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Developing Facilitation Practices in a Secondary Math Teacher Community

Teacher learning communities have the potential to support significant mathematics teacher learning (e.g., Hord, 2004; Vescio, Ross, & Adams, 2008). While there is potential, just having teachers work collectively does not guarantee significant learning, no matter how keen they are to improve their practice. Research suggests that facilitation is key if teachers are to develop knowledge and practices aimed at engaging students in conceptually-oriented activity (Jackson et al., 2015; Little, 2002; van Es, Tunney, Goldsmith & Seago, 2014). Although the mathematics education research community is beginning to recognize the importance of facilitation (e.g., Horn, Kane, & Wilson, 2015; van Es et al., 2014), studies to date have often focused on analyzing expert facilitators. Among those studies that focus on novice facilitators (e.g., Borko, Koellner, & Jacobs, 2014; Elliot et al., 2009), few have provided images of possible learning trajectories of facilitators (for an exception, see Jackson et al., 2015). In this paper, we turn our gaze toward local math leaders who have recently begun facilitating teacher learning communities. We provide the field with a provisional trajectory, based on an analysis of one facilitator's shifting practices in leading a secondary mathematics teacher learning community.

Conceptual Framework

Our analysis was informed by literature that has examined teacher learning communities that provide opportunities for teachers to develop high-quality teaching practices (e.g., Grossman, Wineburg & Woolworth, 2001), and facilitation of high-quality professional development (e.g., Borko, Koellner, Jacobs, & Seago, 2011; Elliot et al., 2009). Little (2002) suggests several key aspects of communities that create significant opportunities for teacher learning. Namely, communities (a) create "representations of practice"; (b) establish "norms of interaction"; and (c) encourage "orientation to practice" (p. 934). Opportunities for learning arise when teaching practice is made explicit for unpacking complex ideas for instructional change. Horn's (2010) work further specifies features of talk that appear to characterize productive teacher learning communities. Specifically, Horn argues that talk that engages teachers simultaneously in reasoning about teaching, student thinking, and mathematics is particularly productive for teacher learning.

Skilful facilitation – which involves both planning for and leading teacher learning communities – is necessary in order to create and leverage such moments for teacher learning. There is increasing attention to the role of the facilitator in professional learning settings focused on improving mathematics teaching, from video clubs (e.g., van Es et al., 2014) to pull-out professional development (e.g., Borko et al., 2011; Elliot et al., 2009; Jackson et al., 2015). For example, based on analysis of productive video-clubs, van Es et al. (2014) developed a framework of facilitation moves that engage and support teacher learning. They identified a number of facilitation moves that served four purposes: (a) orienting the group to the video task, (b) sustaining an inquiry stance, (c) maintaining a focus on the video and the mathematics, (d) and supporting group collaboration.

Whereas several studies (e.g. Elliot et al., 2009; Horn, Kane, and Wilson, 2015; Jackson et al., 2015; van Es et al., 2014) offer the field images of what high-quality facilitation of professional learning entails, there is a need to develop an understanding how novice facilitators develop high-quality facilitation practices. There has been some work in the field to lay out provisional progressions specific to facilitation. For example, in a design study focused on supporting novice facilitators to lead pull-out professional development, Jackson et al. (2015) identified a provisional progression specific to pressing on teachers ideas. They found that initial pressing was characterized by "limited push-back on teachers' ideas" and "positive response to all contributions" (p. 98). Over time, facilitators learned to push back differentially on teachers' ideas, in light of their goals for teachers' learning.

In this paper, we build on the existing studies above to put forth a provisional learning trajectory specific to a novice facilitator's developing practice in leading a secondary math teacher learning community. This work is still in progress, and it is our intention to add to and refine the learning trajectory of this particular facilitator and that of the other facilitators within our study through further analysis of their practice.

Methods

This analysis is based on data collected in Years 1 and 2 of an ongoing, three-year design-based research project (2013-2016) in partnership with three school districts in Quebec to improve the facilitation of secondary mathematics teacher learning communities. The project entails monthly cycles in which a) math teacher leaders lead teacher community meetings; and b) researchers and math teacher leaders meet to debrief the previous teacher meetings and co-plan for upcoming teacher meetings.

Participants and Setting

Our analysis focuses on math teacher leader Fred. We chose Fred's case because he came to the project with several years of experience as a math teacher leader, but with little experience facilitating teacher learning communities. Our initial interview and observations suggested that he saw the importance of supporting students' active engagement in mathematics, yet struggled to support teachers in enacting such pedagogy. In April of Year 1, Fred began meeting regularly with a teacher learning community and continued through May of Year 2 (11 times). Meetings were held in a teacher's classroom, approximately 1.5 hours each. Initially, his group consisted of two secondary (grades 7-11 in Quebec) math teachers, growing to four by January of Year 2.

Data Collection

We video-recorded and took field notes of Fred's meetings and the math teacher leader-researcher meetings. Math teacher leaders were also interviewed at the start and the end of the first year. Because this paper focuses on shifts in Fred's practice, analysis primarily focused on the video records and field notes of his meetings. [It would be helpful to summarize how many meetings across how many years, and the total amount of video hours.]

Analysis

For the analysis, a team of researchers and research assistants met on a weekly basis to view video recordings of the facilitator's meeting with his teachers. During this initial collective viewing, we recorded themes and facilitation moves that we noticed about his developing practice. Subsequently, the research team engaged in more targeted viewing to develop a coding scheme that took into account both the categories that we generated and the categories that were generated in existing research, especially that of van Es et al. (2014). Whereas this analysis focuses on Fred, we also viewed video recording of other facilitators in the study to develop our coding scheme. Whereas van Es et al.'s framework is specific to video-club facilitation, Fred engaged teachers in a number of activies, including co-planning for upcoming lessons, engaging in mathematics tasks, and modeling instructional activities. Our coding scheme, therefore, reflects many of the same categories identified by van Es et al., but also includes new categories in order to take into consideration all facilitation moves observed. A copy of our developing coding scheme is included as an appendix.

For the purpose of this paper, we selected three 30-45 minute episodes from the teacher learning community meetings led by Fred to highlight shifts in his facilitation practice. We selected these three episodes because they represented different points of time and were representative of his practice at those times. The first episode came from Fred's second teacher meeting, in April of Year 1, the second episode came from January of Year 2, and the third episode came from March of Year 2. To determine shifts, we collectively identified facilitation practices in each episode, narrowing down to four practices that appeared important in shaping the interactions within the teacher learning community. We then contrasted how Fred enacted each practice across the episodes to identify differences in his enactment.

For future analyses, with the support of Studio Code, a video coding software, we will use the coding scheme to identify the facilitation moves observed in the teacher meetings led by each facilitator. This process is still ongoing, as we are coding all teacher meetings with each of the facilitators participating in our research project. We intend to compare change in each facilitator's practice over time in order to generate a set of progressions that might characterize development in facilitation practice more generally.

Initial Findings

Among the facilitation practices that appeared to be important in shaping the interactions within the teacher learning community, the math teacher leader's enactment of three practices – orienting to mathematics teaching practice, eliciting teachers' ideas, and pressing on teachers' ideas – shifted over time in ways that increased opportunities for teacher learning. However, the math teacher leader's enactment of a fourth practice, framing collective work, shifted less. In what follows, we illustrate the shifts in practice by providing a snapshot of each at the different points in time.

Initial Forms of Facilitation Practices

Initially, Fred's facilitation practices allowed for few opportunities for teacher learning. During the first episode that occurred in his second teacher community meeting in April of the first year of the research project, Fred engaged the teachers in modelling (Lampert et al., 2010) a "string" or number talk (Humphreys & Parker, 2015).

When Fred introduced their collective work, his framing focused on what they would be doing, and less about how they would engage in the work together, what to focus on when engaging in the work, and how the work connected to their needs. He said to the group: "Have you guys heard of strings, strings of operation, as an instructional method?" Because of this limited framing, their collective work appeared unconnected to the teachers' practice or concerns.

In addition, throughout the modeling activity, Fred rarely elicited teachers' ideas. Instead, he narrated by describing what he was doing and did not ask teachers for their thoughts about possible rationale for his teaching moves. Moreover, Fred generally did little to press on teachers' ideas and instead agreed and added on to the teacher contributions (cf. Jackson et al., 2015). Although his choice in modeling a string helped to provide representations of practice to support teacher learning, Fred did not orient the group's conversation to aspects of his teaching practice that were specific to mathematics. Instead, his narration typically focused on general aspects of his teaching.

Furthermore, Fred seldom pressed on the teachers' ideas. He would generally agree and add on to the teachers' contributions. For example, in a discussion about how the teachers could check for students' understanding in class, Magda explained that she would ask her "students to write their solutions on the board when going over homework questions" and look for the "appropriateness of the solution, if the equations are balanced." Fred nodded in agreement and responded by saying, "getting [students] to do the math and explain." He added the need for students to explain their understanding to Magda's comment, but did not elaborate or emphasize this addition with the group.

Intermediary Forms of Facilitation Practices

In a second episode selected from a January teacher community meeting during the second year of the project, Fred led a discussion focused on collectively planning for one of the teacher's (Magda's) upcoming lessons. Generally, Fred's framing (or lack there of) of their collective work resembled that of the previous year.

In contrast, there were notable differences in how Fred pressed teachers on their ideas. Whereas earlier he had agreed with the teachers and added on, in this meeting, he tended to respond to teachers' contributions in ways that respectfully challenged their views. We saw this especially when the teachers resisted ideas about teaching and learning mathematics that challenged the teachers' existing conceptions. For example, when Fred shared a problem for the teacher to use for the lesson, teachers expressed their disagreement to the proposed task. He asked them to clarify their thoughts in order to understand why they were resistant (e.g., "Is it the fact that it is open-ended?"). At times, he also countered with alternate explanations or suggestions that took into consideration

students' perspectives. As an illustration, when Magda explained a concern about the task being too vague for the "keener" students, Fred responded, "It's interesting that you bring those students up, because sometimes they don't like something that's a bit messy, and that's something that they actually need to work on." Here, Fred provided an opportunity for teachers to reflect on students' experiences in learning.

Later Forms of Facilitation Practices

In March of the second year, the group debriefed Magda's experience of co-teaching the planned lesson with Fred. Again, Fred began by framing their collective work by describing what they were to do. However, Fred continued to press on teachers' contributions by offering alternate explanations, but, unlike earlier, he asked questions that created opportunities for them to rethink their practice. For instance, when Magda said that she lacked time to engage students in discussions, Fred redirected the consideration toward the group by asking, "What could be the benefits of...having the kids talk about the math?" and later pressed further, "How would talking help learning?" It is also interesting to note that by including "about the math," Fred's question aimed to orient teachers to reflect on math-specific aspects of teaching. Fred's pressing elicited teacher's ideas and provided opportunities to make sense of important pedagogical choices.

Discussion and Educational Importance

The facilitator's orientation of discussions to teaching practice shifted to include a direct focus on mathematics-specific aspects. Likewise, the eliciting of teachers' ideas shifted from being absent (replaced by narration) to later asking questions that created opportunities to rethink teaching practice. Building on Jackson et al.'s (2015) work, we identified intermediary forms of pressing, namely how facilitators might respond by offering alternate explanations that take into consideration students' experiences. We also found that framing collective work appeared to be a key facilitation practice, although we did not detect shifts in this practice.

These findings suggest a provisional trajectory regarding shifts in a facilitator's practice specific to leading a secondary mathematics teaching community, and in doing so, contribute to a nascent body of work describing the development of facilitation practices. This provisional image of development may help in the design of supports for math leaders. In our ongoing work with the facilitators, we aim to further develop provisional trajectories of different facilitators and also investigate how designed supports influence shifts in facilitation practice.

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Appendix
Sample of Coding Scheme for Facilitation Practices (in Development)

Practices	**Description**	**Examples**
Framing an activity, a sub-activity, a tool, or an idea (e.g. launching)	Describe what the group is going to do. This may also include providing a rationale for engaging in the collective work and providing context for a video or other representation of practice (adapted from van Es et al., 2014, p. 347)	When introducing a math activity (a string) that the facilitator was about to model, he said, "Have you guys heard of strings, strings of operation, as an instructional method?"
Validating	"Confirm and support participant contributions" (van Es et al., 2014, p. 347). May also anticipate concerns of the teacher and respond to those concerns. The validation provided must be *explicit* verbal validation (e.g., more than 'yes,' 'mm hmm,' or typing).	Responds to a teacher by saying, "I know what you mean…" "I **agree completely** that you need to be clear about what the task is…"
Pressing on teachers' ideas	"Prompt participants to explain their reasoning and/or elaborate on their ideas" (van Es et al., 2014, p. 347).	After a teacher had described how she wanted her students to "reason" about mathematics, the group watched a video of her teaching. The facilitator then pressed by asking, "Is that the kind of reasoning you were hoping for?"
Countering/ Providing alternate point of view	"Offer an **alternate point of view**" (van Es et al., 2014, p. 347) to a teacher's view of teaching, students, mathematics. Does not provide specific suggestions for something the teacher might try.	In a discussion about a task where there are several possible solutions, a teacher commented that the students would be lost and more explicit guidance would be needed in the problem. The facilitator countered by saying: "I don't necessarily know that that's bad."
Clarifying	"Restate and revoice to ensure common understanding of an idea" (p. 347).	When a teacher voiced a disagreement about a proposed learning activity for students, the facilitator asked: "Is it because it's open-ended?" to ensure he understands her position.

Highlighting	Directs attention to noteworthy ideas, putting an emphasis on an idea. Ideas must be existing in, for example, a task, a video, in student work, or in something spoken by a teacher. Highlighting needs to make something visible that was not initially visible to the community.	The facilitator proposed a learning activity for the student and he pointed the choice of the numbers used in the problem: "I chose the numbers to be 10s and 20s just it doesn't get too complicated."
Eliciting teacher thinking /participation	Inviting participation from teachers. May include inviting teachers to contribute to a topic that is already the focus of discussion.	"Is there anything else here that would fit in that category in terms of context, just in terms of helping [students] out?"
Orienting to mathematics teaching practice	Shifts discussion to focus on supporting students learning of mathematics	When a teacher said that she lacked time to engage students in discussions, the facilitator redirected the consideration toward the group by asking, "What could be the benefits of...having the kids talk about the math?" and "How would talking help learning?"
Focusing the discussion	Posing prompts to help to focus the activity or discussion. Includes engaging the group in considering a different idea.	During a lesson planning session, the facilitator asked the teachers: "What are your goals for students at the end of the task?" Teachers offered several learning goals for their students about a mathematical task. The facilitator then prompted them to consider another aspect, "Ok, so those are the math skills things. What about working with groups, working as a team? Is that something you want to ponder?"