EXPLORING THE DISCURSIVE DIFFERENCES OF MATHEMATICS COACHES WITHIN ONLINE COACHING CYCLE CONVERSATIONS

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We present the results of our analysis regarding the discursive tendencies of four mathematics coaches during planning and debriefing conversations within online coaching cycles. Guided by the Content-Focused model of coaching (West & Cameron, 2013), the coaching cycles are a single component of a larger online professional development model for middle school mathematics teachers in rural areas (Choppin, Amador, & Callard, 2015). This paper explores the different ways coaches talk with teachers during coaching conversations. Building on prior studies from literacy coaching (Ippolito, 2010), we found five different discursive moves for how coaches talk with teachers: invitation, suggestion, explanation, description, and evaluation. We use these moves to identify similarities and differences in the discursive tendencies of coaches. The implications of these discursive tendencies are provided.

Keywords: Inservice Teacher Education/Professional Development, Online Learning, Coaching

Introduction

Coaching teachers to support their mathematics instruction is a promising practice to improve pedagogical implementation and content knowledge (Campbell & Griffin, 2017). However, not all coaching processes are the same. There are three commonly referenced models: Content-Focused Coaching (West & Cameron, 2013), Instructional Coaching (Knight, 2007), and Cognitive Coaching (Costa & Garmston, 2016). Although each model approaches the process of coaching differently, they all articulate the same three sequential cycle components: a) a pre-conference discussion to plan a lesson, b) a collaborative lesson implementation, and c) a post-conference discussion to debrief the lesson (Bengo, 2016). The three-part coaching cycle is a prominent professional learning activity mathematics coaches use when working with individual teachers to improve their practice (Mudzimiri, Burroughs, Luebeck, Sutton, & Yopp, 2014). Despite the use of a similar three-part cycle, the way these cycles are delivered varies depending on the type of coaching and the personnel involved.

The research on literacy coaching highlights two competing stances for how coaches talk with teachers: reflective or directive (Deussen, Coskie, Robinson, & Autio, 2007; Ippolito, 2010; Sailors & Price, 2015). Coaches using a *reflective* stance facilitate improvement of teaching practices and student learning through collaborative inquiry (Ippolito, 2010). Coaching moves associated with this stance include probing questions and low-inference, non-evaluative observations as means to catalyze teacher thinking (Costa & Garmston, 2016). In contrast, a *directive* coaching stance involves the use of advice, suggestions, and evaluative feedback to support teachers to implement new teaching practices (Ippolito, 2010). Because these different coaching stances can have significant impact on the teacher's learning and uptake of new practices (Costa & Garmston, 2016), it is crucial for researchers within mathematics education to explore the existence and impact of these stances during coaching.

We examined the existence of reflective and directive stances of four middle school mathematics coaches during their coaching cycle conversations with teachers. Specifically, the

study was guided by the question: What were the different discursive tendencies of four mathematics coaches within the planning and debrief conversations of a coaching cycle? This question is relevant to mathematics education as variability within coaching has been a dominant theme in existing literature. Although coaching and coaching cycles have been shown to have the potential to improve teaching practices and student learning, results have been inconsistent (Gibbons & Cobb, 2016). Variability in coaching experience, the types of activities coaches use, and the context surrounding the coaching activities often vary dramatically (Ellington, Whitenack, & Edwards, 2017). This variability has been attributed to the inconsistent impact of coaching on improving teaching and learning (Campbell & Griffin, 2017). The purpose of this study is to open up an examination of coaching discursive tendencies to explore the variability of coaching stances.

Methods

In this study, experienced coaches, all guided by the Content-Focused Coaching model (West & Staub, 2003), took part in coaching activities as part of a larger online professional learning project (Choppin et al., 2015). The project paired coaches using Content-Focused Coaching with middle grades teachers and was designed to improve teacher practices for implementing high cognitive demand tasks and facilitating mathematical discourse (Smith & Stein, 2011). Using a cohort model, nine teachers from grades 5-8 participated in a two-year online professional development program. The fully online professional development program was specifically created for mathematics teachers working in rural areas and provided teachers with an online course, online teaching labs, and video-assisted online coaching cycles.

Participants

Three of the four coaches (see Table 1) working with the cohort teachers had more than ten years of prior coaching experience and had worked collaboratively using the Content-Focused coaching model (West & Staub, 2003) for at least three years. Each coach was assigned one to three teachers, with whom they each engaged in five total online coaching cycles over the course of two years. The data for this inquiry were collected from the planning and debrief conversations of the four project coaches and their assigned teachers.

Table 1: Coach Demographics

Coach	Years of Classroom Experience	Years Coaching	Teaching and Administrative Certifications
Alvarez	28	21	Permanent Certification in K-5, 6-8 and 9-12 Mathematics
Bishop	28	14	Secondary Mathematics State 1, Secondary Mathematics State 2
Lowery	14	13	Special Education (N-12); Elementary Education (PreK-6); Reading (N-12)
Reiss	15	0	Elementary (N-6), Special Edu (K-12), Mathematics (7-12)

Context: Coaching Cycles

Each online coaching cycle was designed to support successful implementation of new discourse practices (e.g., Smith & Stein, 2011) learned during the online course and teaching labs. Each cycle followed the same structure. First, the coach and teacher had a planning

discussion using video conferencing technology, Zoom, around a proposed lesson. Based on the Content-Focused Coaching model, the focus of this planning meeting was on the mathematical lesson goals, the tasks that would be used in the lesson, anticipated student thinking, and instructional practice goals for the teacher (West & Staub, 2003). The coach used a variety of discursive moves to support the teacher during this planning discussion. Following the planning meeting, the teacher video- and audio- recorded themselves teaching the lesson using Swivl Technology (automated video camera and recording). After the lesson was taught, the coach and teacher asynchronously watched and annotated the lesson video. Annotations included written comments to the other person about the contents of the video. The coaching cycle concluded with the coach and teacher having a debrief discussion that utilized the annotations to reflect on student thinking in relation to the lesson goals and the teacher's goals for instructional practice. The planning and debriefing discussions were the focus for analysis for this project and typically lasted forty to sixty minutes.

Data Collection and Analysis

For this study, we collected and analyzed the planning and debriefing conversations of one coaching cycle for all coaches and their assigned teachers. This resulted in the analysis of 15 conversations (eight planning and seven debriefing), which were transcribed verbatim. Transcripts were parsed into stanzas which we defined as including both the coach's discursive move and the teacher's response, as well as text needed for context (Saldaña, 2013). A stanza served as the unit of analysis. We then used a comprehensive codebook created by the research team to analyze all stanzas. To create the codebook, we first open-coded coaching transcripts for our data set using constant comparative methods (Corbin & Strauss, 2008). We then synthesized our initial open codes with the discursive moves associated with reflective and directive coaching stances described in the three primary coaching models (Costa & Garmston, 2016; Knight, 2007; West & Cameron, 2013). For example, Cognitive Coaching strongly promotes a reflective coaching stance using the discursive moves of invitational questioning and descriptive paraphrasing (Costa & Garmston, 2016). Similarly, Instructional Coaching leans towards reflective coaching stances by encouraging coaches to collect and share observation data using descriptive but non-evaluative discursive moves (Knight, 2007). Finally, Content-Focused Coaching suggests a fluid balance of both coaching stances through the use of reflective questioning moves as well as directive suggestions and explanations when appropriate (West & Cameron, 2013).

The open codes, combined with the literature on coaching, resulted in a broad codebook that accounted for the discursive moves and the content of the conversations. The coaching discursive moves section accounted for five broad categories within this codebook (see Figure 1). Then we connected each of the five discursive moves to either a reflective or directive coaching stance by again returning to the coaching literature. Suggestions, explanations, and evaluations connected to a directive coaching stance as those moves all involve the coach sharing their thinking and opinions with the teacher which in turn positions the coach as an expert (Sailors & Price, 2015). Invitations and descriptions connected to a reflective coaching stance because those moves position the teacher as the thinking authority since neither move contains the thinking or opinion of the coach (Ippolito, 2010).

Coaching Stance	Discursive Move	Description	Example
Reflective	Invitation	Statement or question that invites the teacher to reflect or respond	"What might be some strategies we could use to increase student participation?"
	Description	Statements that share a direct observation and do not contain inference, interpretation, judgement or opinion	"I noticed that during the turn-and-talk, Alex did not say anything to his partner."
Directive	Suggestion	Statement that recommends an action	"I think we should use a turn-and-talk prior to the whole class discussion."
	Explanation	Statements that provide an interpretation or rationale of an event, interaction, or mathematical idea	"Turn-and-talk is a powerful strategy to use prior to a whole class discussion because it increases student participation."
	Evaluation	Statements that offer praise or critique	"I think it was a great idea to use a turn-and-talk."

Figure 1: Excerpt from the Larger Codebook Focusing on Coaching Discursive Moves

To analyze the planning and debriefing meetings between the coach and teacher, the stanzas from the transcripts were coded by pairwise teams of researchers for the discursive moves of the coach, the discursive moves of the teacher, and the content being discussed within each stanza. (Note that only the discursive moves of the coach are considered for this study.) The researchers then calculated Kappa to determine consistency with coding and met to reconcile disagreements. Kappas ranged from 0.39 to 0.65, considered moderate to strong reliability (Landis & Koch, 1977).

Two examples are provided to clarify the ways the five discursive codes were used to analyze how the coach talked to the teacher. The following is an excerpt from a coach:

One of the really nice moves you can do if the group shares a thought about something, and it's somewhat ambiguous, is you can turn to the class and say, "Can someone else use their own words to explain what Dave is saying?"

This comment from the coach was coded as a suggestion because the coach recommended the teacher use a question to promote additional student discourse. In this instance, the suggestive discursive move implied the coach held a directive coaching stance.

It is also possible that multiple discursive moves were used by a coach within one stanza. To illustrate this, the following is an excerpt from a transcript in which Reiss (pseudonym) uses a descriptive move (lines 1 - 4) followed by an invitational move (lines 5 - 6):

1 I kept hearing kids saying, "No, four, no five. You need four, you need five."
2 You asked the question well, how many boxes do you need to take the bagels home
3 was the question you asked.
4 I heard the answers four and five come out from kids.
5 What mathematical idea is at play here, and where do we think the kids understanding
6 is for that idea?

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In this example from a debriefing interview, Reiss recalled the contents of the lesson and details what she heard the teacher and students say without inference or evaluation. She then questioned the teacher about the mathematics and students' understanding. Since she first described student and teacher actions and then invited dialogue, this was coded as both a description and an invitation. Both of these discursive moves suggested the coach was operating from a reflective stance at that moment in the conversation since no interpretation or opinion was provided by the coach enabling the teacher to construct their own meaning from the situation.

After we coded the transcripts, the total number of each of the five discursive moves used by a coach within a conversation was calculated. For example, during a planning conversation containing 31 stanzas, Reiss used a total of 15 invitations, nine descriptions, three suggestions, 11 explanations, and zero evaluations. These counts indicate the coach held both reflective and directive stances during the conversation. However, the higher combined frequency of invitational and descriptive moves (24 total) when compared to suggestive, explanation, and evaluative moves (14 total) suggested the coach favored a reflective coaching stance. Because coaches were assigned different numbers of teachers and thus had different numbers of total coaching conversations, we calculated an average for each move by dividing the total number of discursive moves used in all conversations by the total number of conversations. For example, Reiss used a total of 52 invitational moves during four conversations resulting in an average of 13 invitational moves for a single coaching conversation (see Table 2).

To characterize reflective coaching stances using the discursive moves, we divided the sum of the number of invitational and descriptive moves by the number of coaching conversations. This provided the average number of moves in a conversation associated with a reflective coaching stance. Similarly, we determined the average number of directive stance moves by combining suggestions, explanations, and evaluations. For example, during a single conversation, Reiss averaged 22.5 combined discursive moves connected to a reflective stance and 17 combined moves associated with directive coaching (see Table 2).

Results

In total, we analyzed 594 stanzas from 15 total conversations (eight planning and seven debriefing meetings). When examining the frequency of the five discursive moves used by each coach, we found both consistency and variability. As an example of a consistency, each of the four coaches was similar in their use of descriptive moves as the average ranged from 7 to 9.5 moves per conversation. The coaches were also relatively consistent in their use of explanation moves. However, there existed larger variability within the coaches' use of invitational, suggestive, and evaluative moves. To illustrate this variability within invitational moves, Alvarez had the highest average of 22 invitational moves per conversation compared to Reiss who averaged the lowest with 13 moves per conversation. For suggestions, Bishop had the highest average with 13.7 moves per conversations whereas Alvarez used only 3 suggestive moves per conversation. Bishop also had the highest level of evaluation moves with an average of 6.5 per conversation compared to Reiss who averaged only one evaluation move per conversation.

Reflective and Directive Stances by Coach

The differences in the number of directive (invitation and description) and reflective (suggestive, invitational, and evaluative) moves suggested the existence of variability in how the four coaches balanced the two stances during the conversations (see Table 2). For example, Alvarez averaged 29 discourse moves associated with a reflective stance compared to only 12 directive moves during a single conversation. This finding suggested the coach strongly favored

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a reflective stance. In contrast, Bishop averaged more directive moves per conversation (32.2) than reflective moves (25.8) indicating the coach favored a directive stance. The discursive moves for Lowery and Reiss were more evenly balanced but implied both coaches slightly favored a more reflective stance.

Table 2: Average Number of Discursive Moves Per Coaching Cycle Conversation

	Reflective		Directive			Combined Reflective Moves	Combined Directive Moves
Coach	Invitation	Describe	Suggest	Explain	Evaluate		
Alvarez	22	7	3	7	2	29	12
Bishop	18	7.8	13.7	12	6.5	25.8	32.2
Lowery	18.7	7.7	11	9.3	4.3	26.4	24.6
Reiss	13	9.5	7	9	1	22.5	17

Reflective and Directive Stances Based on Planning or Debriefing

To further explore the discursive tendencies of coaches, we separately examined the data based on the conversation type. Specifically, we analyzed the frequency of discursive moves used by coaches during planning and debriefing conversations. For example, Lowery averaged 13 suggestive moves during a planning conversation and seven during a debriefing conversation (See Table 3). Again, this analysis revealed a small number of additional consistencies and further highlighted distinct differences in discursive tendencies between coaches. As an example of one such consistency, all coaches used more descriptive moves during debriefing conversations than in planning conversations suggesting each coach made a potential shift to the use of more reflective coaching stances during debriefs.

Reflective and Directive Variability

To illustrate the additional variability in discursive tendencies, Table 3 shows the average number of discursive moves per coaching cycle conversation for each coach.

Table 3: Average Number of Discursive Moves Per Coaching Cycle Conversation

	Planning Conversation					Debrief Conversation				
	Reflective		Directive			Reflective		Directive		
Coach	Inv	Desc	Sugg	Exp	Eval	Inv	Desc	Sugg	Exp	Eval
Alvarez	20	0	3	8	1	24	14	3	6	3
Bishop	21.7	6.7	19.7	11	4	14.3	9	7.7	13	8.3
Lowery	21.5	2	13	10	1	13	19	7	8	13
Reiss	16.5	6	5	9	0	9.5	13	9	9	2

Note: Invitation (Inv), Descriptive (Desc), Suggestive (Sugg), Explanatory (Exp), Evaluative (Eval)

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Bishop's highest combined frequency of suggestive, explanatory, and evaluative moves in both the planning and debrief conversations portrayed a more directive coaching stance when compared to the other three coaches. In contrast, Alvarez's low frequency of suggestive and evaluative moves combined with a higher total frequency of invitational and descriptive moves suggested this coach held a highly reflective coaching stance during planning and debrief conversations. The more balanced discursive moves of Reiss and Lowery provided evidence of an evenly balanced coaching stance. We provide three examples of the variability with the discursive moves. First, Bishop and Alvarez varied greatly with their use of suggestions during planning conversations. Bishop provided 19.7 suggestive moves per planning conversation yet Alvarez only offered three per planning conversation. As a second example from debriefing conversations, Reiss and Lowery differed greatly with their use of evaluative moves. Reiss averaged only two evaluative moves per debrief conversation compared to Lowery's 13 evaluative moves per debrief conversation. As a final example, Alvarez averaged 24 invitational moves during debriefing conversations whereas Reiss averaged only 9.5 per debrief conversation. These three examples regarding the differences in discursive moves further demonstrates the existence of variability in how each coach balanced reflective and directive coaching stances. Additionally, the examples highlight large potential differences in the learning experiences of the teachers based on their coach.

Discussion

Our findings suggest the existence of certain common discursive tendencies within the four coaches. For example, all four coaches were relatively consistent in their use of descriptive moves. All four coaches also used more descriptive moves during debriefing conversations than during planning conversations. This finding is consistent with Knight's (2007) recommendation that coaches should collect, share, and examine descriptive, low-inference data with teachers during a debrief conversation. This finding is significant as it suggests each of the four coaches enacted a coaching practice identified by existing coaching literature as productive in supporting teacher learning. However, our findings were consistent with prior literacy coaching studies (e.g. Heinke, 2013) and highlighted many substantial differences in the coach's discursive tendencies. These differences could have a significant impact on the learning experiences of the teachers (Costa & Garmston, 2016). For example, a teacher planning with Bishop received many more suggestions than a teacher planning with Alvarez. Similarly, a teacher debriefing with Lowery encountered far more evaluative moves than a teacher debriefing with Reiss.

Extant research indicates that most coaches tend to use both reflective and directive stances during coaching conversations (e.g. Deussen et al., 2007). The differences in discursive tendencies also suggest variability in how each of four coaches balanced reflective and directive coaching stances despite the fact that each coach was operating within the Content-Focused Coaching model. In fact, authors of the Content-Focused Coaching model advocate for the use of both stances (West & Cameron, 2013). However, neither the coaching model nor prior research on coaching provide guidance on how to properly balance these differing stances to best support teacher learning. Additionally, these works have not closely examined the actual discursive moves coaches are using with considerations about how this may influence teacher learning. Now that we know the types of discursive moves the coaches in our project are using, it would be beneficial to examine how this relates to teachers' responses in the moment of coaching.

Future Directions

Building from the variance in mathematics coaching described by Campbell and Griffin (2017), these findings expose an additional source of variability. Our data show that even with highly experienced coaches drawing from the same coaching model, there existed considerable variability in the discursive tendencies of coaches. Likewise, although our intent was not to compare coaches based on demographics, the coach with the least coaching experience (Riess) showed tendencies similar to Lowrey who had been coaching for over a decade. These discursive differences imply the coaches used distinct coaching stances which, like other forms of variability found within coaching, likely have an impact on teacher learning (Costa & Garmston, 2016). Further exploring the possible relationship between experiences and coaching practices could reveal interesting insights that would provide information on how to best support both coaches and teachers.

These findings are also significant in that they generate new questions for coaching in mathematics education. The existence of discursive variability between coaches, even within the favorable context found in our study, warrants further exploration into the underlying causes of these differences. It is possible that the diversity in coaching discourse is due to the coaches being responsive to the varying needs of the individual teacher. However, it also plausible that these differences result from beliefs, preferences, or personal interaction styles that are inherent of the coach. Prior research on literacy coaching has highlighted that coaching discursive patterns are primarily static and not adapted based on the varying learning needs of the teacher (Collet, 2012). However, research on the adaptive nature of coaching discourse is scarce within literacy coaching (Collet, 2012) and, to the best of our knowledge, non-existent within the specific context of mathematics coaching. To fill this gap, our future analysis will use data from additional coaching cycles to compare both the discursive moves of a single coach across multiple teachers and the way in which coaches shift their discursive tendencies across multiple coaching cycles with the same teacher.

Future studies should also build on these results to examine the relationship between the discursive tendencies of coaching and teacher learning (Heinke, 2013). Although certain coaching models make claims about the affordances and drawbacks of certain types of discursive moves (e.g. Costa & Garmston, 2016), further research is needed to better understand the how different discursive tendencies affect the teacher being coached. This understanding, combined with the results of our study, can provide practicing coaches with sound guidance about how to strategically balance and employ different discursive moves. This understanding could also lead to more strategic partnering of coaches and teachers by matching the discursive tendencies of a coach to the unique learning needs of a teacher.

Acknowledgments

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