Teacher Leader's Facilitation of Lesson Study Discussions: Taking up and Building on Participants' Ideas

Abstract

In this qualitative case study, we examined the following two research questions: 1) How does a teacher leader take up and build on participants' contributions during lesson study discussions in order to deepen groups' understanding of teaching and learning of mathematics? 2) What is the nature of analytical depth of the teacher leader's contributions? Conceptualizing the discursive practice of facilitation as a moment-to-moment improvisation, we identified a number of approaches the teacher leader used to acknowledge and incorporate participants' ideas about teaching and student learning of mathematics while building on and developing these ideas further. The teacher leader's substantive contributions were at the levels of concrete and abstract description, factual information, as well as interpretive reasoning.

Purpose

Practice-based collaborative professional development (PD) opportunities for mathematics teachers are acknowledged as an important factor in improving teaching (Goldsmith, Doerr, & Lewis, 2014), as well as increasing student achievement (Desimone, 2009). Practicing mathematics teachers, who are knowledgeable and committed to professional improvement, have a great potential for facilitating practice-based collaborative PD (Borko, Koellner, & Jacobs, 2014; Elliott et al., 2009). However, while scholars acknowledge the importance of PD facilitators (Borko, 2004; Elliott et al., 2009), there is a limited amount of research on how facilitators support mathematics teacher learning (Even, 2008). Within this limited amount of research, still less is known about the PD facilitation work of K-12 teacher leaders (Neumerski, 2013; York-Barr & Duke, 2004).

The purpose of the current case study was to examine how an experienced teacher leader engaged in facilitating lesson study PD focused on elementary school mathematics supported participants' learning of mathematics teaching practice. Specifically, we addressed the following research questions:

- How does a teacher leader take up and build on participants' contributions during lesson study discussions in order to deepen groups' understanding of teaching and learning of mathematics?
- What is the nature of analytical depth of the teacher leader's contributions?

Perspective

Teacher leaders are a key to scalability of effective PD (Borko, Koellner, & Jacobs, 2014). Given their experience, collegial connections with other teachers, embeddedness in the school culture, and familiarity with the needs of students, teacher leaders who are practicing

teachers have a great potential for facilitating teacher learning in collaborative practice-based PD (Elliott et al., 2009; Koellner, Jacobs, & Borko, 2011; Stoelinga & Mangin, 2010). A school-based teacher leader, rather than a university-based PD provider, might also be more successful at minimizing the practitioner/researcher tensions while facilitating teacher learning (Lefstein & Snell, 2011). However, little is known about how teacher leaders facilitate teachers' learning of teaching practice (Neumerski, 2013).

PD programs that engage teachers in collaborative, practice-based inquiry into teaching practice require facilitators to meet multiple responsibilities, such as engage participants in professional inquiry (Borko et al., 2014; Zhang et al., 2011), help establish a supportive community (LeFevre, 2004), and organize the PD process (Poekert, 2011). Moreover, facilitators have to balance differing aims, such as follow a PD agenda, while allowing the participants to drive the PD process (Jenlink & Kinnucan-Welsch, 2001; LeFevre, 2004) and respect participants' ideas, while challenging prevailing beliefs and pushing participants' thinking to maximize learning (Stein, Smith, & Silver, 1999; Poekert, 2011). Teacher leaders, in particular, must negotiate working on an equal footing with colleagues while supporting teachers' professional learning (Elliott et al., 2009).

Mathematics teachers taking part in collaborative practice-based PDs frequently engage in discussions about teaching practice in order to meet the goals of the PD (e.g., Crespo, 2006). In fact, scholars argue that the quality of teachers' professional learning depends, in part, on the quality of discourse generated during teachers' collaborative work together (Little & Horn, 2007; Zhang et al., 2011). Hence, researchers interested in examining PD facilitation frequently focus on discursive practices of PD facilitators (e.g., Nemirovsky & Galvis, 2004). Moreover, scholars have suggested that facilitation practices are associated with related knowledge constructs

(Borko et al., 2014, p. 165). However, while researchers identified *that* facilitators make their knowledge visible through discourse (e.g., van Es et al., 2014), there has not been a systematic examination of *what* the facilitators say during PD discussions.

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In the current study, we conceptualized the discursive practice of facilitation as an improvisation, where a teacher leader makes moment-to-moment decisions as she acknowledges participants' ideas about teaching and student learning of mathematics while building on and developing these ideas further (Borko et al., 2014). As a collaborative approach to teacher professional learning aligned with the qualities of effective PD (Desimone, 2009; Lewis & Hurd, 2011), lesson study (LS) represented a suitable PD and research context for the current study. During lesson study, participants research, plan, teach, and reflect on a lesson as a way to determine how students learn best (Lewis & Hurd, 2011). Given that the boundary between the facilitator and the LS participants is blurred (Lewis et al., 2011), LS facilitator plays an important, yet unique role during LS conversations. While not focused on the role of the LS facilitator, Warwick and colleagues (2016) did suggest that in LS discussions participants' building on each other's ideas is the most commonly occurring discursive practice. The current study aims to unpack how a teacher leader who is a LS facilitator takes up and builds on participants' contributions in order to deepen groups' understanding of teaching and learning of mathematics. Moreover, we examined the analytical depth of facilitator's contributions, in terms of categories of description, factual knowledge, and interpretation (Winitzky, 1999).

Methods

The case study was conducted at Trailways[1] elementary school, in Coast County School District in the state of Florida (see Table 1). Five elementary school teachers participated in the study – four were LS participants (see Table 2) and one was a teacher leader, who served as

[1] All the school, participant, and district names in this proposal are pseudonyms to conceal their identities.

facilitator of LS (see Table 3). A team had five meetings to research and plan a lesson focused on the first-grade content of number decomposition.

In order to answer the research questions, we analyzed about 48% of LS planning meeting transcript data. We also examined facilitator interviews, research lesson plans, and teacher background survey. To identify the facilitator's patterned ways of taking up and building on participants' contributions, we focused on the instances in the facilitator's talk that responded to or echoed a participant's idea. We were informed by grounded theory (Strauss & Corbin, 1998) and qualitative data analysis (Miles & Huberman, 1994) analytic strategies, as well as the existing frameworks for facilitation of PD discussions (see van Es et al., 2014; Zhang et al., 2011).

Results (Preliminary Findings) and Discussion

Our initial analysis indicates that the teacher leader took up participants' ideas by validating and revoicing, and built on contributions by reframing and changing aspects of their idea, as well as adding new information. The teacher leader's substantive contributions were both at the levels of a concrete description where she illustrated the idea discussed by the participant, as well as an abstract description where she categorized the idea using pedagogical language. In addition, the teacher leader provided factual information as well as pedagogical reasoning.

The facilitator used a number of discursive moves that allowed her to recognize participants' contributions by explicitly acknowledging their ideas. For instance, Patty often validated participants' contributions by positively evaluating and confirming their ideas (see Table 4). At times, she would also restate or paraphrase participants' contributions without adding any new information (see Table 4). In general, such restatements allow a facilitator to clarify participants' contributions, ensuring a shared understanding (van Es et al., 2014).

Revoicing a participant's contribution was also used to build on the participant's idea by adding onto or reframing some aspects of it (see Table 4). Such a reconceptualization of a revoiced idea allowed "inferring what a teacher implied but did not articulate" (Zhang et al., 2011, p. 364), and represented a way to build on participants' contributions that maintained the closest connection to the original idea.

Patty used a number of other approaches to build on participants' ideas, contributing new information at various levels of depth. The first approach was to add descriptive information to the idea, illustrating some aspects of the teaching practice discussed by the participant by quoting hypothetical students' or teacher's voices, or sharing a personal experience. In this case, the additional information provided by the facilitator did not change the core meaning of the participant's contribution (see Table 4). Moreover, facilitator's descriptive addition functioned at two levels of abstraction, exemplifying participants' ideas concretely or categorizing the ideas using pedagogical language (Winitzky, 1999). For instance, the facilitator used pedagogical terms as labels to classify or summarize descriptive ideas presented by the participant (see Table 4). While serving to add a more succinct label for participants' contribution, the use of pedagogical language also allowed reframing participants' description as an instance of a more general category of practice. For example, Patty reframed Rachel's observation of students' invention of unique strategies in terms of student empowerment (see Table 4).

Furthermore, Patty provided descriptive elaboration on participant's idea while adding new information. For example, Patty illustrated Rachel's idea that including students' names into word problems engages students by agreeing and replaying student voices from her class (see Table 4); however, prior to exemplifying Rachel's comment, Patty reframed Rachel's

contribution by referring to 'word problems' as 'stories' (see Table 4). With this addition, Patty emphasized the influence of finding mathematics in everyday contexts on student engagement.

In addition to concrete and abstract descriptive contributions, the teacher leader also provided factual information. However, factual contributions did not closely integrate participants' contributions; rather, they used participant's ideas as a point of departure for the facilitator's input. Facilitator's factual contributions tended to occur in response to participants' factual comments, their questions or concerns, or in order familiarize the participants with the LS process (see Table 4).

Patty also built on participants' contributions by providing reasoned responses. For instance, when multiple teachers reported that some of their students had to always recount the number of objects, Patty took up their contributions by suggesting that the curriculum focus on subitizing has come about so that students would learn to reason about numbers in terms groups, as opposed to individual objects (see Table 4). Thus, Patty provided reasoning about the purpose of subitizing in the curriculum, while linking her input to the participants' detailed contributions about students' struggles. In general, Patty's reasoned responses provided an explanation for some aspects of participants' contributions. Furthermore, an important form of facilitator's reasoned contributions were pedagogical principles (Horn & Little, 2010) that communicated generalizations regarding teaching practice. Patty's pedagogical principles tended to focus on student mathematical reasoning in relation to reform-based instruction, typically in response to participants' contributions about specifics of their practice or their students' learning (see Table 4).

It is important to note that, instead of providing information herself, the facilitator frequently questioned the participants in order to invite further contributions (see Table 4). In

particular, Patty asked teachers to clarify and elaborate on their ideas, as well as to contribute based on their experience and to explicate their reasoning (see Table 4). However, the facilitator seemed more likely to provide information herself if participants' responses did not present the ideas she was looking for. For instance, while Patty initially questioned the participants about the importance of subitizing, as the conversation progressed, on multiple occasions, she answered the question herself. Lastly, not all participant contributions were built upon; at times, the facilitator used redirecting strategies to refocus the conversation on a different topic (see Table 4).

Conclusion and Significance

Practice-based PDs that aim to engage the participants in shared inquiry into teaching practice present unique challenges for PD facilitators (Stein, Smith, & Silver, 1999), particularly for the facilitators who are teacher leaders working with their fellow colleagues (Elliott et al., 2009). Specifically, facilitators must create a safe yet challenging learning environment (LeFevre, 2004), maintaining a balance between respecting individual PD participants and critically analyzing issues in their teaching practice (Borko, 2004; Seago, 2004). One of the core factors in forming such a learning environment is facilitator's ability to engage with participants' existing understandings, building, challenging, and replacing them, when necessary (Bransford, Brown, & Cocking, 2000). During discussions, this factor manifests in facilitator's ability to take up and build on participants' contributions guiding the conversation toward deep understanding of important ideas (Borko et al., 2014). However, taking up and building on teachers' ideas during discussions requires a skillful improvisation (Smith & Stein, 2011), in which the facilitator must make in-the-moment decisions about when to incorporate participants' ideas or redirect the conversation, ask the participants to elaborate or offer information herself,

describe participants' idea in more detail in order to demonstrate a shared vision or explicate pedagogical principles that would allow for the re-envisioning of teaching practice (Horn & Little, 2010). Novice PD leader will likely require extensive training on how to improvise skillfully (Borko et al., 2014).

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Table 1

School and District Characteristics

	Trailways	District	State
School Characteristics			
School Size	721	64,058	2.6 mil
% FRL	42.6%	39.3%	45.4%
% Minority	23.2%	38.9%	58.4%
% ESE	15.6%		

Table 2

LS Team Background Characteristics

	Trailways
Team Characteristics	
Number of teachers	4
Number of teachers new to LS	3
Range of LS experience (# of LS cyles)	0-1
Range of teaching experience	2-20 yrs
Mean of teaching experience	11.75 yrs

Note. LS=lesson study

Table 3

LS Team Facilitator Characteristics

Name	School	Teaching experience (years)	Current grade level	Prior levels taught	Certifications	Years participating in lesson study
Patty	Trailways	24	3 - 5	3 - 5	Elementary 1- 6 / Gifted Endorsement	13

Table 4

Examples of Key Findings

Themes	Examples
Validating	Gloria: I'm on page 207… So, they had all that hands-on experience, and then you bring it back as a whole group, teachable moment. And that's different than the way we always do it. We do the whole group, and *then* we do the practice. So I thought that was interesting. Patty: **Well, I put a big start behind it. It would be fun [to do] some time.** (PM1, line 314)
	Greer: Well, that's just life, you know. Parents are working, there are other family members, you know. 'Let me just do this for you so it's done.' Instead of saying— Gloria: —and I'm at fault for that in my own house. Greer: Well, we all are. To some extent. That's what I said they [students] are afraid. Patty: **That's interesting**.
Revoice by restating	Patty: What would be our overarching goal, as a person and as a learner, that would help them with these [points to board]? Gloria: To be confident, independent learners. Greer: Open-minded to others. Patty: **Ok, confident and independent learners. Open to others' reasoning.** [Writes down on the board]. That's an awesome goal; that's an awesome goal. If we can move children in that direction, that would be great. … **So, our students will be confident, independent learners, that will listen to others' reasoning**. Does that sound good? (PM1, line 640)

Revoice with reframing	Rachel: They talked about it here [pointing to book], in the chapter on the conservation of number; they know it's a five, so they don't have to say [counting with fingers] '1, 2, 3, 4, 5, [pause], 6, 7, 8'; they know it's 5 plus [counting] 1, 2, 3—'5' and '3,' that's '8.' So, that [subitizing] helps with their fluency as well. Patty: So, that whole counting-on strategy, **which is a big jump for kids.** They go from doing [counting] '1, 2, 3, [pause], 4, 5,' to being able to say '3' [counting] '4, 5.' **That's a big jump for kids**, and the subitizing helps with that. (PM1, line 166)
	Patty: Why give them [students] different strategies? So, what's the purpose in it? Hazel: Different types of learners. Patty: Ok, so **we have different entry points** because we have different types of learners [writes on the board]. (PM1, line 679)
Adding descriptive information to the idea, providing an illustration.	Rachel: It also engages them [students] when you use the student's name into word problems. My students light up when it's so and so in the classroom. Patty: 'I have to get that one right' [laughs]. 'You got my problem wrong?' Yah, that's great. (PM1, line 20)
	Gloria: The other point they said it's that it helps them [students] envisioned, have that mental image, where they use a real world problem, they can put that image in their head… Patty: I really had a situation this week, with my first graders, and the situation really gave them an image of action and operation, because…they were dividing, and were removing equal groups, and because of the situation, they could imagine—'So, ok, if he took 4 pictures and he puts them on the page [uses hands to gesture].' (PM1, line 32)
	Rachel: Another part that I underlined in this book that I was talking about earlier where it says 'many teachers and other adults are surprised when students can invent ways to solve a problem.'… Even if they aren't inventing the ways, but to me they're doing things that I wouldn't even think of in my mind. I can think of 4 different ways to do it, and they come up with 6... Patty: Yeah, yeah. There's a point when I say, 'no more! No more strategies' [laughs] 'let's move forward!' (PM1, line 114)

Providing a more succinct descriptive label for participant's idea, using pedagogical language	Hazel: Just yesterday, one of my students, I had her do two times with the manipulatives, you know, and she counted '10' '10' '10.' And I said, 'Ok. How many is in this group [of 10]?' '1, 2… [shakes head],' I said, 'How many?' '1, 2…' [makes gesture], 'C'mon, how many?' And then, she finally—but she counted '10,' '10,' and '10.' And she was trying to count to see—'but how many tens you have? How many groups?' '3' 'Ok, so may do you have total?' '1, 2, 3…' [shakes head], 'but you did all the work already!' Like, c'mon! Patty: That's the subitizing! [laughs]. (PM1, line 188)
	Hazel: Well, chapter four was pretty much about how, the different strategies of what you're trying to teach them. How to actually do the number talks… So, it was nice to have those… the number talks, you know, examples of how to do it, because it says, 'Ok, do 9 + 1 first, and then 9 + 3 + 1, and then 9 + 5 + 1.' So, they're making those tens into different doubles that we taught them. So that was nice to see that they're using those strategies that we've taught. At least with those examples. Patty: So, the idea of selecting numbers that you'll use carefully…Anytime so that you're building the ones you just said, like 9 + 1, and now 9 + 1 + 5, so the selecting and the flow of your numbers and how important that is. (PM1, line 337)
	Rachel: Also because some of the strategies built upon each other. You have to learn the basic strategy for addition, or decomposing a number, before the can add double-digit numbers in their minds, or their heads. Patty: [writes on the board] So we're establishing prior knowledge. (PM1, line 681)
	Rachel: Even if they aren't inventing the ways, but to me they're doing things that I wouldn't even think of in my mind. I can think of 4 different ways to do it, and they come up with 6... Patty: But I love this idea of kids coming up with their own strategies, how did you solve it, and I think it gives them empowerment, they feel like 'Look what I can do in math!'— (P, line 128)

Adding descriptive information to the idea, while changing some aspects of the contribution.	Rachel: It also engages them [students] when you use the student's name into word problems. My students light up when it's so and so in the classroom. Patty: And I actually switched from common math problems to stories. And the kids will say, 'Are we doing math stories today? Would you read us that story today?' I do think that hitting that personal dimension is so engaging, to be doing a story with their names in it, 'they went shopping, and they got blah, blah, blah.' It's very helpful. (PM1, line 28)
	Greer: ...but the kids… still I found that they'll count the crayon box, to see if there's ten crayons in the box. Rachel: 'So they're telling us already that there's 10 crayons; we do not need to count these crayons.' I said that before I said—but they'll still [count] Patty: Yeah. I just think that's a huge concept for children to master. The ability to say, 'Ok, this is 3' without doing this [counting fingers], or 'this is 5,' without doing this [counting fingers]. And then, certainly, 10.
Providing factual information	Gloria: So that, um, I guess kinda summarizing [from the research reading] that it's the 4 strategies that they talked about in the K-2 classroom, developing the number sense, or kinda the goals I guess: developing fluency with small numbers, subitizing, making tens Patty: I think we can now—we've talked about number sense before, so I think we probably have a good sense of what number sense is; if kids know what whole numbers are by, if they get some kind of image of the size or the quantity… Fluency is knowing some facts, but also knowing how to break apart some numbers to get to… (PM1, line 70)

	Rachel: In my mind, picturing that, though, in my class—I'm picturing—they will had to have some sort of what they're doing with the manipulatives— Patty: What it is not is showing them how to solve a problem. Rachel: Giving them the strategies, right. Patty: Giving them the strategies, and then you as teacher showing them how to do it. And they might do it in their seats, and then the next five problems they solve it the same way you did, kind of thing, following the steps that you gave. That's what it is not. (PM1, line 670)
	Greer: Multiplication starts in third grade? Rachel: It starts at the end of second grade, does it? Patty: No. It's repeated addition in second grade. You do a raise, but it's supposed to be aligned to repeated addition. You don't have to do multiplication. Multiplication doesn't start till third. (PM1, line 1084)
	Patty: What would be our overarching goal, as a person and as a learner, that would help them with these [points to board]? Gloria: To be confident, independent learners. Greer: Open-minded to others. Patty: In Japan, the lesson study teams decide, through this process, decide this [points to the board], and that's the goal for the year. The whole year, it's addressed, and certainly the research lessons address the overarching goal, in some form, in some way. (PM1, line 636)
Providing reasoning	Gloria: And I'll have to say, at the kindergarten level, even though it is our goal to go beyond that, and to go to the point to put the number in your head, and count it, there are some of our little kids that cannot; they have to recount every. Single. Time. Greer: Yep, even in 1st grade— Rachel: —even in 1st grade; they have to count. Patty: Yeah. So, this subitizing, it seems to me that has come to the forefront for that purpose—that children learn to think in groups. (PM1, 177)

	Greer: 'The magical ten!' If you can find those tens, it would be easy, you know. But some kids still struggle. Patty: But I think that's why subitizing has come to the forefront. It helps the kids visualize it. (PM1, line 218)
	Greer: Because they're now tested on how to make a ten. And some of them mentally are not ready for the strategy that they're asking, from the county, for the kids to do. They're not. Patty: And I don't know what that test looks like, and what that question looks like….But I know the intent of that make a ten strategy; it's, first of all, build a good place value number sense, stressing the importance of ten. (PM1, line 732)
	Greer: It's developmental. In about a month, or in six weeks from now, if you were to do the same thing, she probably be able to do it quickly. Place value is very hard for first graders. Patty: Well, place value it's close to impossible if they [students] cannot see the times 10. Or they do not have a strong understanding of what tens is. (PM1, line 213)
Providing pedagogical principles	Greer: And I was calling it a double-ten frame… a double-ten, and they say you're not supposed to call it that. It's two separate ten frames….Because, when you're looking at making a number '13,' it's '10' and some more. Patty: …But I think that's the importance of language, to be more specific with our language, so that when we're saying ten and some more, does that help them [students] envision a teen number—(PM1, line 390)
	Rachel: You have to learn the basic strategy for addition, or decomposing a number, before the can add double-digit numbers in their minds, or their heads. So, I think it's valuable for… for me, this is the biggest reason why I do multiple strategies [points to board]…. I never, never, do a strategy for any algorithm that does not promote number sense, and eventually efficiency.

Questioning	Patty: So, thinking about our primary children, as people and as learners, what are some of their needs? What are their situations? The way they are right now? Greer: They're dependent. Patty: Dependent, is that what you said? Ok. What do you mean by dependent? (PM1, line 502)
	Greer: I think that, um, they [students] are afraid a little bit. Patty: That's interesting [keeps writing on the board]. What do you mean when you say that they're afraid? (PM1, line 514) … Is that what you were thinking? Or were you thinking of something else? [looking at Gr]. (PM1, line 525)
	Patty: I would like to go back to subitizing for just a minute… I guess, can we talk about why is that important?...So, why is subitizing—why do you think it has come to the forefront? What's its value? (P, line 136)
Redirecting	Gloria: Well, you know, in the number talks I went to—just kind of on that topic—it's when a kid has an idea, a strategy, that's not working, and there [you've] been laboring it in front of everybody, and it's taking way too much time—they say it's ok to stop and say, 'You know what? We're going to meet later, and I'll meet with you one-on-one.' Patty: Yeah, it's time to stop. It's time to stop [slight pause]. But I love this idea of kids coming up with their own strategies… (PM1, line 128)
	Gloria: Um, and just one thing I was thinking too, is that at first—my very first experience with number talks—I kinda walked away with the idea 'Ok, this is great. Now, where does it fit with my lesson?' And so I kind of got clarification when I went to the all-day number talks. And it doesn't have to go with your lesson. That was a misconception on my part… Patty: Well, that's good to know. Anything else you read in chapter 4?

	Greer: Well, if they, if they don't have the solidity of adding numbers together, as oppose to balancing equations on both sides, it's hard, hard for them, and the county refuses to move that. Patty: Well, and I would keep talking about it. Just keep saying it— I guess I just wanted to get really, really clear as we had looked at a book that has multiple strategies, maybe talking about the lessons what we're doing, the question is 'why bother?'
	Greer: Because they're now tested on how to make a ten. And some of them mentally are not ready for the strategy that they're asking, from the county, for the kids to do. They're not. Patty: And I don't know what that test looks like, and what that question looks like….But I know the intent of that make a ten strategy; it's, first of all, build a good place value number sense, stressing the importance of ten. (PM1, line 732)

Table 5

Patty's Example Interview Quote

In my past lesson study cycles, after a couple of years, we would have several people on the team who have done lesson study before. So the conversation would very quickly get very deep and very applicable in the classroom… In this group of teachers, that isn't true. Only one teacher has ever done lesson study before, and that was just last year's cycle. And so everybody else is new. So it's been interesting to me – it's a much slower process to try to have a rich discussion about what is happening with the mathematics and the children's thinking. The tendency is "well, my kids will do this", and they'll say "my kids will do", but not answer the "why" – "well, why do you think your children are thinking this way?". And they are not used to analyzing children's reaction and just thinking about children's thinking. (Patty, Facilitator Interview)