Challenges of critical colleagueship: examining and reflecting on mathematics teacher study group interactions

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Abstract This article examines mathematics teacher collegiality by focusing on both the ways in which teachers interacted as critical colleagues in a long-term professional development project and the evolving role of the teacher–educator–researcher as the facilitator of this project. The professional development collaboration comprised two phases: one focused on reading classroom discourse literature and one focused on supporting each other through cycles of action research related to mathematics classroom discourse. Lord's (1994) critical colleagueship framework is used to examine how a study group of middle-grades (ages 11–16) mathematics teacher–researchers took (or did not take) a more critical stance toward their own teaching practice and that of their colleagues. We found that challenging interactions were related to instances in which the teachers interacted as critical colleagues and were marked by particular features including the use of particular words and the use of personal experience as a form of evidence. We present the ways in which we came to understand what it might look like to scrutinize one's practice and findings related to the development of this type of collegiality across the two different phases of this project. We end with a section in which the teacher–educator–researcher who facilitated the professional development project reflects on the ways in which the analysis caused her to reconsider both the nature of argumentation in mathematics study group settings and what implications this has with respect to her own practice as a facilitator.

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"I cannot change others, but I *can* work at changing myself."

John Mason (2002, p. xii)

The sentiment expressed by Mason has implications for teachers engaged in professional development (PD) and for teacher educators. Teachers' recognition that change in mathematical knowledge and practices cannot be 'deposited' in students brings with it the parallel notion that teacher–educator–researchers should not expect teacher change to stem from telling teachers what to do—the teaching and learning processes require careful reflection over a period of time. Yet teachers and teacher–educator–researchers alike can aid one another in working toward conscious change by collectively pushing their thinking about the practice of teaching. This article incorporates both levels through (1) an examination of the ways in which mathematics teachers interacted as critical colleagues in a long-term PD project and (2) a reflection on the findings by the teacher–educator–researcher who organized the project.

Mathematics study group collegiality and critical colleagueship

Teacher educators and researchers have argued for some time that collegiality helps teachers improve their practice (Lieberman et al. 2000). According to Little (1990), colleagues can present new ideas and classroom practices and may do this by scrutinizing their teaching. Through scrutiny, collaborative work can allow teachers to develop a form of professional autonomy and sense of control over their work.

Reading and action research groups provide a context for this type of collegiality and are settings in which to gain understanding about teacher learning, broadly defined (Atweh 2004; Cochran-Smith and Lytle 1993). There has been a small but growing body of research on mathematics teacher study groups (e.g., Arbaugh 2003; Crespo 2006; Slavit and Nelson 2010) as well as collaborative efforts related to action research with mathematics teachers (Herbel-Eisenmann et al. 2009; Jaworski 2006; Zack and Graves 2001). This work has focused on developing productive collaborations among mathematics educators and within projects such that mathematics teachers can begin to engage critically with issues of practice.

Confirming the difficulty that Wilson and Berne (1999) described with regard to building "trust and community while aiming for a professional discourse that includes and does not avoid critique" (p. 195), many mathematics educators have reported difficulties in developing constructive critique among teachers. They cited issues of power and authority, conflicting values, and teachers not knowing how to provide critical feedback to their colleagues. Critical interactions of this sort may be against the personal and "experiential" nature of the teaching profession (Labaree 2003) and may run contrary to the culture of teaching because teachers are not often asked to explain their actions (Lachance and Confrey 2003). Though it is difficult for individual teachers to find colleagues who are willing to join them in taking a critical stance toward mathematics teaching (Krainer 1999), such interactions are valuable as teachers work collaboratively to change their practice. Although many of these authors did not describe precisely what critique among teachers might look like, Sherin and Han (2004) indicated that it corresponds to a university discourse of competitive argumentation or 'critical colleagueship'.

Lord ([1994](#)) identified such a critical stance as a necessary condition for transformation of practice, stating that "[t]his means more than simply sharing ideas or supporting one's colleagues in the change process. It means confronting traditional practice—the teacher's own and that of his or her colleagues—with an eye toward wholesale revision" (p. 192). Here, traditional practice is akin to what Smith ([1996](#)) called "teaching by telling." Critical collegiality situates teachers at the center of the change process. Lord articulated several elements of his critical colleagueship framework:

1. Creating and sustaining productive disequilibrium through self reflection, collegial dialogue, and on-going critique;
2. Embracing fundamental intellectual virtues (such as openness to new ideas, willingness to reject weak practices or flimsy reasoning when faced with counter-vailing evidence and sound arguments, accepting responsibility for acquiring and using relevant information in technical arguments, assuming collective responsibility for creating a professional record of teachers' research and experimentation);
3. Increasing empathetic understanding (that is, placing oneself in a colleague's shoes);
4. Developing and honing the skills and attributes associated with negotiation, improved communication, and the resolution of competing interests;
5. Increasing comfort with high levels of ambiguity and uncertainty, which will be regular features of teaching for understanding;
6. Achieving collective generativity, "knowing how to go on" (Wittgenstein [1958](#)), as a goal of successful inquiry and practice. (Lord [1994](#), pp. 192–193)

In this article, we examine "challenging interactions" within two phases of a long-term mathematics teacher study group, reading groups and action research groups, for the purpose of illuminating Lord's "intellectual virtues." To locate these virtues within study group meetings, we chose to examine interactions in which "challenges" took place. A previous study of the same long-term PD project identified three particular interaction patterns—praising, advising, and challenging (see Males [2009](#)). Challenging interactions, in particular, were defined as interactions in which the teacher–researchers or teacher–educator–researchers probed or used questions to push individuals or the group to think more deeply about an idea or a particular practice. One characteristic that distinguished these from the other interaction patterns was that the receiver of the challenge responded defensively, often explaining, justifying, or providing more evidence for their original comment. We focus here on challenging interactions because we believe that this inter-action pattern can illuminate the manifestation of intellectual virtues in this PD group. For example, it seems possible that the rejection of "flimsy reasoning" or the "use of relevant information in arguments" may take place through a challenging interaction. We address the following question: What are the features of challenging interactions in each of the phases and how do challenging interactions relate to critical colleagueship, in particular, intellectual virtues?

Method

Participants

During data collection, the participants included three mathematics teacher–educator–researchers (one faculty member, Beth, and two graduate students) and eight secondary (ages 11–16) mathematics teacher–researchers from seven schools in one state in the

Midwestern United States. These schools were located in a variety of communities (rural, urban, suburban) and included students from a range of socioeconomic, racial, and ethnic backgrounds. The mathematics teachers were also purposefully selected to vary gender (5 women; 3 men), context of teaching situation (such as public school, school for talented/ gifted students, and school with a high percentage of students receiving academic assistance), certification level (elementary; secondary), years of teaching experience (1–21), extent of involvement in professional development (such as school-based only, attendance of regional and national professional conferences), and reasons for entering the teaching profession (for example, they loved mathematics, they wanted to coach sports]) (Herbel-Eisenmann et al. 2009). The project was designed to examine the nature of mathematical discourse in middle school classrooms and to collaborate with teachers to become more purposeful about their discourse practices. An assumption of the project work was that classroom discourse practices mainly occur at a tacit level and are rarely the object of reflection. Past work indicated that even experienced mathematics teachers are relatively unaware of their discourse patterns (Herbel-Eisenmann 2000).

In the project's first year, the teachers allowed the teacher–educator–researchers to collect extensive classroom observation data that served to capture what the mathematics classroom discourse was like prior to later phases of the project. In subsequent phases, the teachers created a "beliefs mapping" (Herbel-Eisenmann and Cirillo 2009) and then juxtaposed their beliefs mapping with: (1) a discourse analysis of their baseline data; (2) information they learned from classroom discourse literature; and (3) multiple viewings of videotaped classroom observations. Each teacher then articulated a "performance gap" (Hopkins 2002) that identified aspects of their discourse practices that may have undermined or not supported the statements in their beliefs mappings. This work occurred during collaborative project meetings over several years and two sequential phases. The first phase involved reading literature on classroom discourse and the second focused on reflection and systematic investigation into changing discourse practices through action research projects. Thus, the purpose of the PD project was not to develop critical colleagueship explicitly among the teachers (though Beth did share Lord's framework in year five). It is, nonetheless, a case of a long-term collaboration and thus a site in which to look for critical colleagueship.

Data collection and analysis

All project meetings were video-recorded and transcribed in Transana (Fassnacht and Woods 2005). The meetings during the reading groups (18 meetings across years 2–3) and those that occurred during the action research projects (19 meetings across years 3–4) were examined. Typically, during the reading group phase, the teacher–researchers selected 3–4 readings from a library of articles and book chapters provided by the teacher–educator–researchers. The discussions of the readings usually involved, first, reactions to the readings generally (for example, what the teacher–researchers liked/disliked or had questions about), and then a progression through the articles one-by-one to talk about any points the teacher–researchers felt had not yet been raised. The action research meetings, in contrast, usually started with each teacher–researcher working individually, examining a videotape of his/her own classroom practice and taking notes about relevant aspect(s) of discourse in a journal. One or two teacher–researchers shared at the end of the meeting (for example, a clip from a videotape, a transcript, an assessment) and asked the group to attend to an aspect of their classroom discourse (for example, the kinds of questions or processes they focused on). For this study, we selected three whole-group discussions from the reading

group phase (3 h each) and three from the action research phase (1.5 h each), one meeting from the beginning, middle, and end of each of these phases for the intended purpose of varying the time-points and examining a broader range of challenging interactions.

Through prior work (Males 2009), it became clear that coding directly for aspects of critical colleagueship is problematic. It is not feasible to code for the aspects at the sentence or word level since the aspects involved stretches of utterances. We acknowledge that approaching critical colleagueship via the identification of challenging interactions does not guarantee that our analysis will capture all instances of mathematics teachers embracing intellectual virtues, but most likely no analysis would. We found that coding challenging interactions is more feasible and reliable than coding intellectual virtues directly, and it does provide meaningful insights. Thus, to isolate and analyze aspects of critical colleagueship being appropriated within the group, challenging interactions were identified, separately, by the first two authors. We also included instances when people were asked to clarify their thinking or elaborate on an idea because this can be a challenge, especially for those who might not engage in this kind of elaboration and justification (as several teacher–researchers reported). More specifically, the first and second authors coded a common subset of the data to identify challenges in the study groups. The coding was compared and agreement was reached. Due to constant collaboration, the refining of the codes, and the process of continually revisiting subsets of the data, there were few discrepancies in coding. The discrepancies that existed were discussed and resolved. The remainder of the transcripts were coded by one author and validated by the other. Collection reports were created containing all instances of challenging for each phase of the project. Challenges were further coded for the following: (a) who initiated the challenge; (b) who received the challenge; (c) the primary content of the challenge (that is, what seemed to be challenged); (d) the nature of the challenge (linguistic features); and (e) related aspects of intellectual virtues (for example, openness to new ideas, rejecting flimsy reasoning).

Findings and discussion

We structure the findings by, first, describing the nature of the challenging interactions, particularly focusing on salient linguistic features of these interactions and the intellectual virtues taken up by the group. We then turn to an examination of the different phases of the project, focusing first on the reading group phase followed by the action research phase.

The nature of challenging interactions

The challenging interactions stretched over multiple turns and involved many questions. Most of these questions were "what" or "how" questions, such as "What is your goal?" or "How would changing the physical setup of your room change things?", used by the initiators to push the receivers to describe more thoroughly, think more deeply, or think in different ways. Challenging interactions were also often marked by the use of particular words and the teacher–researchers frequently drew on their experience as a basis for reasoning. We illustrate these features in the next few paragraphs.

The most notable word used was the word "but." Challenging interactions often involved the initiator beginning with a statement that illustrated his or her understanding of or agreement with part of what someone had said. The teacher–researchers then used the word "but" and articulated what they disagreed with or what they wanted the receiver to

consider (for example, instructional strategies, theoretical orientations). In some cases, the initiator provided reasons immediately upon stating their disagreement, in other instances the reasoning came later, and in some cases no reasons were provided. For example, in the following excerpt Owen discussed students' use of the Pythagorean theorem to determine the distance between two points. Owen was first asked to say how he defined "procedural" and "conceptual" because he categorized students' use of the Pythagorean theorem to determine distance as 'conceptual'. He defined 'conceptual' as instances in which students used mathematical ideas to solve a problem in a way that they had not been shown previously. Gwen questioned why Owen thought that a student's use of the Pythagorean theorem implied a conceptual understanding of distance.

> Owen: Even though we've done that in class, to me it [using the Pythagorean theorem] represents a conceptual understanding, because they are tying that back into something we've already talked about. Pythagorean theorem has nothing to do with distance.
> Gwen: I understand that, but you taught it [the distance formula] that way.

Owen stated that using the Pythagorean theorem to find distance represented conceptual understanding even though he had previously taught this method for determining distance in class. Although Gwen said she understood what he had done, she used "but" to push Owen to think about the fact that, based on his stated definition, his students may be working in a procedural way.

Another common word used to initiate a challenge was the word "if." In particular, "if" was used when the mathematics teacher–researchers pushed each other to consider a different perspective. Similarly, words such as "would," "could," "or", and "wonder" were commonly used by initiators. These words, particularly the word "wonder," were also frequently used by Beth, followed by her telling a story or providing possible interpretations of ideas. In the following excerpt, Kate discusses a problem in which her students had to determine how much money they would make (or their salary) from doing various chores. Mike and Stacey suggest alternatives for making this problem more open ended.

> Kate: I wanted to set the first one up as a model so that when they did the other one–, because this is the first one we had done. We hadn't done any of the others yet.
> Mike: And so you didn't do any of those at all? It could have been a really open-ended thing, "What did you get [for] the salary?" I don't know, I'm just wondering how–, because my instinct would be to probably do all five of those problems. So I was thinking, OK, what would I do?
> Stacey: Or what would have happened if you said, for a couple of minutes, "Everybody try to figure out," and then…

Here Mike and Stacey pushed Kate to consider other ways to set up a problem. Mike offered an alternative question Kate could have asked to make the problem more open ended. He also shared what he might have done with this same lesson. Building on Mike's comments, Stacey suggested another alternative, using the word "or," in which she wondered what might have happened if Kate had given her students time to figure the problem out independently.

Another feature of the challenging interaction was that the teacher–researchers often used classroom stories as the basis for their reasoning. This reasoning sometimes took the form of a story about a specific example from the classroom or a relation based on their general experiences from years of mathematics teaching. The following excerpt is part of a group discussion on students taking more control of the discourse and how this involves

redefining for students what it means to "do school." Gwen and Cara take this up in terms of how comfortable their advanced students would be to exercise this control (for example, work together, present, and take risks). To support their arguments, they each cited their own experience.

> Cara: But I think sometimes those [advanced] kids are less likely–, I mean, I have found some of my advanced kids are less willing to go out on a limb and to be creative or try something different in their strategies or in their thought process. They want to know this, this, this, this.
> Gwen: See, now that isn't the history I've had with my advanced kids. […] But I was just thinking if I put some of these kids that are–, and they're the supposed leaders of the class, if I'd put them in front to go over the warm-up activities then that would satisfy their need to be the leader. Give them the opportunity to show off, "I know what I'm talking about."

In this interaction, Cara and Gwen are each making arguments about whether advanced students are willing to take risks. Cara stated that some of her advanced students wanted explicit steps to follow. Gwen disagreed with Cara by making reference to the history she had with her advanced students. Unlike Cara, who spoke about her advanced students as followers, Gwen's experience led her to consider ways in which she could provide leadership roles her advanced students were seeking. It is noteworthy that each used "my" advanced students instead of referring to advanced students more generally, indicating that they may have viewed these perceptions as being localized. This interaction, like others, concluded with the teacher–researchers agreeing to disagree based on the fact that everyone taught in different contexts and had different experiences. Agreeing to disagree seems appropriate if the evidence is only one's personal experiences. After all, it is difficult to disagree with someone's story of practice because it is based on a practice and context that the other speaker does not know. The reliance on stories of practice as evidence (often at the exclusion of other kinds of reasoning) may have hindered the teacher–researchers from engaging as critical colleagues in the way Lord described it.

Challenges brought some of the intellectual virtues of critical colleagueship to the forefront, primarily 'rejecting weak practices or flimsy reasoning'. Embedded within this virtue is the importance of being able to recognize alternative explanations for phenomena. The teacher–researchers and teacher–educator–researchers pushed each other to consider alternative explanations for what was happening in their mathematics classrooms. As described above, implicit in their language choice (for example, "if," "could," "would") was the notion that there could be something else happening and often the receivers of the challenge were faced with many different alternatives. This type of challenge was often the result of the receivers making claims based on what others perceived to be insufficient evidence. For example, teacher–researchers may be challenged when their interpretation of a reading was based only on their conception of practice and did not account for other conceptions.

Another intellectual virtue taken up to varying degrees was 'openness to new ideas'. In some cases, the teacher–researcher or teacher–educator–researcher was open to a new idea and would explicitly state that they were going to take an idea up, whereas, at other times, even after continued pushing, new or different ideas were rejected. Like Slavit and Nelson (2010), who found that both individual and collective theories were continually built by teachers participating in a collaborative group, our data indicated that ideas were frequently neither taken up nor rejected but problematized as the teachers worked to develop a more nuanced conception. The next excerpt illustrates such development. Stacey, an

experienced teacher who had used Connected Mathematics (Lappan et al. 1995) for 10 years, adds to Owen's (a second-year teacher) idea, and this yields a more nuanced definition of the summary portion of a lesson.

> Owen: So the summary part of the lesson is when we should talk more, I mean, the teacher is going to talk during the summary, because you can say, "OK, this is what I thought you were going to learn. You were going to learn this and this." And you can definitely have them call in response about that, but if you actually get into a dialogue about it, they've sort of already done that [during the problem exploration].
> Stacey: Well, I'll interject. Many times, not all the time, but many times a task will lend itself to a lot of different ways of thinking about it. And so a lot of times what the summary will do is–, I think you have a typical problem like the juice problem where you've got four different kinds of juice and which one tastes the strongest. And there [are] all these different ways the kids can look at the ratios of the four different mixes to try and figure out which one is going to taste the most orangey. […] So a lot of that summary is the opportunity to get those different groups of ideas up so anybody can see them.

In this interaction, Owen questioned Stacey's previously stated position that summaries should include student-to-student interaction. Owen argued that such student participation had already happened and therefore was not necessary. Stacey's interjection illustrated her disagreement. She used examples from her own experience to expand the definition of summary that Owen seemed to be using.

The next interaction, however, illustrates openness to ideas and arguments. During a project meeting, Owen was repeatedly challenged for his attempts to determine whether students' understandings were procedural or conceptual (as above). He was challenged to define the terms conceptual and procedural, explain his lack of categories between them, explain how he might know what students understand, and consider how the tasks he chose might influence the students' responses. In the following excerpt, which occurred 30 min after the challenges were initiated, Owen seemed to concede that assessing student understandings was not so simple.

> Owen: What's happened is that because we can't tease apart–, just in the same way that I can't tease apart who has a conceptual understanding and who has a procedural understanding, right? We can't tease apart who has a purely procedural understanding and who has a conceptual understanding.

Although we did find a few other examples within challenging interactions, we suspect that intellectual openness might be more likely to occur during other forms of interaction (that is, advising and praising). We also acknowledge that stating openness is not equivalent to an actual openness to change one's practice; this type of interaction, however, may be one of the degrees of an inquiry-oriented collaboration described by Slavit and Nelson (2010). Recognizing such distinctions adds nuance to our conceptualization of critical colleagueship.

We now turn to the way in which challenges played out in each of the two phases, first in the reading group phase and then the action research phase. We do this in order to gain insight into how the teacher–researchers engaged as challenging colleagues in these two different phases. It is essential, as mathematics teacher–educator–researchers, to examine how different contexts may or may not support mathematics teachers as they attempt to change their practice.

Challenging within the different phases

There were many challenges in the reading group phase (approximately 24 per hour); more than in the action research phase. The primary receivers of challenges in this phase were the articles, or ideas in the articles, being discussed. Challenges often involved addressing the author's writing style or the resonance of the ideas with the teacher–researcher's experience. Challengers questioned the reality of some of the classroom excerpts and the types of instructional strategies promoted by the authors (such as, problems to pose or proof-styles to incorporate). It is possible that these challenges occurred in part because many of the ideas proposed in the literature were new to the teacher–researchers and outside their current thinking about mathematics classroom practice. As we discuss below, these challenges tended to remain directed at abstract instructional notions rather than the practice of any particular individual.

Overall, there were fewer challenges in the action research phase of the project (approximately 18 per hour), and they were generally shorter in length than the challenges during the reading group phase. In other words, there was less challenging back-and-forth between the participants. The frequent receivers of challenges were the teacher–researchers who presented their action research progress at that particular meeting. Challenges directed toward the presenter are to be expected based on the format of the project meetings in this phase, which focused on a particular teacher–researcher's work. In these meetings, however, it was typical that a presenter would receive several challenges without issuing counter-challenges as occurred in the reading group meetings. A large portion of the challenges that we saw in this phase occurred as Owen presented progress on his action research project. The content of these challenges centered on his approach to the research (see discussions of "procedural" and "conceptual" above).

Conclusion

As teacher–educator–researchers, we join others in recognizing the value of critical colleagueship as a catalyst for teacher learning, and we see the effort to cultivate critical colleagues as being related to the ways in which participants interact. Understanding the types of interactions through which aspects of critical colleagueship can be realized is an important first step. In this article, we examined challenging interactions in particular, attempting to gain insight into their discursive properties and the ways in which they were linked to the intellectual virtues identified by Lord. We found that the mathematics teacher–researchers in this particular study group often began a challenge by identifying a point of agreement and then using the word "but" to begin an articulation of their disagreement. The teacher–researchers and Beth also used words like "could," "if," and "wonder" to suggest alternative ideas or reasoning. We found connections between the challenging interactions and intellectual virtues such as the rejection of flimsy reasoning and openness to new ideas (though we are not claiming that these virtues were fully taken up). We also found it to be common that teacher–researchers' articulated their evidence for challenges in the form of personal experience.

An understanding of interactions related to critical colleagueship can be followed by an attempt to learn about the ways in which these interactions develop. By exploring two phases at different times within the same mathematics teacher study group, we are able to make modest observations with regard to such development. Challenges were more frequent in the reading group meetings, possibly because receivers were often article authors

who were challenged because their ideas did not resonate with the classroom stories of the teacher–researchers in the group. It may also be the case that the teacher–researchers felt more comfortable challenging the authors since they were absent from the group. The frequency of challenges in this phase may also have been related to its distance from actual practice. It seems as though initiating challenges became more difficult as personal dynamics came into play (such as "face-saving" (Brown and Levinson 1987)) and as the challenges moved closer to classroom practice.

As critical colleagueship develops within a group of mathematics teachers, the end goal of 'improving mathematics practice' must be kept in mind. Since challenging specific aspects of one's practice may lead to teacher change, it is significant that this work suggests it is more difficult to challenge one's practice than to challenge ideas from someone outside of the community (such as authors of articles). Although this result in itself may not be surprising, this study also suggests a possible (and certainly partial) explanation for the difficulty. How does a mathematics teacher cast the light of scrutiny on his or her experiences when it is precisely stories about those experiences that are often used as evidence? As Crespo (2006) noted in her work with a mathematics teacher study group, teachers used "expository" talk, or stories of their experiences, when discussing their students' engagement with mathematical tasks in their classrooms. These narratives were one teacher's interpretation of the event and did little to engage their colleagues in interpreting the events. Although Crespo acknowledged that expository talk provides opportunities for teachers to learn from their colleagues (such as expanding their repertoire of students' thinking beyond that of their own students), she pushed us to think about why this type of talk may be problematic. She claimed that expository talk is insufficient in getting teachers to revise their ideas about issues of practice. If critical colleagueship is a way to address this insufficiency, must an evidentiary paradigm shift take place before teachers can challenge their practice, and if so, what are the ethical implications for teacher educators who might promote such a shift? Teaching can be intensely personal and, for teachers, this kind of shift, which moves away from expository talk and opens the door to direct challenges of practice, may feel unnatural and may make turning a critical eye on oneself and one's experiences painful.

Reflection from the project leader

In this reflection, I parallel the teacher–researcher's process of articulating some "professed beliefs" and then reflecting on my "enacted beliefs." I was apprenticed into teacher education by being involved in "professional development schools" (PDS; see Stallings and Kowalski 1990) as a graduate student. The PDS contexts involved intense collaboration and I learned to value teachers' practical knowledge as being different yet just as important as knowledge published in academic journals. I also knew that, similar to my own experience as a mathematics teacher, most PD involves a disparate set of meetings that are not selected by the teachers themselves but mandated by school authorities (Little 1993). Finally, I had witnessed that many teachers perceive university faculty as being out of touch with the context in which they work.

Because of these previous experiences, I designed a collaborative PD project related to mathematics classroom discourse that would encourage participant's voice in the work: a long-term study group involving reading, discussion, and action research. By collecting their own evidence, I believed that teachers could generate worthwhile data to investigate their professed beliefs in the context of their own discourse practices.

I did not set out to develop "critical colleagueship," but the theoretical arguments that other researchers made convinced me that it was important. Upon examining my conception of "intellectual virtues," in particular, I realized that my images were shaped by my own enculturation into academic culture; these were not something I experienced in PD as a classroom teacher. My interpretation of Lord's "argument" and "evidence" involved, for example: addressing each other directly and competing for the floor to speak; unearthing and challenging interpretations and assumptions; thinking analytically about observations rather than normatively or emotionally; and connecting theoretical ideas to practice in ways that helped to question the practice. Although I recognized the social risk of these practices, my definitions of challenge and argumentation were based on literature about mathematics classrooms, much like Sherin and Han's (2004) mentioned earlier. These reflections have led me to conversations with colleagues and readings in discourse literature. In the next few paragraphs, I first explain the new framing through which I see 'project meetings' and then consider the potential unintended consequences of the conceptions of argumentation that I brought to these meetings.

I now frame these project meetings as a 'hybrid activity' setting—not a course setting in which I am trying to help graduate students become researchers nor an informal dinner party with friends. To a more experienced teacher–educator–researcher, this may seem naïve. Yet, there is evidence that more experienced teacher–educator–researchers like Florio-Ruane (2001) have had similar realizations. Given the fact that study group meetings are hybrid activity settings, I have begun to question my assumptions about what "intellectual virtues" might entail. My expectation going into the project was that teachers would be engaging in the kind of practice that I learned in academic settings. If I continue to maintain this image of project meetings, then what are some potential unintended consequences of this insistence? I reflect on two potential consequences here.

First, my view of competitive claims-evidence argumentation, often considered valuable in academic settings, is related to the ways in which people develop the "floor" and participate. Argumentation involves interactions that are more like "singly-developed floors" (SDF) or floors characterized by "monologues, single party control, and hierarchical interaction where turn takers stand out from non-turn takers and floors are won or lost" (Edelsky 1993, p. 221). Another type, however, is "collaboratively-developed floors" (CDF) or "more informal, cooperative ventures which [provide] both a cover of 'anonymity' for assertive language use and a comfortable backdrop against which [participants] can display a fuller range of language" use (p. 221). More importantly, I learned that men, in mixed-gender meetings, participate more equally with women during CDF rather than dominating the floor, as they often do in SDF. Women also took on the role of questioner during CDF in ways they did not in SDF. During CDFs, then, women and men interacted as equals. In the same way that Ball (1993) argued that some practices of mathematicians are not appropriate for classrooms, it may be that SDF characteristic of academic discourse is not appropriate for these hybrid activities and may perpetuate gender inequity.

Second, as the findings show, without intentional intervention toward developing evidence-based argumentation, the teacher–researchers used stories as evidence. The modal verbs (could, would) and hypothetical language (if, wonder) that we used in these interactions are appropriate when exploring ideas and may also invite many ways of participating, including the use of stories as evidence. One reaction to this finding might be to think that I need to change my practice by establishing different norms that are more like academic argumentation. For example, I could make these norms more explicit, explaining to the teacher–researchers how to do this in ways that might be valued by academic

researchers. Yet, as someone who values practical knowledge, this option seems limited and might de-value practical knowledge.

From discourse literature, I learned that narratives play an important role in developing complex understandings and are important persuasive tools. For example, Florio-Ruane (2001) examined the narratives that prospective teachers told during a study group focused on culture and literacy. These narratives, which ranged from brief "kernels" to full-blown stories, were part of an important, intellectual process that helped prospective teachers learn about themselves and their teaching role. Through discussions, the narratives built upon one another and moved the joint work of the group forward, acting as a scaffold with peers and/or more experienced others and resulting in deeper understanding of culture and identity. Florio-Ruane argued that participants formed "a kind of connected knowing" (p. 136).

Drawing on rhetoric and sociolinguistics, Juzwik (2009) examined narratives in the context of teaching history and showed how narratives served a performance function by which teachers were able to identify with others in order to persuade them. She argued that 'the use of narrative in teaching' needs to be examined in order to understand the strengths and concerns associated with such use, including the ways in which narratives are used to develop the meanings of an idea. Attending to stories as rhetorical devices could help me to understand how narratives persuade in more subtle ways than explicit claims-evidence argumentation does.

As a teacher–educator–researcher, I need to consider that there are multiple ways to develop the floor and reflect on whether our floor development supports equitable participation from the group. I also need to listen carefully to when, how, and why teacher–researchers tell the kinds of stories they do. I will consider the ways in which these stories construct a complex understanding of classroom discourse through tracing the ways in which the narratives build on the thematics of each other. If stories are an important sense-making tool for teachers, then my practice should develop toward knowing when stories are stalling the work or when they are helping us move forward. According to Florio-Ruane (personal communication, January, 2010), these skills can be developed through careful listening, discussions with teachers, continued reflection, and systematic investigation.

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