coaching" as the object of negotiation,

(b) K1 moves with "coaching" as the object from at least three coaches not including facilitator Beth, and

(c) at least one K2, challenge, or clarify move with "coaching" as the object from a coach not including facilitator Beth.

There were no extended discussions of coaching in the doing the math sessions.

To illustrate an episode of *extended discussion of coaching* during the book club, we highlight three connected excerpts from a single episode with 38 exchanges with 17 containing "coaching" as the object of negotiation. In the first portion of the excerpt (shown in the **Table 12**), Lola discusses the importance of recognizing teachers' anxiety towards mathematics during PD using a K1 move with "coaching" as the object of negotiation. In the second and third exchanges, Beth elaborates on Lola's statement through K1 moves, which evokes a challenge move from Lauren, who argues the issue under consideration is more about confidence than knowledge. Beth acknowledges this challenge in exchange four and uses a K2 move to invite the coaches to consider the implications of the conversation on the PD they offer teachers.

After Lola responds to Beth's K2 move, the object of negotiation shifts to "math" and "teaching" for eight exchanges in which the coaches discuss possible reasons why doing mathematics creates anxiety for teachers. In exchange 14, Josie repositions "coaching" as the object of negotiation and the resulting conversation is shown in **Table 13**. Josie shares a story about a teacher acting defiantly when asked to engage in mathematics tasks as part of a PD experience. In exchange 15, Lola uses a K2 move to ask others to consider the reason behind the teacher's actions. In exchange 16, Aubrey enters the conversation, shifting the object of negotiation to "math" as she briefly reminds the group about the diversity of strategies the coaches used to solve mathematical tasks during the doing the math activity structure. This frames her K1 move in exchange 16 in which she returns the object of negotiation to "coaching" to recommend a solution to Josie's challenge.

In the next six exchanges, the coaches continue considering possible reasons as to why teachers push back against engaging in mathematics during professional learning activities. We rejoin the conversation in **Table 14** with Josie's K1 move (exchange 24) with "math" as the object of negotiation, in which she shares how doing mathematics tasks can be humbling for her. In exchange 26, she shifts the object back to "coaching" positing that teachers, like students, should be expected to engage in doing mathematics. Josie then uses a K2 move to invite others to share their perspectives about her statement (exchange 26). After a K1 response from Beth, Josie challenges Beth's response (exchange 27), shifting the object the object of negotiation to "math". This challenge leads to a K1 response for Lola about coaching (exchange 28) in which Lola assertively shares that doing mathematics is a critical part of professional learning for teachers.

In this example, we highlight several conversation features that make extended discussion of coaching unique from the shorter, and more frequently found episodes of brief and moderate discussion of coaching.

Table 13. Second portion of the extended conversation about coaching

Exchange	Speaker	Move	Negotiation move	Object of negotiation
14	Josie	I don't know that I've ever shared this, but after [person] encouraged us to do problems with teachers…	K1	Coaching
	Beth	You mean on your PLCs?	clfy	Coaching
	Josie	Yes.	K2f	Coaching
	Josie	I did that, and it was a first grade group. And I was not there for this meeting, for this particular meeting. But one teacher went on a tirade about how they were not treated as professionals, and that it was nothing against the person who did it, but, how insulting it was to be given a math problem to solve. Of course, they went on a tear about other things, too. It wasn't just me—but that was sort of the icing on the cake. How, what do you say about, number one—I said, do I need to just lay low? And they said, why don't we just lay low for a while? But this has been a number of years ago. So, of course that teacher is still there. But … and I didn't say the grade level, so y'all didn't hear that.	K1	Coaching
15	Lola	Do you feel that may have been a defense?	K2	Coaching
	Josie	Yes	K1	Coaching
16	Aubrey	Because even amongst us, we all do the problems totally different.	K1	Math
17	Aubrey	And that's the same way that you can present this with teachers …	K1	Coaching

Note. K1: Primary knower move; K2: Secondary knower move; A1: Primary actor move; A2: Secondary actor move; K2f: Follow up by secondary knower; ch: Challenge move; rch: Respond to challenge move; & clfy: clarification move

Table 14. Third portion of the extended conversation about coaching

Exchange	Speaker	Move	Negotiation move	Object of negotiation
24	Josie	I like to be challenged, you know? And I can't do it. What is humbling to me is, sometimes we talk about a problem that might have been … and I'm thinking, wait a minute. What are they really asking here? Is this easier than I think it is, or am I making more out of it? And then when I hear what grade level it can be used at, I'm a little humbled sometimes.	K1	Math
	Riley	Me too	K2f	Math
25	Josie	This is what our students are being asked to do. I don't think it's unfair to ask teachers to do that.	K1	Coaching
26	Josie	Do y'all?	K2	Coaching
	Beth	No	K1	Coaching
27	Beth	But I think Lola hit the nail on the head. And I think that's what these two chapters in the book really address, is that there's a true fear and uncomfortable feeling when it comes to being faced with something that you don't feel confident with. Nobody likes to feel off-guard, or at disequilibrium. And I think that, for many of us—myself included—at times, whether it be a math problem or any situation where you just feel sort of ill-at-ease. And so, some people…	K1	Math
	Josie	But it wasn't that hard of a problem.	Ch	Math
28	Lola	Sometimes it's just that whole thing of, how many t-shirts can you get. You know? [CROSSTALK] … $2.00. it's the numbers. It's not even … You know, the studio day, and I'll keep writing about this, y'all. I'm telling y'all. I'm gonna keep doing it until I get some friends on board. You do the math. That's part of the day. The math that you're getting ready to do with the kids is, you do that math. And you take it apart. And then you go and watch the kids do it.	K1	Coaching

Note. K1: Primary knower move; K2: Secondary knower move; A1: Primary actor move; A2: Secondary actor move; K2f: Follow up by secondary knower; ch: Challenge move; rch: Respond to challenge move; & clfy: clarification move

First, this episode featured two challenge moves from coaches that briefly shifted the object of negotiation away from coaching to offer a different perspective about the mathematics or teaching pertinent to the discussion of coaching. In both instances, the challenge moves with objects of negotiation other than coaching appeared to catalyze additional coaching discussion. Second, the episode contains two K2 moves from coaches about coaching. Each move initiated exchanges with "coaching" as the object of negotiation. Third, Beth–as the facilitator–played a key role in the episode. In exchange four, Beth used K1 moves followed by a K2 move to invite the group to consider how Lola's general statement about coaching might impact the PD they provide teachers. This move appears to catalyze the subsequent, extended coaching discussion.

DISCUSSION AND IMPLICATIONS

With the proliferation of coaching programs in United States schools (Woulfin & Rigby, 2017), it is of tantamount importance that coaches are provided with ongoing PD so that coaches can learn how to be effective coaches. Yet research exploring coaches' learning opportunities is very much in development. This growing research base has tended to focus on PD that is available in higher education settings, such as in the context of certification programs (e.g., Baker, 2022; Swars Auslander et al., 2024), as well

as PD offerings in grant-funded projects (e.g., Campbell & Malkus, 2011; Russell et al., 2020). This research is important because it illuminates what is possible for coach learning in best-case scenarios when coaches have access to substantive expertise, funding, and resources. However, this research does not reveal the typical PD offerings that reach typical coaches who are employed in United States school districts. Hence, one overarching contribution of the present study is that it forwards an understanding of coaches' job-embedded professional learning opportunities.

Beyond this overarching contribution, our findings push the field of coaching forward as we offer an up-close view of what it looks like for coaches to learn about coaching. While the research literature is clear about the various types of expertise coaches must possess to do their jobs effectively (e.g., content knowledge, pedagogical knowledge, and leadership knowledge; AMTE, 2024; Polly et al., 2013), it is particularly important for coaches to be provided with opportunities to develop their expertise as it relates to coaching. This is because as classroom teachers, coaches likely have few opportunities to learn how to coach their adult peers. Hence, using the system of negotiation, our study breaks ground as it offers an up-close perspective of what it looked like for one group of mathematics coaches to learn about coaching.

Our study forwards three characterizations of coaching talk. That is, when presented with opportunities to discuss the work of coaching, our participants either engaged in brief, moderate or extended coaching discussions. These discursive characterizations are important because they illuminate the broad spectrum of learning opportunities that are possible as coaches learn about the work of coaching. We contend that opportunities that are short and to-the-point, as in the case of the brief discussions, still provided coaches with a chance to interact with the complex work of coaching. Furthermore, opportunities that are more sustained, as in the case of the extended discussions, created an opening for the coaches to cultivate a prolonged and arguably deeper conversation about coaching. As the field continues to grapple with how to support coaches to learn about coaching, we hope this study's three characterizations of coaching talk provide a helpful starting point for further conversations.

Additionally, we wish to highlight that when coaches were provided with opportunities to discuss coaching, the conversations did not exclusively focus on coaching from start to finish. As previously discussed, the segment may have been initiated with a direct, facilitator-prompted question about how the coaches' professional learning could be applied at the coaches' school sites. The segment may have also started with a coach-initiated story about a resistant teacher or time the coaches facilitated PD. After this invitation to discuss coaching, the participants did discuss coaching, but coaching was often intertwined with other objects of negotiation, including teaching, mathematics, and students (see **Table 6**). Recall the excerpts provided above to illuminate the moderate and extended conversations about coaching. During these important discussions, the participants toggled back and forth between talking about coaching, teaching, mathematics and students. We elevate this finding because we believe it helps broaden the field's understanding of what it means to learn about coaching. Because of the complexity of coaching (Kane & Saclarides, 2022) coupled with the different forms of expertise coaches must possess (AMTE, 2024; Polly et al., 2013), we contend this makes it difficult to learn about coaching. We assert that learning about coaching does not necessarily mean having conversations about coaching exclusively. Instead, and as our findings reveal, learning about coaching involves traversing different knowledge layers.

Following situated learning theories (Greeno, 2006; Greeno & Gresalfi, 2008), it is important to recognize the contextual factors that may have influenced the coaches' opportunities to learn about coaching. Here, we focus on the following:

(a) the use of protocols, and

(b) the curriculum.

Previous research has pointed to the influence that protocols can have on learning opportunities that are discursively made available to individuals who are co-participating in an activity structure (Elliott et al., 2009; Lesseig et al., 2017). Furthermore, prior book club and doing the math literature has pointed to the use of protocols as one dimension of variation in the context of these activity structures (Elliott et al., 2009; Lesseig et al., 2017; Lyons & Ray, 2014; Mensah, 2009). In our study, and as previously discussed, we highlight that a protocol was used during the doing the math sessions. The protocol questions seemed to privilege the coaches' problem solving strategies as well as teaching and learning issues related to the mathematics task. On the other hand, during the book study, facilitator Beth did not use a protocol and instead asked open ended questions to guide the conversation. Given that the doing the math protocol centered questions related to mathematics, pedagogy and students, it is not surprising that as compared to the book club, coaches had relatively few opportunities to discuss coaching.

Additionally, previous literature has made strong connections between curricular resources and learning opportunities (e.g., Collopy, 2003; Remillard & Bryans, 2004), which is another salient contextual feature that may have influenced coaches' opportunities to learn about coaching in this context. That is, while doing the math, the coaches' curriculum consisted of high-cognitive demand mathematics tasks, and during the book club sessions, the coaches read the book *Becoming the math teacher you wish you'd had*. Conventional wisdom suggests that coaches might have fewer opportunities to learn about coaching while doing a high-cognitive demand math task in comparison to having broader discussions about the teaching and learning of mathematics, which is exactly what our results showed. And yet, the distribution of objects of negotiation was similar, even though there were fewer exchanges in total. Overall, we elevate the importance of considering contextual features that may have shaped coaches' learning opportunities, opening up conversations about some topics while closing others down.

Implications for Research

We offer several implications for researchers who wish to build upon this study's findings. This study took place in one relatively well-resourced school district in which coaching was well-established and largely institutionalized as a PD structure. Furthermore, and among our sample of coaches, we partnered with 12 elementary mathematics coaches only. While this was an intentional sampling decision to showcase what is possible regarding coaches' own opportunities for professional learning about coaching, results do not necessarily generalize to other contexts. Hence, future search should seek to partner with a larger sample

of different types of coaches (e.g., content-focused and cognitive) who are steeped in different types of schools (e.g., middle school and secondary) and contexts (e.g., title I) to further build upon and nuance this study's findings. Furthermore, future research should seek to explore coaches' opportunities to learn about coaching in activity structures that differ from those featured in this study.

Additionally, this study chiefly made use of transcripts generated from coaches' PD sessions and the system of negotiation was leveraged as an analytic tool to understand coaches' opportunities to learn about coaching. However, such discursive analyses were not coupled with observations from coaches' work supporting teaching and learning to understand the extent to which their professional learning, in turn, impacted their practice as coaches. Hence, future research might seek to understand connections between coaches' PD and changes in coaches' practice as they strive to support instructional improvement. Such research might combine observations of coaches as they engage in PD with observations of their work in schools providing PD for teachers. Additionally, such research might include interviews with coaches that ask them how their professional learning impacts their practice, as well as interviews with teachers to seek their perspectives on their experiences engaging with their coach.

Last, in seeking to understand our broad phenomenon of interest–how coaches learn about coaching– we leveraged the system of negotiation as this analytic tool enabled us to understand the substance of coaches' talk, as well as how the coaches positioned themselves and one another. However, we wonder about other analytic tools that might be productively utilized to help paint a more nuanced and comprehensive understanding of coaches' in-the-moment learning opportunities. Hence, we call upon the field to help uncover additional discursive tools that will help researchers understand and analyze coaches' opportunities to learn.

Implications for Practice

We conclude by offering several implications for practice. As previously mentioned, we identified three levels of talk about coaching (brief, moderate, and extended). In contrast to brief episodes, extended conversations afforded coaches with more robust and sustained opportunities for coaching-related learning. However, in order to support coaches to access these extended learning opportunities, facilitators of coaches' professional learning may need to deploy intentional discursive scaffolds to foster deeper inquiry. This might include supporting coaches to rehearse or role-play coaching dilemmas and/or collaboratively analyze coaching artifacts. Last, our findings showed that there was uneven discursive contributions among the mathematics coaches, which likely created uneven learning opportunities among the group. Thus, facilitators of coaches' PD should carefully attend to this issue when designing and implementing learning experiences for coaches to ensure that quieter, more reserved, perhaps novice coaches have just as many opportunities to discursively grapple with coaching ideas as coaches who are more vocal, assertive, and experienced. This might be achieved by leveraging protocols that require contrasting perspectives and/or assigning rotating roles.

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