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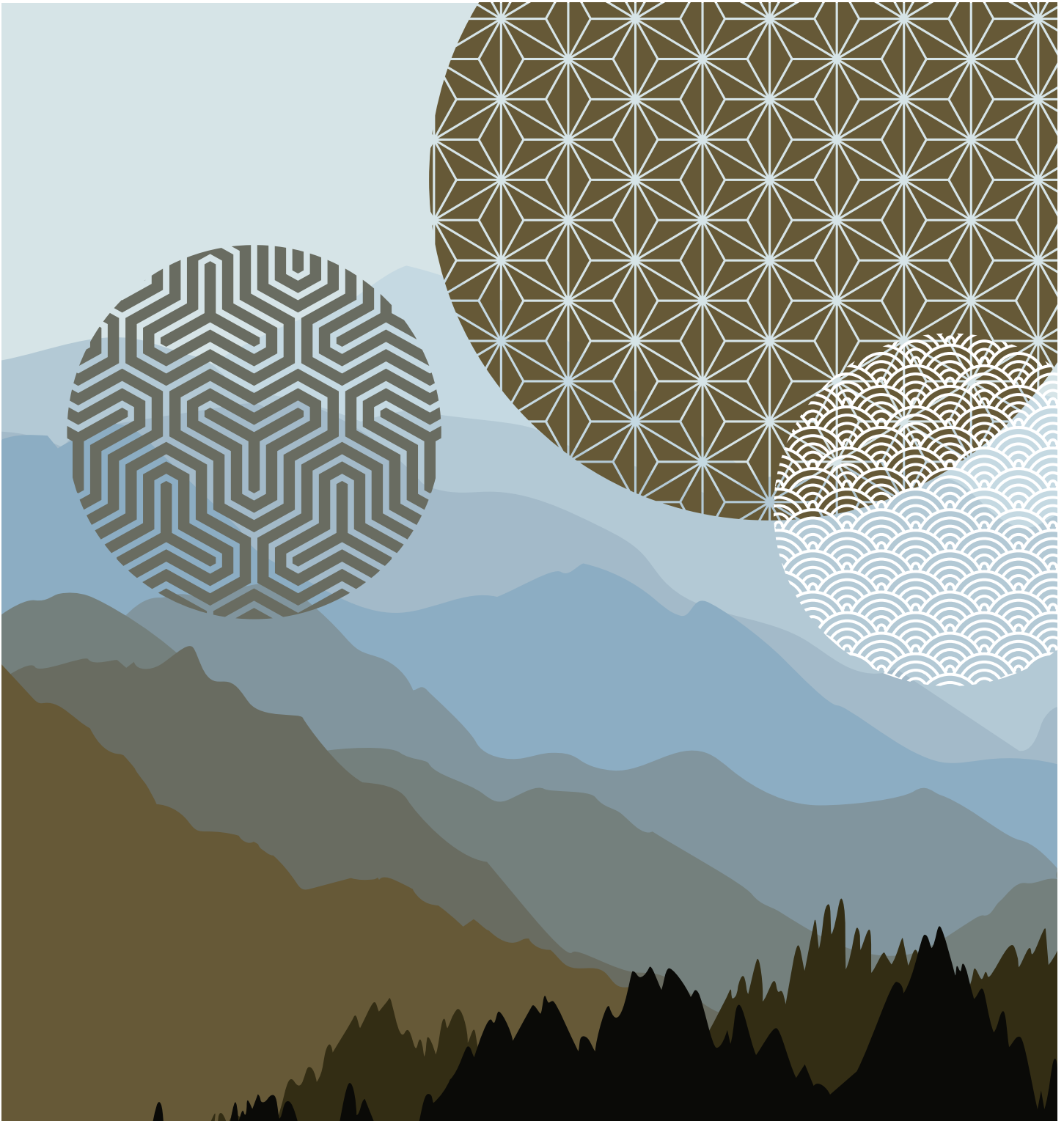


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Implementing Lesson Study: Challenges Identified by Emerging Teacher Leaders

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Abstract

Within the context of a professional development project, we supported emerging teacher leaders as they facilitated teachers' engagement in the lesson study process. In this paper, we share the self-identified challenges met by this group as they led lesson study in their school settings. In addition, we share lessons learned in response to these challenges. Implications for mathematics education leaders are included.

Introduction

As mathematics education leaders, we know that professional development is key to supporting effective mathematics instruction (Sztajn et al., 2017) and must be ongoing, embedded, and sustainable (Loucks-Horsley et al., 2010). With the support of external funding, our professional development project, Project IMPACT (Implementing Mathematical Practices And Content into Teaching), provided countless hours of professional development across a total of seven years. The project included in-school experiences, such as demonstration lessons (Loucks-Horsley et al., 2010), to enhance teachers' pedagogical content knowledge and summer institutes focusing on teachers' specialized content knowledge (Ball et al., 2008). We feel confident that our project

met the expectations of being ongoing and embedded, as its design was informed by research (Desimone, 2009; Loucks-Horsley et al., 2010; Smith, 2001). Knowing that our external funding would eventually end, we wondered throughout the project how we might best support the sustainability of Project IMPACT. During the third year of the project, this wondering led us to consider lesson study.

Lesson study is a form of professional development that originated in Japan (Stigler & Hiebert, 1999) and has demonstrated its effectiveness as a professional development model in the U.S. (Lewis et al., 2009; Lewis et al., 2006). Typically, lesson study involves a group of teachers in developing a research lesson that addresses their selected goals for student learning. The group collaboratively plans the lesson and then engages in a process of teaching, revising, and reteaching the lesson based on their observations of student learning during the teaching of the lesson. This process of teaching, revising, and reteaching the lesson continues until the teachers feel comfortable with the lesson outcomes. Collectively, these steps represent what is referred to as a lesson study cycle (Lewis & Hurd, 2011).

Lesson study as a possible mechanism for sustaining the work of our professional development project appealed to us for three reasons. First, lesson study meets the general expectations of effective professional development (Darling-Hammond et al., 2009; Desimone, 2009; Lewis & Hurd, 2011). Second, we had utilized demonstration lessons (Loucks-Horsley et al., 2010) frequently in Project IMPACT,

and lesson study seemed like a natural extension of these (see Gerstenschlager et al. (2021) for details regarding demonstration lessons and their connection to lesson study). Third, many of our project participants already had professional learning communities (PLCs) established in their schools, which would provide a natural place for lesson study to occur. For these three reasons, we aimed to train a small group of Project IMPACT teachers on the processes of lesson study with a goal of these teachers, who we referred to as emerging teacher leaders, conducting lesson study within their school contexts. In doing so, our hope was to support the sustainability of the project.

In this paper, our purpose is to share the reflections of this group of emerging teacher leaders following their implementations of lesson study in their school settings. In particular, our focus is on the self-identified challenges that this group met as leaders of lesson study in their school settings. By sharing these challenges, we aim to guide other mathematics education leaders who support emerging teacher leaders in facilitating the lesson study process.

How Literature Regarding Lesson Study Shaped Project IMPACT

Background on Lesson Study

Our own understanding of lesson study grew from a series of early works whose authors introduced the tenets of Japanese lesson study to a western audience (e.g., Fernandez & Yoshida, 2004; Lewis & Tsuchida, 1998; Stigler & Hiebert, 1999). Like many U.S. mathematics education leaders, we first encountered the idea of lesson study in *The Teaching Gap* (Stigler & Hiebert, 1999). Here, Stigler and Hiebert argued that teaching is a cultural activity and most attempts at education reform and teacher professional development eventually erode due to a failure to integrate cultural change into activities of professional learning. As a potential solution to this problem, these authors introduced lesson study as an ingrained cultural practice focused on the continuous, incremental improvement of a specific *research lesson* over time (Fernandez & Yoshida, 2004; Lewis & Tsuchida, 1998; Stigler & Hiebert, 1999). Lewis and Tsuchida (1998) further described the research lesson as not only “an actual classroom lesson, taught to one’s own students” (p. 12), but also highly focused, collaboratively planned, observed by other teachers, recorded, and debriefed by a group including, at a minimum, the teachers involved in the lesson study.

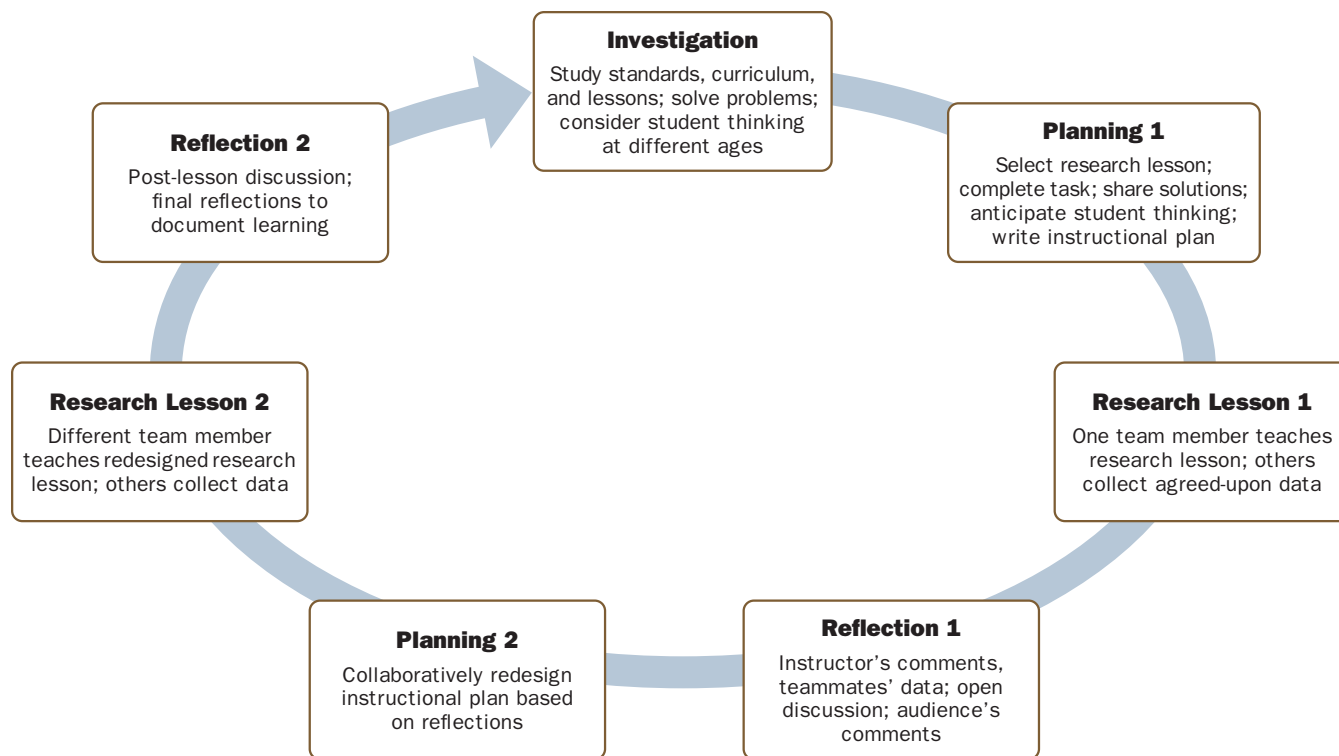
Given our emphasis on promoting sustainability in Project IMPACT, we were drawn to lesson study as the focus of professional development for our emerging teacher leaders and a possible impetus for affecting school culture. Research by Catherine Lewis, Clea Fernandez, and their colleagues confirmed this appeal in a variety of ways. In addition to providing rich descriptions of the nature of research lessons, their impact, and necessary supports (Lewis & Tsuchida, 1998), Lewis defined universal features of the lesson study cycle that influenced much of its western adoption. These features pervaded our own vision of lesson study and included an emphasis on shared long-term goals, important lesson content, careful study of students and student thinking, and live observations of lessons taught by lesson study participants (Lewis, 2002). Fernandez (2005) provided evidence that lesson study offers opportunities for both the development of mathematical content knowledge and the enactment of reform-oriented teaching, two of the fundamental goals of Project IMPACT.

Other writings helped us understand the transition of lesson study from its origins in Japan to the U.S. mathematics classroom (Fernandez, 2002; Lewis et al., 2006; Watanabe, 2002), provided theoretical lenses and experimental innovations through which to operationalize lesson study (Lewis et al., 2009; Takahashi & McDougal, 2016), and offered practical supports for implementing a lesson study cycle (Fernandez & Chokshi, 2002; Lewis & Hurd, 2011; Takahashi & McDougal, 2016). Many of the resources described here shaped not only the development of our own understandings of lesson study, but also influenced the handbook we selected, *Lesson Study Step by Step: How Teacher Learning Communities Improve Instruction* (Lewis & Hurd, 2011), to guide our emerging teacher leaders as they led their colleagues in a lesson study cycle. In the remainder of this section, we elaborate on what this body of literature suggests as a typical cycle of lesson study and its affordances.

A Typical Lesson Study Cycle

Although lesson study cycles may take on a variety of slightly different forms, the research lesson is integral to each of these, and a typical pattern of investigation, planning, teaching, and reflection regarding this lesson emerges across sources (e.g., Fernandez & Chokshi, 2002; Lewis et al., 2009; Stigler & Hiebert, 1999; Takahashi & McDougal, 2016). A typical lesson study cycle (see Figure 1, adapted from Lewis et al., 2009) begins with the lesson study team

FIGURE 1. A Typical Lesson Study Cycle



Note. This figure was developed from “Improving Mathematics Instruction through Lesson Study: A Theoretical Model and North American Case,” by C. Lewis, R. Perry, and J. Hurd, 2009, *Journal of Mathematics Teacher Education*, 12, 285 – 304.

selecting a content topic for their investigation, examining learning standards which address the topic, solving related problems, sharing their solutions, and considering the resources available to them to support their teaching (e.g., textbooks, published lessons, or curricular guides). Once the team has selected the content and general structure for the research lesson, they move into a period of collaborative planning in which they choose tasks and sequencing for the lesson, generate and discuss exemplary responses, anticipate possible student thinking and solutions, and record their instructional plan in some agreed upon format. Soon after, the research lesson is taught by one of the participating teachers, with the remainder of the group observing and collecting previously agreed upon data generated directly from the lesson and students’ accompanying thinking (e.g., students’ conversations, solutions, models, understandings and misunderstandings).

Invited others, such as peer teachers, local experts, or members of educational leadership, may be present to

observe the research lesson and participate in the reflective discussion that follows immediately after. These discussions tend to include comments by the teacher leading the lesson, presentations of data collected by the lesson study teachers, and a whole-group discussion of questions and features selected by the team. Based on feedback from this period of reflection, the lesson study teachers revise their written instructional plan, teach the modified lesson to a new group of students (generally with a different participant teacher), and host another round of reflective lesson debriefing. These second stages of planning, teaching, and reflection are similar in nature to their first stage counterparts, but this time with a goal of finalizing the lesson and documenting what was learned from the lesson study process in terms of incremental change.

Affordances of Lesson Study

A variety of positive attributions, including factors both internal and external to participating teachers, appear repeatedly in research related to lesson study. We categorize

the recurring internal factors broadly as improvements in three areas: teacher knowledge and beliefs, instructional practices, and confidence and self-efficacy in teaching. Evidence for *improvements in teacher knowledge and beliefs* appears in the form of increased subject matter and pedagogical content knowledge (Fernandez, 2005; Lewis et al., 2004; Lewis et al., 2012), as well as beliefs regarding mathematics and the nature of teaching and learning mathematics (Lewis et al., 2009; Lewis et al., 2012). Enhancements to *instructional practices* include enriched classroom practices (Lewis & Tsuchida, 1998), learning how to reason mathematically during the enactment of a lesson and how to best support students in developing content knowledge (Fernandez, 2005), and a stronger ability to connect daily practices to long-term classroom goals (Lewis et al., 2004; Lewis & Tsuchida, 1998). Changes in *confidence and self-efficacy* present as increased professional confidence (Lewis et al., 2004; Rock & Wilson, 2005), a greater perception of one's ability to influence student learning (Lewis et al., 2012), and motivation to improve teaching (Lewis et al., 2004). As an offshoot of this motivation to improve teaching, the literature suggests that engaging in lesson study increases teachers' demand for high-quality professional development experiences (Lewis & Tsuchida, 1998), allows focused and sustained efforts to improve their growth, and extends their confidence in engaging in the processes involved in lesson study (Rock & Wilson, 2005).

Evolving with these internal developments, and as part of the sustained effort required by lesson study, are exterior features of the participating teachers' world related to student thinking, their professional networks, and the manner in which they utilize instructional resources. Lesson study encourages *focus on and insight into student thinking* by centering instruction on student work (Lewis et al., 2012) and improving teachers' ability to anticipate and observe student thinking (Lewis et al., 2004; Lewis et al., 2012; Perry & Lewis, 2009). Accompanying this shift in focus are gains in students' mathematical thinking measured by both classroom assessments and standardized testing (Lewis et al., 2012). This focus on student thinking, in addition to shared lesson planning, common teaching experiences, and lesson debriefings, is shown to *strengthen teachers' professional networks* (Lewis et al., 2004; Lewis et al., 2009) as well as increase the value they place on peer collaboration as part of their own professional growth (Rock & Wilson, 2005). Other improvements in *resource utilization* occur as teachers increasingly consult external sources such as professional literature and local experts

(Lewis et al., 2012; Perry & Lewis, 2009; Rock & Wilson, 2005) and as they explore internal resources including each other's practice, their students' thinking (Lewis et al., 2012), and the protocols and tools they develop to facilitate their lesson study (Perry & Lewis, 2009). Additionally, the nature of lesson study leads to a higher quality of available lesson plans (Lewis et al., 2004; Lewis et al., 2009) and the sharing of new ideas regarding both content and teaching (Fernandez, 2005; Lewis & Tsuchida, 1998).

Project IMPACT's Plan for Emerging Teacher Leaders

Convinced that lesson study was the appropriate next step for Project IMPACT, we moved forward with identifying and working with emerging teacher leaders. At that time, Project IMPACT was in its third year of implementation and had 82 teachers representing kindergarten through sixth grade from eight different school districts in a southeastern state of the U.S. The components of Project IMPACT (i.e., demonstration lessons and content-intensive summer institutes) were designed to enable participating teachers to meet the standards set forth by the National Council of Teachers of Mathematics (NCTM, 2000, 2014) for teaching mathematics in ways that engaged learners in sense-making. A focus on learning through problem solving and sense-making of mathematical concepts through use of manipulatives and models was prevalent throughout activities. Participating teachers came to refer to lessons they experienced in the project as "Project IMPACT Lessons," noting these as a different way of teaching mathematics than that to which they were accustomed. By situating our work with emerging teacher leaders within Project IMPACT, the context of the project provided a pool of potential emerging teacher leaders that shared a common vision of effective mathematics instruction.

To identify participants from within Project IMPACT for the emerging teacher leader focus, we sent a general invitation to all project participants, inviting them to consider participating in the teacher leader training. We defined teacher leaders as individuals who provide instructional support to teachers. Likely, these individuals held titles such as mathematics coach, numeracy coach, or mathematics supervisor. In addition, we described emerging teacher leaders as teachers who perceived themselves as eventually moving into the role of a teacher leader or as teachers beginning to assume teacher leader roles with no official change in job title or job responsibility. In response

Table 1: Background on Emerging Teacher Leaders

Teachers by Grade Level Taught				
District	K-2	3-4	5-6	Teacher Leaders
A	2	5		
B	4	3	1	3
C		1	3	
D	1			1
E	1	1		
F			1	

to our invitation, 28 teachers from Project IMPACT agreed to participate, and 27 actually attended the initial training session. Table 1 provides information on the teacher leaders and emerging teacher leaders that participated in the training. For simplicity, we refer to all of these individuals as emerging teacher leaders.

The 27 emerging teacher leaders attended their first meeting in early September, near the beginning of the school year. At this meeting, they began by engaging in activities aimed at developing their understanding of working with adult learners and the stages of career development. Then, we turned our attention to lesson study.

A quick poll of the emerging teacher leaders demonstrated that none were familiar with lesson study. With this in mind, we provided an overview of the lesson study cycle and then engaged participants in a mock lesson study experience using video and tools associated with the selected lesson study handbook, *Lesson Study Step by Step: How Teacher Learning Communities Improve Instruction* (Lewis & Hurd, 2011). Specifically, we followed the professional development plan described in Chapter 2 of this book, in which the authors state, “The best way to learn about lesson study is to participate. In this chapter, we do the next best thing – participate vicariously” (p. 18). After completing the activities described in the handbook, the emerging teacher leaders were given their charge of returning to their school setting and leading their colleagues in a cycle of lesson study that followed the guidelines and expectations outlined in the handbook. Time was spent addressing the expectations and logistics of the charge, as

well as the guidance our handbook offered for handling obstacles that might arise during the process. It is important to note that each emerging teacher leader received a resource bundle to support their work, which included the lesson study handbook by Lewis and Hurd (2011) and a video camera for recording the lessons and meetings associated with the lesson study.

In late February of that same school year, we met with the emerging teacher leaders for the purpose of debriefing their experiences as leaders of lesson study. This single-day meeting began with a discussion of the experience, during which we engaged them with the following eight prompts:

1. Looking back, I wish I had known . . .
2. The most challenging part of **leading** the lesson study was . . .
3. The big idea that I walked away with was . . .
4. The strength of our lesson that we implemented was . . .
5. The weakness of the lesson that we implemented was . . .
6. If I had this to do over again, one thing that I would do differently is . . .
7. Some of the obstacles I had for **conducting** the lesson study included . . .
8. If asked, I would/would not lead a lesson study again because . . .

Each prompt was written on a separate piece of large chart paper, with the pieces of chart paper rotated through the small groups of emerging teacher leaders. As they discussed their ideas related to each prompt, they recorded them on post-it notes and placed the post-it notes on the corresponding chart paper. After the chart papers had rotated through all of the groups, each group of emerging teacher leaders was assigned a poster and given the task of summarizing the ideas on the poster. This work was then presented to the whole group and used to launch follow-up discussions. This entire debriefing session was video recorded and lasted around three hours.

To analyze the data drawn from this single meeting, we began by recording the ideas from the post-it notes in a spreadsheet and then transcribed the portion of the debriefing session video that included group presentations of the chart papers and the ensuing whole group discussions. Next, two of the researchers analyzed this data with an eye on the challenges to leading lesson study that were identified by the emerging teacher leaders. Specifically, we used the process of open coding (Creswell, 2013) to categorize the data contained on the post-it notes that were written in

response to the second prompt (i.e., The most challenging part of **leading** the lesson study was . . .). Next, these codes were grouped into themes (Creswell, 2013). Finally, we analyzed the transcripts, identifying passages that offered insight into the original codes drawn from the post-it notes. Throughout this process, the researchers oscillated between working individually and collaboratively, allowing for rich discussions of the data and resolution of any coding differences. In the next section, we elaborate on the results of this analysis.

Emerging Teacher Leader Reflections

The three themes that emerged from the analysis involved the logistics, culture, and coordination of lesson study. Within the logistics theme, the emerging teacher leaders identified the challenges of time for planning and scheduling issues. Although these logistical challenges were common to all emerging teacher leaders, the underlying issues that led to these challenges (e.g., weather-related school closures) were context dependent and, therefore, unique to each school. In contrast, the remaining two themes (i.e., culture and coordination) represented shared challenges resulting from similar issues faced as leaders of lesson study, which were the focus of our investigation. Therefore, in the following sections we will expand upon these two themes. Participant quotes, taken from small group presentations, will be included throughout these descriptions. However, these quotes will not be attributed to the individuals that spoke, as they were primarily given in the context of representing the perspective of either the presenting group or the whole group rather than the individual's perspective.

Culture

To begin the lesson study process, the emerging teacher leaders were tasked with identifying teachers in their schools who would potentially participate in the lesson study. For the most part, the potential teachers had not participated in Project IMPACT and, therefore, did not necessarily practice the student-centered instructional strategies that the emerging teacher leaders had learned through the project. Further, emerging teacher leaders reported that many of the teachers were not accustomed to working collaboratively with their colleagues in processes associated with the lesson study cycle. As a result, the school culture within which the emerging teacher leaders worked led to two challenges: teacher buy-in and teacher participation. These cultural challenges are described in the following sections.

TEACHER BUY-IN

In leading a cycle of lesson study in their schools, the emerging teacher leaders found it difficult to develop teacher buy-in so as to support meaningful engagement in the process. Initially, the difficulty stemmed from an inability to articulate the goals and purposes of lesson study.

Getting teachers to understand what [lesson study] is — “What is it you’re asking me to do, you know? I don’t really know what a lesson study is.” None of us knew what lesson study was before we came in September. So that was a challenge to explain [what lesson study is] without the [training] videos [from our book]. . . . I had to get [the potential teachers] to sit down and show them the video for them to be able to understand it. But they didn’t want to do that because they didn’t know what it was yet.

This difficulty was compounded by teachers’ hesitation to “give up [their] limited time to do [lesson study].” In fact, “some teachers had to be bribed with [continuing education] hours that had to be cleared by central office. And that shocked me.”

Once the emerging teacher leaders formed their lesson study groups, in some instances the emerging teacher leaders found it difficult to get “teachers to realize that lesson study is not my thing, but our thing. Since it’s not my lesson plan.” That is, teachers saw the lesson study as an assignment that the emerging teacher leaders had to complete as a result of their participation in Project IMPACT rather than a professional development opportunity for all involved. “We felt like they were - they were just helping us out. It was our thing. . . . So we did the bulk of the work.”

In thinking about teachers lack of buy-in to the lesson study process, the emerging teacher leaders wondered if it was a result of the teachers not having participated in Project IMPACT. Emerging teacher leaders questioned whether or not the teachers approached the lesson study with the mentality of working together to improve their practice.

What we sort of thought was maybe they’re not [Project] IMPACT-trained teachers. You know? They don’t have that mindset of: we’re going in trying to make ourselves better. This isn’t a degrading process. It’s a learning process. I’m not here to say, “Oh, Mary, I would never do that. And what you did was horrible.” It’s, “Hey, we’re a team. We’re supposed to be making us better as a group.” . . . It’s really the group effort.

Closely related, other emerging teacher leaders wondered if the association of the lesson study with Project IMPACT led to a lack of buy-in.

Maybe that's one of the things that's kind of shutting them down. If they've not – [if] they don't know anything about Project IMPACT. And if we just say, "Hey, we're going to do this Project IMPACT lesson or this IMPACT lesson study." Then they're like, "Look, what I've been doing is fine. So, you just need to leave me alone."

The emerging teacher leaders further reflected on this connection between the lesson studies and Project IMPACT as they considered the need for relationship building.

So, I have to believe that most teachers want to improve. But if they say no, they have the right to say no. And I think, you know, the teachers that I talk to - the teachers I developed a relationship with - and it's teachers that I say, "I'm excited about this, you know, and I'd like to share this with you, you know." If I just go to somebody and I say, "I want to do this Project IMPACT thing with me," and they say, "no," and I'll say, "Fine." You know, you've got to have a relationship. And if you don't have a relationship, it won't work. . . . Just because we're learning this fabulous thing. We want them to be excited about it, because we're excited about it.

Based on their discussions, it appeared that Project IMPACT had developed a culture for collaborative professional growth and fostered a willingness among its participants (i.e., the emerging teacher leaders) to try new instructional strategies with the support of their peers. These same characteristics were not necessarily true of the school cultures in which the emerging teacher leaders worked, posing a challenge to them as leaders of lesson study.

TEACHER PARTICIPATION

As the groups of teachers moved through the lesson study process, the emerging teacher leaders faced a new challenge: teacher participation. Initially, "getting teachers to talk or share was a big deal. . . . What's the point of having this group discussion if you're the only one speaking?" The emerging teacher leaders noted that the presence of a video camera may have contributed to this hesitancy to participate.

But if it was not recorded. . . . I don't care how many times I told them, "Y'all, I am not giving this to your principal." They didn't believe me, I don't think.

Compounding this issue of being recording was the idea that:

Not many of the teachers, who have been teaching for a long time, have done anything like this [lesson study] and . . . maybe [having] their reactions to things that they've never heard of recorded [was] probably something they might have been scared of.

As teachers overcame their hesitancy to participate, the emerging teacher leaders noted additional challenges related to teacher participation. It "was hard to convince teachers that this was not an observation of their teaching. . . . We were there to observe the students learning." By focusing on the performance of the person teaching the lesson(s), the lesson debriefings focused on positive affirmation. "'Well, I thought it was great.' 'I thought it was good, too.' And they all just thought it was great." As the debriefings shifted to an analysis of student work, though,

I was like, this was not a success. So how was it great? That one quote from the book, saying it was a great lesson, but the students just didn't get it. It's just like saying the surgery was a success, but the patient died. . . . But if during the lesson study, the goal is to actually look at and critique the learning of that lesson. If all we're doing is saying everything was great, wonderful. Well, all right, then what are we doing here?

From these discussions, it seemed that teacher participation was limited by teachers' inexperience with operating in a culture that values critical reflection about instruction.

Coordination

The impact of the cultural challenges described in the previous section extended beyond the lesson study groups' compositions and preparation to engage in the lesson study cycle. More specifically, these issues impacted the activities of the lesson study cycle led by the emerging teacher leaders, including co-planning, teaching, and debriefing the groups' research lessons. In this section, we will chronicle the observations made by the emerging teacher leaders regarding the challenges they faced as they led teachers in co-planning their lessons and dealt with misalignments in the groups' knowledge and expectations for their students.

CO-PLANNING

In their reflections regarding the most challenging aspects of leading the lesson study process, the emerging teacher leaders repeatedly cited managing their time efficiently and learning to plan collaboratively with their fellow teachers. Although the teacher leaders shared a variety of ideas during this discussion, their struggles with time management and co-planning were evident from the beginning:

I think as we start out [discussing the most challenging part of leading the lesson study], we have the three main categories of time management, colleague buy-in, and planning. . . . I think it's a little misleading because the time management part was by far the most comments we actually had on there but it was the same thing: the time to plan and time to collaborate . . . is definitely a huge part of it.

However, as conversation around this idea evolved, the emerging teacher leaders framed these challenges as more than a simple issue of finding time to work together. Rather, they discussed internal conflicts, contrasting styles of planning, and issues regarding the scope and sequence of their lessons as obstacles to their planning process.

Supporting the notion that these issues were more than a simple logistical challenge, one participant elaborated on how an internal debate regarding teachers' autonomy led to struggles in co-planning.

We work by ourselves really, almost all the time, and you can see, which it started to happen in our group, but it didn't end up happening, when it actually comes to suddenly you're collaborating and trying to get to that, it's really easy to have to try to stand your ground on saying, "I don't do it that way." I think it can be hard to kind of put it aside, and say, "Well I don't normally do it that way, but for this, I can go ahead and try to do it this way, and see what happens." You may like it, you may hate it, whatever. And, I think I'm preaching to the choir here, but that's the thing, everybody in here is willing to try, that's why you're here to start with. But, sometimes, that can be challenging in dealing with other teachers.

Building on this, another emerging teacher leader voiced an explanation of how contrasting styles of planning impacted collaboration between two emerging teacher leaders working together on lesson study.

I work with Heather [another emerging teacher leader], and I plan a lot different than Heather does. I'm, you know, a big idea, kind of person, then I go with that, and Heather's more precise than me. She'll say exactly what she's going to say, and that, you know, stresses me out, because I know I'll never actually say what I wrote down. You know, it's just two different styles, not that one is more correct than another, but, you know, it's just different ways of doing it. So there's some translation going on there, but planning, as a whole, was a bit of a challenge.

Facilitating teachers' navigation of these types of interactions, within the already limited time available for lesson planning, proved to be a consistent challenge faced by the emerging teacher leaders as a whole.

A related concern arose as the emerging teacher leaders reflected on the challenges their lesson study groups encountered in planning instruction that could be modified for different grade levels and learners. A variety of cultural and logistical reasons led most of the emerging teacher leaders' lesson study groups to span a wide range of grades. One emerging teacher leader summarized:

The last category that kind of came to light [was] . . . the brass tacks of us executing it. In terms of you have different teachers of different grade levels trying to figure out a topic. And, once you determine a topic, how that fits in the scope and sequence, four weeks from now, or days from now, when you're actually going to teach it, and trying to figure out how that all works together.

Another emerging teacher leader expanded on this idea:

I had my lesson study in sixth and seventh grade, so meshing the expectations of the sixth- and seventh-grade standards and the student knowledge level was difficult for the group that I had. Just because of the way the mini schools were divvied up, or the type of students that were in each one, and then the standards we meshed at different times. That was hard for us.

Comments such as these illustrated the core challenges the emerging teacher leaders faced as they facilitated their groups' co-planning during their lesson study, and foreshadowed further difficulties that would arise in their teaching due to a lack of knowledge of the students with whom they worked.

KNOWLEDGE OF AND EXPECTATIONS FOR STUDENTS

In looking back across what they wished they had known prior to the start of their lesson study process, the emerging teacher leaders cited finding a more “efficient way to journal and collect lesson data” as a key concern. As with the other challenges of leading the lesson study process, discussion of this notion allowed the group to uncover deeper concerns, this time involving the importance of building on their knowledge of students and considering the ways in which students were prepared to learn mathematics. Initiating this conversation, one teacher leader noted:

You have all this fancy stuff planned, but yet you never get to the point of what you’re wanting to get across to the kids . . . then a lack of notetaking through the whole process [limits being] able to recall and go back to the lesson and see what the kids were getting and what they weren’t.

One emerging teacher leader attributed part of this failing to not knowing “the learners individually, so you don’t necessarily know what their learning styles are or their strengths or their weaknesses” and asserted that “you really need to have a knowledge of the students and where they’re coming from” to be successful. Another emerging teacher leader supported this line of thinking, suggesting that knowing “more about the diversity of the student’s knowledge and the grade level expectations with each of the classes for the lessons” would lead to more consistency across the research lessons, as “one class might have had this type of students where the lesson didn’t go exactly the way that it did over here because of the students.”

A specific example of this need for a better knowledge of students was cited repeatedly regarding students’ preparedness to learn in a small-group, hands-on fashion. In their eagerness to design what they referred to as “Project IMPACT lessons,” which involved extensive use of manipulatives for making sense of mathematics, the emerging teacher leaders found that “a lot of kids [from the non-IMPACT teachers’ classes] weren’t used to actually dealing with manipulatives and hands-on materials.” One teacher leader noted a cultural barrier to this approach, as some of the non-IMPACT teachers felt the “whole idea of this lesson study bringing in manipulatives, heaven forbid, is viewed as we’re playing,” because “it’s fun, and if it’s fun, you’re not really learning.” Another voiced the reason that she suspected many students were not prepared to use this type of tool.

The manipulatives will show the reasoning behind it, as opposed to just the straight scale of doing the [operation] . . . and the problem is, though, is that [not all non-IMPACT teachers are teaching this way]. Most or many students [from their classrooms] are not geared to work with manipulatives and come out with what you wanted them to come out with. It’s more of, “Oh, this is great fun. I have something to play with right now,” and let me play with it, and their focus goes away and it takes a lot more work on everybody’s part.

Another teacher leader carried this reasoning even further, suggesting that some of the teachers they worked with did not understand how to use the tools themselves. He referenced a specific example that arose in planning for instruction.

She actually said something [regarding] teaching the lesson plan. We were trying to use manipulatives to show why, like five tenths times five tenths is twenty-five hundredths, and she started that out, she says, “I can’t use manipulatives so you’re going to have to teach me how to do that.” And, she could sit there and say, “I know this is the best way to teach using manipulatives, using those,” but she’s like, “it’s, you know, all of our kids are not trained for them. So it’s hard to use them [in research lessons].”

This combination of factors caused many teachers to doubt the effectiveness of their lessons, stating that they did not “feel like the class got out of it, what I wanted them to get out of it” or that they had to move to individual instruction with the manipulatives as “the group thing took their focus off of what our goal was.” Collectively, these ideas regarding knowledge of, and expectations for, students represented challenges for the emerging teacher leaders as they facilitated the lesson study process.

Responding to Challenges: What Have We Learned?

As we reflected on the challenges identified by the emerging teacher leaders, we were struck by two realizations. First, as they engaged in the lesson study process, the emerging teacher leaders played the dual role of lesson study participant and lesson study facilitator. As they shared their ideas with us, they did not differentiate in these two roles. However, the challenges shared in the previous section were in response to the prompt of leading

lesson study and, thus, represented challenges that the emerging teacher leaders felt compelled to overcome given their role as the facilitator of the lesson study process and their desire to make the experience productive for everyone involved. This led to our second realization: despite the challenges, these emerging teacher leaders pushed ahead and completed a cycle of lesson study within their school contexts. In doing so, they gained insights that would inform future opportunities to lead a lesson study. To this end, we share in this section the reflections of the emerging teacher leaders that they felt would likely address the earlier noted challenges. In addition, we feature what we learned as mathematics education leaders that would influence future work with emerging teacher leaders leading lesson study.

Emerging Teacher Leaders' Insights

In their first attempts to carry out a lesson study, the emerging teacher leaders found much of their effort directed towards establishing cultural norms and mechanics that would facilitate the process. In doing so, the emerging teacher leaders attributed much of their success to looking beyond the end result of their initial attempts and towards the processes and relationships involved in their work. One emerging teacher leader summarized this sentiment, noting the importance of reflection and persistence in developing the research lesson.

This lesson thing that we're doing here, it's just a process. It's not the product. It's just like with math, it's the process. We're trying to develop a lesson that is effective and as we reflect on it, it becomes more effective for the students that we teach; and we reflect on it more, and it becomes a better and better lesson that involves our students and lets them become the leader of the lesson. And, you can't do that the first one out of the chute. I mean, if you put me on a rodeo horse today, I've got to tell you, I'm not lasting the eight seconds, and I may not last the eight seconds until it finally kills me. But, until I die, I'm going to be trying to improve.

In many ways, this process-oriented view of lesson study adopted by the emerging teacher leaders facilitated the product-oriented conception espoused in the literature (e.g., Fernandez & Yoshida, 2004; Lewis & Tsuchida, 1998; Stigler & Hiebert, 1999). Without making arrangements to prepare for both the cultural and mechanical aspects of lesson study, the resulting research lesson was likely a

mere shadow of its possibility. However, when a school's professional culture aligns with the lesson study process and is then focused through the lens of student learning, there is an opportunity for professional development and curriculum development to reinforce one another and create a whole that is greater than its parts. Recognizing this potential opportunity, in the remainder of this section we share insights the emerging teacher leaders gained as they responded to the challenges faced when implementing lesson study. These insights are related to encouraging teachers to fully participate in the lesson study cycle, time for planning and working together, and shifting their groups' professional focus to student thinking and learning. Whenever possible, the emerging teacher leaders' words are used to frame their ideas on these topics.

ENCOURAGE TEACHERS TO FULLY PARTICIPATE

The vast majority of advice offered by the emerging teacher leaders centered on encouraging those involved to engage in the process in meaningful ways. This facilitation occurred in three overlapping areas: encouraging broad participation in the project, setting norms and expectations for the various stages of the process, and building professional relationships with the team engaged in the lesson study. In this section, we will provide a brief summary of how each of these factors influenced the emerging teacher leaders' work.

Encouraging Broad Participation in the Project. The emerging teacher leaders suggested recruiting participants for the project from a broad group of teachers and administrators that would bring different ideas to bear. Although some groups selected their participants from Project IMPACT so as to have a shared vision of instruction, the emerging teacher leaders recommended intentionally choosing a broader range of participants to provide exposure to different ways of teaching. The group's rationale was that "we're going to grow more if we get people that are different from us," and that this type of selection would allow the group to expose their peers to their new ideas about teaching and learning that arose from Project IMPACT. The teacher leaders also suggested inviting school-level administrators to participate in the lesson study so participating teachers could "know that [the administrators] are on our side and willing to learn these things, and because they need to be opened up to this way of teaching, too." Perhaps most importantly, the teacher leaders acknowledged their role in bringing lesson

study to the attention of their peers. Their sentiment was that “this professional development activity, now that it’s happened once in the building, those teachers may share some positive things with others” and that other teachers would be “more willing to participate in it again.”

Setting Norms and Expectations. Although the emerging teacher leaders felt that, “Project IMPACT lessons are sort of our new norm,” they recognized that this view of instruction develops over time. In response, they hoped that in future lesson studies they might have a way to “quickly introduce Project IMPACT philosophies to all members of the group.” Additionally, almost everyone agreed that, during their reflection phases, “getting teachers to talk or share was a big deal,” with an acknowledgment that, “we didn’t do a good job of making clear what role they were supposed to take as observers.” Thus, they acknowledged a need to delineate observational expectations.

The emerging teacher leaders also suggested being selective in terms of what components of the lesson study are video recorded, as some teachers may be reluctant to share their ideas freely when being recorded. They recognized that video recording during research lessons provided an opportunity to watch the lesson again at a different pace or with a different lens, but they felt it may make more sense to leave cameras off during planning and reflection. As summarized by the emerging teacher leaders, “If I could turn the video camera off, would they say more? Would they be more willing to actually share?”

Building Professional Relationships. Throughout the process, the emerging teacher leaders referenced developing strong professional relationships within their lesson study groups and leveraging these relationships to share good teaching practices. Once engaged in the project, trust between the research lesson teacher and those observing the lesson became paramount. As one teacher said, “Once you get into your lesson and you’re comfortable with it, then [the feelings of nervousness] kind of disappeared.” As a result, the emerging teacher leaders emphasized the importance of co-planning the research lesson and promoting shared ownership of the product as a way to build professional relationships. When they nurtured these relationships, the emerging teacher leaders found that lesson study was “a good way to introduce teachers to the IMPACT way of thinking, and helps examine good instruction and ways that we can show improvement.”

TIME TO PLAN AND WORK TOGETHER AND FOCUS ON STUDENTS’ THINKING AND LEARNING

The recommendations in the previous section dealt primarily with promoting a school culture that is conducive to the lesson study process. With this type of culture in place, each phase of the lesson study cycle runs more fluidly, and teacher leaders can more heavily emphasize the mechanics of planning, teaching, observing, and refining the research lesson. The emerging teacher leaders offered descriptions of these elements from their lesson studies as well, focusing on the importance of time for planning and reflection, and the need to highlight students’ thinking and learning throughout the project’s phases.

Across the board, the emerging teacher leaders referred to their own mismanagement of time, or contextual situations that limited their time together (e.g., weather, illness, outside commitments), as one of the more challenging aspects of their lesson study. They found that the initial phases of the process were “very time consuming and you weren’t really sure if you were doing it right or how long it was going to take,” and suggested “starting sooner” and generating “a more realistic timeline” as a key modification for future cycles. As the time spent “to plan, reflect, and focus was extremely beneficial,” particularly in the second half of the cycle, starting early and using the initial stages of the project to gauge the time commitment needed for a full cycle may help others in their own implementations of lesson study. Supports, such as finding “better, more time efficient ways to journal and collect lesson data” or learning to “look at and critique the learning of the lesson” are also likely to arise from starting early and engaging in the initial phases, even clumsily, that will help improve the overall fidelity of the lesson study cycle. Other groups recommended looking towards platforms that are already used for planning and communication in their schools, and adapting these structures to assist with lesson study. Although an individual team’s resources will vary, many organizational structures (e.g., professional learning communities, grade-level meetings) and technological platforms (i.e., Google Drive/Docs, Microsoft Teams, Slack) can be easily adapted for this purpose.

From a more pedagogically significant vantage, the emerging teacher leaders stressed the challenge of shifting their groups’ focus, in all phases of the lesson study cycle, away from the individual teacher’s actions and choices, and towards students’ mathematical thinking and learning.

As one teacher leader described it, her stress in being observed teaching by her peers “went away” when the observing teachers told her, “I’m not watching you. I’m watching the kids.” The emerging teacher leaders emphasized the idea that “we are not critiquing the teacher in her teaching,” but rather critically examining the lesson and its influence on students’ thinking and learning, and suggested that lesson study participants be repeatedly reminded of this central premise.

Mathematics Education Leaders’ Insights

As mathematics education leaders, this was the first time we had engaged emerging teacher leaders in the process of leading a lesson study. As we reflected on the challenges they identified, we recognized aspects of our process that we would change in response, if we had the chance to do this again. These aspects primarily fell in two areas: utilization of demonstration lessons and conducting check-in meetings. We will discuss each of these in the following sections.

UTILIZATION OF DEMONSTRATION LESSONS

In hindsight, we wished that we had asked the emerging teacher leaders to go through the process of conducting/leading a demonstration lesson before we introduced them to lesson study. This would have allowed them to start with a professional development model with which they were familiar, as demonstration lessons represented a key component of Project IMPACT. Further, demonstration lessons, as described by Loucks-Horsley et al. (2010), include processes similar to that of lesson study (see Gerstenschlager et al. (2021) for a discussion of these similarities and differences). More importantly, though, the use of demonstration lessons could have potentially addressed three of the challenges identified by the emerging teacher leaders.

First, the time commitment for participating teachers in a demonstration lesson is only a few hours in a single day compared to many hours over possible weeks or months with a lesson study. This smaller time commitment likely would have helped with teacher buy-in, as teachers might have been more willing to commit to a smaller amount of time. Second, this small-scale opportunity could have potentially led to greater teacher participation and, thus, the opportunity to begin establishing the relationships and cultural norms needed for a successful lesson study. Third, the featured lesson in a demonstration lesson is developed by the individual who teaches the lesson. Therefore, the emerging teacher leaders would have gained experience in

preparing a lesson far in advance that fits into the curriculum without the frustrations of having to do so collaboratively with a group of teachers.

Recognizing these affordances, if we have the opportunity to repeat this project, we feel that having the emerging teacher leaders carry out a demonstration lesson (or two) will set a strong foundation for later leading a lesson study cycle. In this way, we see leading a demonstration lesson as scaffolding the emerging teacher leaders towards leading a lesson study.

CONDUCTING CHECK-IN MEETINGS

As we considered the challenges identified by the emerging teacher leaders, we had a second realization: we should have scheduled meetings along the way to check-in with them. Although we encouraged communication through emails and established a Facebook group as a means of support, offering these opportunities for support from us (the Project IMPACT team) was insufficient, as the emerging teacher leaders did not take advantage of our invitations to consult with us. However, had we planned meetings along the way, we could have addressed several of the challenges that we only learned about afterwards. For example, several of the issues noted by the emerging teacher leaders were discussed in books that were a part of their resource bundle. A check-in meeting could have provided an opportunity to revisit these resources with an eye on the challenges they were facing. In addition, the challenges of, for example, engaging students who are not used to working with manipulatives is something with which we, as mathematics education leaders, have quite a bit of experience. A check-in meeting would have provided an opportunity for sharing insights and strategies for teaching in these situations. We also noted a perceived roadblock related to lack of knowledge of individual students. Had we engaged in check-in meetings and learned this earlier, we would have directed teachers to materials addressing learning trajectories and shifted focus away from individual students and toward strategies that engage all learners along the trajectory.

Discussion and Conclusion

In our work, we sought to support the sustainability of our externally funded, professional development project by developing emerging teacher leaders as facilitators of lesson study. In reflecting on this research study, one might think its results lack transferability to other con-

texts due to its close association with Project IMPACT. From our perspective, though, Project IMPACT simply provided a group of individuals who held a common vision of effective mathematics instruction as a result of their participation in the project. Therefore, we believe that our results serve to inform mathematics education leaders who are working with emerging teacher leaders regardless of the context. Unique to this report was the venture into lesson study led by individuals who had limited training and had not previously participated in lesson study. Although not ideal, with the enthusiasm that often surrounds lesson study, we hypothesize that similar grassroots efforts to learn from lesson study are being conducted, and our work serves to inform these efforts. With this in mind, we shared the reflections of the emerging teacher leaders following their implementations of lesson study in their school settings, with particular attention given to the self-identified challenges they faced as leaders of lesson study. These challenges were related to their school cultures (e.g., teacher buy-in and participation) and their efforts to coordinate the lesson study process (e.g., co-planning and knowledge/expectations for students). In response, we shared insights from the emerging teacher leaders, as well as our own, that should inform future opportunities for repeating this work.

By sharing our work, our goal was to support other mathematics education leaders in three key ways. First, we aimed to introduce lesson study to mathematics education leaders as a potential for sustaining professional development efforts. The literature has established the potential of lesson study for supporting teacher growth (e.g., Lewis et al., 2009; Lewis et al., 2006). It is, therefore, enticing to think of lesson study as a mechanism for extending the influence of professional development beyond the life of a project.

However, using lesson study in this way requires utilizing classroom teachers (or emerging teacher leaders) as the leaders of lesson study. Consideration must be given to how to support emerging teacher leaders in the process of leading lesson study before we can examine lesson study's potential for supporting sustainability. Our results serve to inform these efforts.

Second, we saw working with emerging teacher leaders as a means for scaling up lesson study, thus allowing for broader participation. The literature tends to report on lesson studies led by lesson study experts or others who have strong experiences with lesson study (e.g., Rock & Wilson, 2005). Given the power of this professional development model, it is desirable to see more teachers provided with the opportunity to engage in lesson study, thus the need for scaling up lesson study. We hope that our work will inspire other mathematics education leaders to consider this possibility and that the narrative shared in this report will provide guidance for doing so.

Finally, the challenges identified in our work should be of particular interest to those working with teachers who are not accustomed to collaborative professional development efforts and/or who do not necessarily hold a common vision of effective mathematics instruction. Our reflections, as well as those of the emerging teacher leaders, provide specific insights into how to overcome those challenges.

By supporting mathematics education leaders in these three ways, our intent is to expand and enhance the opportunities for more teachers to participate in lesson study. Through participating, teachers will grow professionally and, in turn, positively impact mathematics achievement. ★

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