MATHEMATICS COACHES' SUGGESTIONS: FOUCS ON TOPIC, LESSON PHASE, AND CLARITY TO SUPPORT TEACHERS' INSTRUCTIONAL PRACTICE

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We examined the suggestions mathematics coaches provided to teachers as part of one-on-one coaching cycles. The purpose was to understand the object (content) of the suggestions, the lesson phase in which the suggestion would occur, and the clarity of the suggestion (how actionable the suggestion would be if the teacher followed the suggestion). Twenty-three coaching planning meetings were recorded, transcribed, and analyzed. Findings indicated that suggestions commonly focused on lesson design (how the lesson plan should be completed) or teacher questions (actual questions the teacher should ask). Almost half of the suggestions were about the explore phase (or middle) of the lesson and a majority of the suggestions were coded as medium or high clarity, meaning the coach clearly articulated what the suggestion would look like in the classroom. Implications for coaching and future coaching research are provided.

Keywords: Professional Development, Coaching, Online Professional Development, Directive, Mathematics Teacher Educator

Coaching is a professional development process used to support teachers to improve their instruction (West & Staub, 2003). Within mathematics education, content-focused coaching (e.g., West & Cameron, 2013) is a common model. Content-focused coaching involves iterative cycles in which a coach works one-on-one with a teacher with a focus on students' mathematical learning goals. Each coaching cycle contains three sequential components: a pre-conference discussion to plan a lesson; a collaboratively taught lesson; and a post-conference discussion to debrief the lesson (Bengo, 2016; West & Staub, 2003). Coaching is a dialogic endeavor in which the coach responds to multiple simultaneous obligations, such as designing a high-quality lesson, supporting the teacher to learn mathematics content and pedagogy, and establishing a trusting and productive relationship with the teacher. Given the complexity of coaching, it is important to explore the levers by which coaches manage these obligations (Gibbons & Cobb, 2016). A primary mechanism coaches employ is to suggest a course of action to the teacher. Doing so serves several purposes in relation to the obligations listed above: first, suggestions influence the design of the lesson; second, suggestions offer new or alternative courses of action for the teacher, thus creating opportunities to encounter new content and pedagogy; and third, suggestions push the boundary of the relationship between coach and teacher. From a research perspective, suggestions provide insights into the coach's perspectives on mathematics teaching and learning, and the coach's priorities with respect to a given coaching cycle. In short, studying the suggestions of coaches is a way to delve into the complexities of coaching.

There is a need for more research on how mathematics coaches using a content-focused coaching model interact with teachers (Gibbons & Cobb, 2016); especially around coaches'

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suggestions to teachers. Our study is situated within an innovative online mathematics video coaching experience that we adapted from an in-person modality to an online modality. We describe our three-part coaching model, with a specific focus on the video-assisted interactions between the coach and teacher. We studied the suggestions coaches provided to mathematics teachers by looking at the *Object* (content) of the suggestion, the *Lesson Phase* to which the suggestions applied, and the *Clarity* of the suggestion. Specifically, we answer the following research question: What is the nature of the suggestions coaches offered to teachers when using a content-focused coaching model?

Theoretical Framing and Related Literature

We theoretically frame this paper from a perspective of discourse, with a focus on how conversational turns occur, with attention to the particular stances of actors in a conversation (Ippolito, 2010). Research on coaching has highlighted two competing stances for how coaches talk with teachers: reflective or directive (Deussen et al., 2007; Ippolito, 2010; Sailors & Price, 2015). Coaches using a *reflective* stance emphasize collaborative inquiry in which the coach elicits ideas from the teacher; these ideas become the basis of the coach-teacher discussion (Ippolito, 2010). Coaching moves associated with a reflective 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 suggestions and evaluative feedback (Ippolito, 2010). The challenge in content-focused coaching is to know how and when to provide a teacher with direct assistance, such as a suggestion, and when to employ an inquiry stance (West & Staub, 2003). It is crucial to understand how coaching moves, particularly suggestions, impact teacher learning and the uptake of new practices.

Despite the importance of mathematics coaches' strategic decision making when choosing appropriate actions when working with teachers, little is known about how mathematics coaches using a content-focused coaching model interact with teachers in ways they envision supporting teachers (Gibbons & Cobb, 2016). Furthermore, researchers such as Witherspoon et al. (2021) specifically call for new research on how direct assistance from a coach during a coaching cycle supports a teacher to implement new instructional practices. We focused on the suggestions coaches gave teachers in a coaching cycle (which included a planning meeting, lesson implementation, and a debriefing meeting) to characterize the focal topics for suggestions. The way coaches use suggestions and what they actually suggest can impact opportunities for teacher growth (Costa & Garmston, 2016; Heineke, 2013, Witherspoon et al., 2021); yet discerning moments and techniques for sharing suggestions with teachers is a primary challenge for coaches (West & Cameron, 2013). Researchers have identified that suggestions occur in the process of coaching (Gillespie et al., 2020), as noted with directive coaching stances (Deussen, et al., 2007; Ippolito, 2010; Sailors & Price, 2015), but researchers have yet to characterize coaches' suggestions in ways that would support professional developers, coaches, and researchers to consider the efficacy of suggestions in influencing the professional growth of teachers.

Methods

In our video-assisted online coaching model, coaches engaged teachers in typical content-focused coaching cycles that included a planning meeting, lesson implementation, and a debriefing meeting (see Figure 1). The planning and debriefing meetings were conducted via Zoom and videorecorded. The lessons were recorded using Swivl robot technology to capture audio and video data from middle grades mathematics classrooms. These data were

automatically uploaded to the online Swivl platform. The coach and teacher then independently watched and annotated the video prior to the debriefing meeting. Figure 1 details the online video coaching process, showing both the collaborative and independent aspects of the cycle.

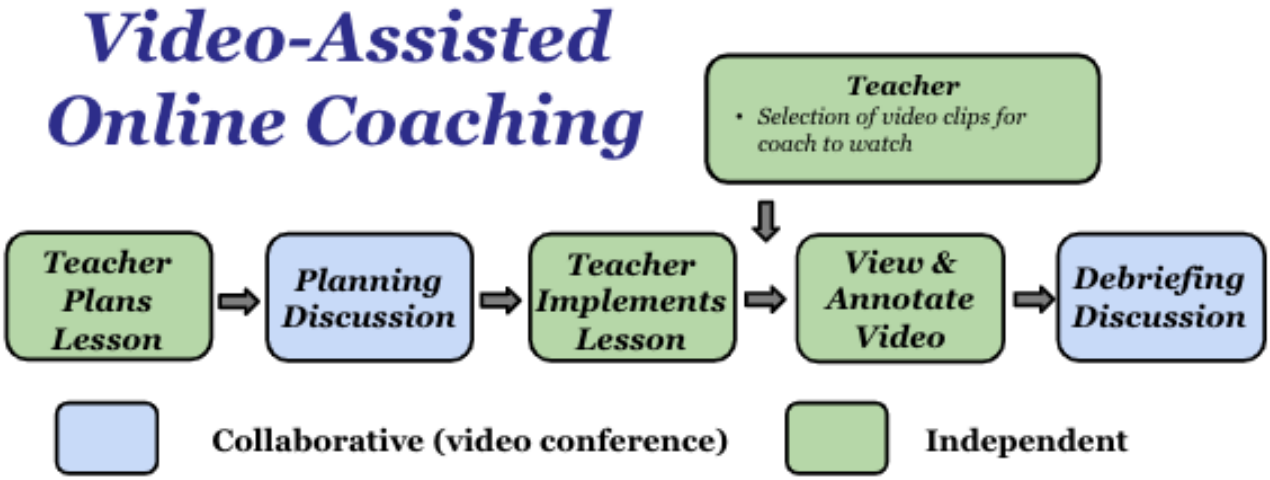

Figure 1. Online Video Coaching with content-focused Coaching

Data Collected

In total, there were three cohorts of teachers in the project, staggered over a four-year span, with each cohort participating for two years. Data for this study are transcripts from the Cohort One coach-teacher planning meetings as part of the one-on-one coaching cycles. Cohort One had eight teachers and four coaches, for a total of 23 transcripts of their online planning meetings.

Data Analysis

To identify the suggestions the coaches made during the collaborative planning conversations, we used results from a broader analysis of the coaching conversations. In that broader analysis, we parsed the transcripts of the coach-teacher planning and debriefing conversations into stanzas, which included a coach's statement and the teacher's response, as well as text needed for context (Saldaña, 2013). This broader data set included the analysis of 1719 stanzas from coaching conversation transcripts. We developed a codebook to analyze the discursive moves of the coaches and teachers as well as the content of the conversations within stanzas. We coded stanzas in pairwise teams after a lengthy calibration process that involved five researchers. We met via video conferencing software, Zoom, to reconcile disagreements. Kappas ranged from 0.39 to 0.65, which is considered moderate to strong reliability (Landis & Koch, 1977). Analysis for this study focused on the discursive moves of the coach. The section in the codebook on coaching discursive moves was comprised of five categories, including suggestions (see Figure 2). We defined a suggestion as a statement from the coach recommending an action for the teacher. We identified 273 suggestions in the 23 transcripts.

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 2: Excerpt from the larger codebook focusing on coaching discursive moves

The following example is a coach's comments that was coded as a *suggestion*:

> 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?"

In this comment, the coach recommended that the teacher prompt students to paraphrase a peer's explanation as a means to increase student participation in classroom discussions.

Following the aforementioned coding to identify suggestions, two researchers wrote low inference paraphrases for each suggestion and later reconciled these to ensure the main action or idea of the suggestion was consistent across researchers. Table 1 shows two examples of excerpts from a planning meeting on a lesson on congruence, and the assigned low inference paraphrase.

Table 1. Suggestion examples from a coach-teacher planning meeting

	Transcript of Suggestion	Low Inference Paraphrase
Example 1:	"Have a discussion, I hope—- about which ones they put where, here and the fact there's nothing here. How are they going to justify that they're congruent?"	Have a discussion and encourage students to justify congruence
Example 2:	You could say, "Well, why don't you think you have anything over there? What have you seen?"	Probe students to explain their thinking if they struggle

We then analyzed the suggestions based on the actual transcript and the low inference paraphrase for the object (content), lesson phase, and clarity. To arrive at the Object codes, four

researchers open coded (Corbin & Strauss, 2008) a subset of the larger data set and met to discuss and agree on the Object codes. Once we had a small set of Object codes, we went back to the data and coded another subset of the suggestions using the Object codes and met to reconcile and refine the definitions again. This resulted in the final list of Object codes, which referred to the topic of the suggestion. Codes for Object included Lesson Design (a suggestion about how the lesson plan or design should be completed and what should be included), Facilitating Discourse (a suggestion about promoting and facilitating classroom conversations), Teacher Questions (a suggestion of actual question(s) that should be asked during the lesson), and Teacher Action (a suggestion of what the teacher should do physically). Given the frequency and diverse nature of suggestions about Lesson Design, we divided the Lesson Design category into four subcategories to provide increased clarity about the aspect of Lesson Design being addressed. Subcodes for Lesson Design included: Represent (a suggestion about how representations of student work would materialize in the lesson), Resource (a suggestion about a particular resource or manipulative to use), Task (a suggestion about a particular task or modification of a task), and Participation Structure (a suggestion about how students should be grouped, whether whole-class, small groups, independent). To assign the Object codes, we used the low inference paraphrase from the initial analysis in addition to the original text for each suggestion. Lesson Phase codes included Launch, Explore/Investigate, and Summarize (e.g., Van de Walle et al., 2019), and identified the phase of the lesson in which the action proposed by the coach would occur. Clarity codes included Low, Medium, and High. Low clarity implied there were many ways for the teacher to enact the suggestion. Medium clarity implied there was more than one way to follow the suggestion, and High clarity implied there was only one way to follow a particular suggestion. Table 2 provides an example of the coding process for Object, Lesson Phase, and Clarity.

Table 2. Suggestion examples from a coach-teacher planning meeting

	Transcript of Suggestion	Object	Lesson Phase	Clarity
Example 1:	I think that would be great to try the warm-up of that. Then have a discussion about what they really found. You can call even the airplane distance between two points.	Facilitating Discourse	Launch	Low
Example 2:	That gives you the opportunity to ask, "How is this, when you get 4 S plus 4, how is that connected to S plus S plus 4?"	Teacher Questions	Summarize	High

In example one, the Object code is "Facilitating Discourse" because the suggestion focused on the teacher hosting a discussion after students attempted the warm-up activity. In example two, the Object code is "Teacher Questions" because the suggestion focused on a question the teacher should ask. The Lesson Phase of example one was coded as Launch because the suggestion pertained to the beginning phase of the lesson. Based on the context of the suggestion (in the transcript, not included here), the Lesson Phase of example two was coded as Summarize because the suggested question was to be used during the summary discussion. Example one was coded as Low clarity because there were many ways for the teacher to facilitate the discussion. In example two, the coach told the teacher exactly what to ask, which was considered a High

Clarity suggestion because the question was provided word for word. Following this additional round of coding, we then calculated frequencies for each of these codes for each coach across the coaching cycles.

Findings

We focus first on the Object of the suggestions, followed by Lesson Phase and Clarity. Table 3 shows the percent of the suggestions for each code within the three categories.

Table 3. Content of suggestions

Code	Percent of Suggestions
Object	
Lesson Design	30.0%
Teacher Questions	27.6%
Teacher Actions	25.4%
Facilitating Discourse	17.0%
Lesson Phase	
Launch	19.3%
Explore/Investigate	46.6%
Summary	34.2%
Clarity	
Low	8.5%
Medium	51.8%
High	39.7%

Lesson Design was the most frequently occurring Object code as 30.0% of suggestions focused on the design of the lesson. The focus of Lesson Design is unique from the other three Object codes as it related to planning decisions made prior to the lesson versus what the teacher should do during the lesson. These suggestions specifically targeted how students should represent their work (Lesson Design- Represent, 3.9%), how teachers could use resources (Lesson Design- Resource, 4.2%), particulars of tasks (Lesson Design- Task, 14.5%), and participation structure (Lesson Design- Participation Structure, 7.4%). Almost half of the Lesson Design suggestions focused explicitly on the mathematical task that would be used during the lesson. These included modifications to the task, suggestions about a particular task to be used, or ways to implement the task.

More than half of the suggestions focused on Teacher Questions or Teacher Actions, meaning the coach provided questions to ask or described movements or actions to make during the lesson. As evidenced in the table, more than a quarter of all suggestions focused on Teacher Questions. These were suggestions where the coach suggested that the teacher should ask a question. The following is an example that was coded a suggestion characterized as Teacher Questions:

> [ask] if we know what interior is and we know what alternate is. “Can you identify a pair of alternate interior angles?” Then, “What is the relationship between those angles based on the work we did before? Are they congruent or are they supplementary?”

In this example, the coach provided the teacher with the exact questions the coach thought should be asked. About one-quarter of the suggestions were coded as Teacher Actions. In the following suggestion, the coach encouraged the teacher to share student work on a document camera, "If you see some kids with some interesting work, good work, you could have them put it on there. The other option is you take a picture." The coach specifically provided direction to the teacher about what to do (an action) if a particular situation occurred (students with interesting work).

With respect to Lesson Phase, the majority of the suggestions focused on the exploration of the lesson (Explore/Investigate, 46.6%). The suggestions related to the Explore/Investigate phase often referenced the participation structure or other aspects of the lesson design that related specifically to what students would do after the lesson was launched, but prior to a summary or discussion. Summarize, as a lesson phase, was the focus on more than a third of the suggestions. A majority of the suggestions that focused on the Summarize phase of the lesson addressed how to structure a summarizing discussion or questions that should be asked during this discussion.

Regarding Clarity, most of the suggestions were coded as Medium (51.8%) or High (39.7%) Clarity, meaning there was more than one way (Medium) or only one way (High) that the suggestion could be accomplished. As an example of a High Clarity suggestion, meaning there was only one way to implement the suggestion, one coach said, "Have them in partners," which offered only one course of action. In contrast, an example of a Low Clarity suggestion (8.5%) was "Give students the opportunity to arrive at their own solution." This was coded as Low Clarity because there would be many different ways that a teacher could provide an opportunity for students to come to their own solution.

Discussion and Conclusion

The suggestions coaches provided to teachers occurred through *directive* comments that occurred as the coach and teacher interacted in the coaching conversation (Ippolito, 2010). In this negotiated space of learning, the coaches often used dialogue to tell the teacher specifically how the lesson should be designed, including what task should be used or how a task should be modified. Coaches commonly gave direct suggestions of exact questions teachers should ask students while teaching. They also provided input on what the teacher should do physically during the lesson, such as how to show student work. The directive comments of the coach focused mostly on the Explore/Investigate and Summarize parts of a lesson and were Medium to High clarity. We consider these suggestions to be the coaches' way of conveying direct instruction in the context of content-focused coaching (West & Staub, 2003).

We recognize the need for more extensive research on coaches' suggestions and how those suggestions relate to the relational dynamics of a coaching context, but we believe the findings of this study provide a typology of suggestions made by coaches engaging in coaching cycles with teachers. We see this way of characterizing suggestions as the first step in gaining more insight of how coaches' suggestions can be effective for supporting teachers. Knowing the content of the suggestions not only provided insight on what is being talked about, but it raises questions about why those topics are being discussed and how those topics could be intentionally selected to support teachers in particular aspects of practice. Research has shown that teachers respond to feedback (e.g., Cherasaro et al., 2016), which indicates that coaches' suggestions can be purposeful in what they talk about with teachers.

The findings about the Object, Lesson Phase, and Clarity of suggestions raise questions for future research. First, the present study focused on the coaching conversations and the

suggestions that were provided. Knowing whether or not the teachers actually implemented these suggestions would provide insight on the extent to which teachers follow what the coaches recommend. Further research on whether or not teachers follow the suggestions, and perhaps why or why not, would add to the existing literature on coach-teacher dynamics. Second, it would be interesting to know if the coach and teacher discussed the suggestions when they met after the lesson was taught during the debriefing meeting. Analysis of these interactions would also provide details on the process of providing suggestions.

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