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ARTICLES

Reframing Practice: Teacher Learning Through Interactions in a Collaborative Group

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Using a case study design and ethnographic methods, this research investigated the interactions of a group of high school mathematics teachers who collaborated daily on issues related to curricular and pedagogical reforms. The members of the collaboration team implemented these reforms with the goal of supporting all students' learning of 1st-year college preparatory mathematics. This study used conceptual tools from frame analysis (E. Goffman, 1974) alongside an analysis of teacher participation patterns to understand teacher learning within a community of practice (E. Wenger, 1998). This analysis documented development within the teacher community through teachers increasing orientation to classroom-based interventions for struggling students alongside more collegial participation patterns, contributing an empirical example of teacher learning within a community of practice.

I have the kid [Taylor] who is really flaky and doesn't know what's going on and is starting to annoy the rest of the group. So that's a really struggling kid and so they're starting to opt out. (Rose,[1] October 6, 2005)

He's not doing well now, but Taylor is so smart! And so here I am at the end of the year and I'm thinking, "Why would I put him back in Math 1?" . . . Because he

[1] All proper names of schools, participants, and students are pseudonyms.

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> obviously understands stuff. . . . So I think there are some kids we need to look at a little differently . . . there are some kids maybe we shouldn't really keep back, 'cuz then we're really sentencing them to not ever be able . . . to come out of that. (Rose, May 25, 2006)

Rose, the veteran high school mathematics teacher and department chair featured here, painted a portrait of two very different kinds of struggling students to her peers in a grade-level collaboration team meeting, even though both excerpts feature the same student. In the first quote, she described Taylor as flaky and annoying and then projected that these sorts of kids opt out of participation in class. A perspective emphasizing the "flaky-annoying kid" as the "kind of kid" (Horn, 2007) who refuses to do any work reduces the student as a priority for his or her teacher's academic attention. This characterization stands in stark contrast to Rose's description in the second excerpt—a student who is failing, yes, but a student who demonstrated key understandings of challenging mathematical content. A perspective emphasizing a student's capability and contributions despite failing grades motivates teachers to find a way to help him or her turn around (Horn, 2008). Rose's shifting understanding of Taylor as a struggling student likely had dramatic instructional consequences for her support of his learning in her ninth-grade mathematics classroom (Thompson, 1992). Assuming that Taylor did not change his flaky-annoying personality with tendencies to opt out of participation, how did Rose come to see him as such a smart, capable learner of mathematics?

Although there are many ways to respond to this question, the one I explore in this article centers on a teacher community as a learning resource for its members. There is an established positive relationship between teachers' participation in strong teacher communities and equitable student outcomes, with indications that teachers' collegial learning mediates this relationship (Boaler & Staples, 2008; Cohen, 1994; Gutiérrez, 1996, 2012; Horn, 2005; McLaughlin & Talbert, 2001). This finding underscores the potential of teacher communities to provide robust settings for teacher learning, though what that learning is or how it might be taking place is largely unaccounted for in the teacher community literature (Levine, 2010, p. 915). This study makes progress on the "black box" of teacher learning (Little, 2003) by connecting teachers' framing of a problem of practice over time (Goffman, 1974) with a situated model of learning in a community of practice (Lave & Wenger, 1991; Wenger, 1998). Thus, the central research question for this study was the following: *How do teachers' participation patterns and framings of a common problem of practice over time show learning within a teacher community?*

To answer this question, I first characterize learning within a community of practice (Wenger, 1998) and link community interactions with key concepts from frame analysis (Benford & Snow, 2000; Goffman, 1974; Snow & Benford, 1988). Then I closely examine teachers' participation and reification patterns of a

common problem of practice using conceptual tools from frame analysis to understand development within the group, thereby contributing empirical evidence of teacher learning inside a teacher community.

TEACHER LEARNING IN A COMMUNITY OF PRACTICE

This is an era in which teacher community-based efforts dominate teacher professional development and school improvement efforts, as there is evidence that this investment produces better outcomes for teachers and students than individualist approaches (Darling-Hammond, 2014). However, questions remain about how these efforts work, including criticisms regarding teachers' mandated participation in them and diminished positive effects (Grossman, Wineburg, & Woolworth, 2001; Hargreaves, 1994; Levine, 2010; Little, 2003). I adopt a more neutral stance on teacher community with a *communities of practice* perspective (Lave & Wenger, 1991; Wenger, 1998) that recognizes this potential but also allows for a community-based conception of a teacher group without a particular theoretical stance or improvement orientation (e.g., Brown & Campione, 1992; Cochran-Smith & Lytle, 1992; Curry, 2008; Fairbanks & LaGrone, 2006). Rather, the communities of practice tradition is a social theory for understanding how people learn from "seeing, discussing, and engaging in shared practices" (Levine, 2010, p. 111) with the assumption that knowledge is coconstructed and distributed across group members (Kelly, 2006).

Wenger (1998) specified communities of practices as groups whose members (a) are *mutually engaged* in an activity, such as coplanning instruction; (b) are held together by a *joint enterprise,* such as developing interventions for struggling students; and (c) have a *shared repertoire* of customs for practice, including meeting protocols and check-in routines. The group of high school mathematics teachers in this study, for example, collaborated daily (shared repertoire) on curricular and pedagogical reforms (mutual engagement) in response to a student failure crisis from the previous year in an effort to support all students' learning of challenging content (joint enterprise). A communities of practice framing, therefore, helped me see the teacher workgroup in my study for what it was: a key site for negotiating meaning related to teachers' joint enterprise of addressing a student failure problem (Coburn & Stein, 2006; Grossman et al., 2001).

According to Wenger (1998), negotiating meaning in a community of practice involves the complementary processes of participation and reification. *Participation* describes the experiential process of taking part and sharing in communities, whereas the dual process of *reification* gives form to experiences through "objects that congeal this experience into 'thingness'" (p. 58). Because Wenger conceptualized *learning* as changes in participation in a community of practice, then by extension, understanding learning in a community of

practice involves analyzing both participation and reification patterns within these communities and their interplay.

Frame Analysis as a Means of Capturing Teachers' Reification Patterns

I join the frame analysis literature with a communities of practice perspective for my empirical analysis of learning because of the potential for member frames to capture reifications of the group's joint enterprise over time and give insights related to member participation. Frame analysis comes out of a similar theoretical tradition as the communities of practice literature and can be traced to Goffman's (1974) work on understanding how interactions are socially organized. As I have theorized elsewhere (Bannister, in press), it is productive to link these two typically disparate literatures because of the way in which frame analysts conceptualize meaning-making processes in a group (Benford & Snow, 2000; Goffman, 1974; Snow & Benford, 1988). The process of *framing,* for example, refers to the how existing meanings are shaped and structured in the group, including conceptualizations of problematic scenarios and potential solutions for them. Snow and Benford (1988) labeled these tasks as *diagnostic framing* ("identification of a problem and the attribution of blame," p. 200) and *prognostic framing* ("a proposed solution to the diagnosed problem that specifies what needs to be done," p. 199). *Frames,* therefore, are coconstructed objects among group members that represent existing meanings in a group at any given time. A teacher group may *frame* the same situation about struggling students differently—a student "chose to fail" or "did not understand that effort relates to grades"—and each interpretation positions the members differently in terms of how they conceptualize and respond to the needs of their students.

Borrowed concepts from frame analysis have the potential for rendering the processes of participation and reification in a community of practice more visible (Bannister, in press; see Figure 1 for a representation of these connections). For example, consider a teacher community of practice that is organized around supporting struggling students. Member framings related to this joint enterprise about struggling students reify, or give "thingness" to (Wenger, 1998, p. 58), the community's ideas about who the struggling students are and what can be done to help them. Taken together, teacher framings in a community of practice thus have the capacity to provide evidence of changes in teachers' participation and reification patterns over time, yielding empirical evidence for learning within a community of practice. As I set out to analyze teacher learning in a community of practice, I subscribe to the theory that tracing a teacher group's framing and participation patterns over time fosters manageable units of interactions that together constitute a coherent narrative about development (Bannister, in press; Evans, 2002; Russell & Munby, 1991; Wenger, 1998).

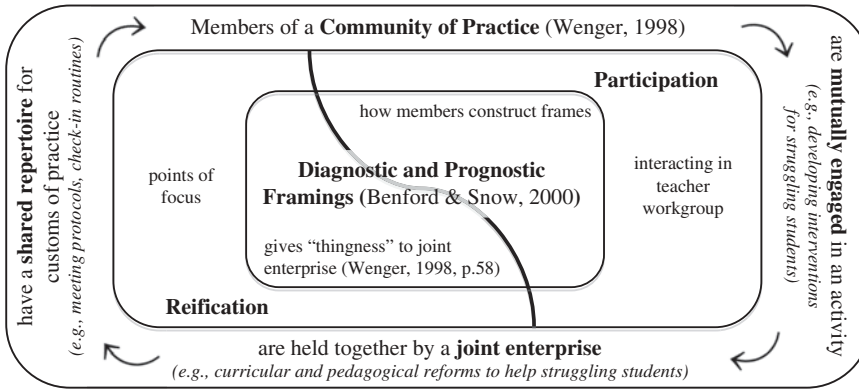

FIGURE 1 Connections between key ideas from communities of practice and frame analysis.

RESEARCH DESIGN AND METHODS

Research Context, Settings, and Participants

Adaptive professional development at Clark. This research took place in the context of a larger design-experiment project[2] situated in part at Clark High School, a large, urban comprehensive high school in a large school district in the northwestern United State. Clark was chosen for us as a research site by the school district because of our partnership agreement with them. Our research team approached our work with the Clark mathematics teachers collaboratively, meaning that we worked with teachers to create activities that fit theoretical principles about equitable mathematics teaching while serving teachers' goals (Cole, 2006). We took a normative stance toward pedagogical principles about equitable mathematics teaching, meaning that we favored well-documented pedagogical strategies that engaged learners in important mathematical ideas, increased classroom participation, fostered collaboration, and used a larger repertoire of math abilities (Boaler, 2002, 2006; Horn, 2006; Moses & Cobb, 2001; National Council of Teachers of Mathematics, 2014). In addition, we used learning principles for teachers to guide our work (Bransford, Brown, & Cocking, 2000; Cochran-Smith & Zeichner, 2005; Darling-Hammond, 2006; Darling-Hammond & Bransford, 2005; Horn, 2005, 2007; Horn & Little, 2010; Little & Horn, 2007), such as prioritizing providing teachers with collaborative time in the school day to make sense of new practices in their classrooms. Throughout the 2004–2005 school year I followed the progress of the 11-member mathematics department at Clark by

[2]Principal Investigator: Ilana Horn.

observing classrooms, attending department meetings, and providing classroom support to teachers.

Curricular and pedagogical reforms. The Clark mathematics teachers decided to enact reforms during the 2005–2006 year to support learning and success for all of their students because more than 50% of their students had failed freshman mathematics the previous year. This statistic was disturbing to the teachers, and they asked our research team for help. Our team adaptively responded with school-based support and resources and collaboratively generated suggestions for teachers' actions. For example, we suggested that teachers target first-year college preparatory mathematics during this inaugural year because it is historically the course during which students are most likely to drop out of mathematics, a pattern that also held true at Clark (Horn, 2004; Ruthven, 1987).

Teachers selected the Interactive Mathematics Program curriculum (Fendel, Resek, Alper, & Fraser, 1997), a National Science Foundation standards-based reform curriculum (Borasi & Fonzi, 2002), to replace their more traditional curriculum. Teachers felt strongly about changing their teaching practices at the same time as they were enacting curricular changes, and so our research team suggested that teachers look beyond best practices and think more broadly about classrooms as systems that can support academic success for all students. We supported teachers' training in and implementation of *complex instruction* (CI), a pedagogical approach aiming to provide academic access and success for all students in heterogeneous classrooms through groupwork (Boaler & Staples, 2008; Cohen, 1994; Horn, 2012; Lotan, 2003). Users of CI focus on (a) *groupworthy* tasks that are open ended, require a variety of intellectual abilities so that students from diverse backgrounds and different levels of academic proficiency can make meaningful contributions to the group, and support learning of central mathematical ideas; (b) *instructional strategies* that support group interdependence and autonomy within each group through the use of norms, roles, and teacher interventions; and (c) *status and accountability structures and interventions* that raise all intellectual expectations for all students. These interventions directly address perceptions of student capability by broadening conceptions of what it means to be smart and convincing students that they each have important intellectual contributions to make to the mathematical work (Cohen, 1994; Horn, 2012). Teachers engaged in an intensive summer training program in CI (pedagogical approach) and the Interactive Mathematics Program (standards-based curriculum) in preparation for their reforms, with follow-up seminars and classroom coaching during the school year.[3]

[3]We contracted with a professional development organization for our training programs and classroom coaching experiences.

Focal participants: The Freshman Team community of practice. Realizing the ambitious nature of the Clark teachers' plans for implementing starkly different pedagogical and curricular reforms in 1 year, our team designed an intervention for the 2005–2006 school year to support their work. We supported the creation of the Freshman Team, which provided the four teachers of first-year college preparatory mathematics daily collaboration time around issues of teaching and curriculum during the workday. Each teacher gave up one class (reducing the normal teaching load from five to four) and gained a common planning period in addition to their personal planning period. We helped Clark find an additional teacher trained in CI to teach the missing classes and participate on the Freshman Team with the same load arrangement. Clark's principal supported this intervention by crafting a master schedule that allowed all five Team members a common planning period.

The Freshman Team was composed of five teachers: Rose (30+ years experience), Susan (10+ years experience), Julie (5+ years experience), Zack (3+ years experience), and Linda (new teacher). In communities of practice terms (Wenger, 1998), members of the Freshman Team (a) were *mutually engaged* in reforming their curriculum and pedagogy; (b) were held together by their *joint enterprise* of improving low student performance; and (c) had a *shared repertoire* of customs for going about their work, such as norms for checking in and agenda setting.

University project team members, the school district's instructional coaches, and our CI and Interactive Mathematics Program training coaches participated in some of the teachers' collaboration meetings and training activities and facilitated the "translation, coordination, and alignment of perspectives and meanings" (Cobb, McClain, Lamberg, & Dean, 2003, p. 19). These actions necessarily made us peripheral members of the community of practice. However, we did not engage in the everyday collaboration and teaching work of the Freshman Team. Thus, although interactions with these peripheral members were included in the data set because of their influence on how frames were coconstructed in the group (Benford & Snow, 2000; Jacoby & Ochs, 1995), I did not consider the learning outcomes of the project team, the district coaches, or the contracted training coaches as part of this study of teacher learning and instead focused the analysis on the teacher-members of the Freshman Team workgroup.

Research Strategies

Because teaching is a cultural activity, it follows that teacher learning is culturally embedded, steeped with unique subtleties and particulars of a place and time. I crafted a case study around the Clark Freshman Team because this method focused the investigation and analysis on teachers' learning around the struggling student problem in the context of their reforms (Merriam, 1998). Sustained attention to one group and context fostered in-depth exploration and analysis of

the "richly brewed particulars" (Dyson, 2005, p. 2) of teachers' learning. These choices ultimately allowed me to theorize about teacher learning inside a teacher community more generally and respond to a need for case studies of this nature, especially in the context of community formation (Barab, Barnett, & Squire, 2002; Dooner, Mandzuk, & Clifton, 2008; Grossman et al., 2001; National Academy of Education, 2008).

I took an active role in teachers' experiences, from attending one of the Freshman Team meetings per week to providing onsite support when teachers requested my help. I was also involved in teachers' experiences that were a part of the larger design-experiment project but were not included in this study, such as videotaping their classrooms for the video club (Sherin & Han, 2004) sponsored by our project and participating in the curricular and pedagogical training with them. This strategy was intentional, as it allowed me to spend significant amounts of time with the teachers and earn their trust, helping me capitalize on being there and knowing the data. This time was well spent, as it gave me important context for teachers' negotiation of meaning around these reforms as well as provided participants with opportunities to get to know me and become more comfortable with the data collection process. However, I carefully negotiated the tension between my researcher role and my former teaching experiences with maintained awareness of my brokering status (Cobb et al., 2003; Wenger, 1998) and adherence to my participant-observer role (Emerson, Fretz, & Shaw, 1995). I made peripheral contributions to the Freshman Team's conversations when specifically called on or once the teacher-members had multiple turns with an idea.

Data Collection Procedures

I collected a variety of qualitative data about the teachers' work, including audio records and fieldnotes of Team meetings,[4] artifacts from Team meetings and activities, and teacher interviews. The data used in this analysis were transcriptions of audio records from Team meetings. The data set included 35 records of Freshman Team meetings, 31 of which were from weekly 2-hr-long meetings. Of the 35 meeting records, 26 had fieldnote records and 32 had audio records. I also had "headnotes" collected from my experiences working at Clark that allowed me to build connections between events from my deeper knowledge of the place and participants (Emerson et al., 1995).

Data Reduction Strategy

The unit of analysis for this study was *episodes of pedagogical reasoning* (EPRs), which Horn (2005) defined as

[4]The Team met during every sixth-period meeting. In a typical week they had three 50-min meetings and one 110-min meeting.

> units of teacher-to-teacher talk where teachers exhibit their reasoning about an issue in their practice. . . . EPRs are moments in teachers' interaction where they describe issues in or raise questions about teaching practice that are accompanied by some elaboration of reasons, explanations, or justifications. These episodes can be individual, single-turn utterances, such as "I'm not using that worksheet because it bores the kids." Alternatively, these can be multiparty coconstructions over many turns of talk. (p. 215)

Because EPRs home in on teachers' reasoning through talk, this unit of analysis provided a means for reducing the Team's broader conversations into episodes of teacher talk about struggling students, which related back to the research question and joint enterprise of the Freshman Team. Because I was interested in tracing teachers' framing practices over time, the struggling student episodes provided focused units of data warranting further examination. Thus, the data reduction process included (a) paring down the primary data vis-à-vis struggling student EPRs and (b) systematically selecting particular episodes for in-depth analysis. Six episodes met my criteria for closer analysis: (a) at least three of the five Team members present and involved in extended talk about the struggling student problem; (b) substantive discourse dominated by teachers; (c) quality records available; and (d) when taken together, constituted a coherent narrative about development. Three of six total EPRs are reported in this article because the remaining three neither contributed additional perspective nor took away from the empirical findings about development within a community of practice.

Data Analysis Using Conceptual Tools From Frame Analysis

In keeping with the conceptual framework described earlier and theorized elsewhere (Bannister, in press), I looked for evidence of learning in a community of practice by examining (a) *participation* patterns within the group—"who contributes in what ways? what participation norms and structures emerge?" (Little, 2003, p. 939); and (b) *reification* patterns of the Team's joint enterprise, evidenced by changes in framings of the struggling student problem. For this part of the analysis, the transcripts and corresponding meeting summaries for selected EPRs were coded using diagnostic frames and prognostic frames (Snow & Benford, 1988) to help identify how teachers framed the struggling student problem in the context of their reforms (see Table 1 for a description of framing tasks paired with examples from the data). I looked for (a) *diagnostic frames* to understand how teachers conceptualized the struggling student problem and (b) *prognostic frames* to understand how teachers conceptualized interventions related to the struggling student problem. After coding the transcripts of the EPRs, I linked the Team's participation and reification patterns together and looked for themes within and across the data. A limitation of my analysis is that I do not make claims about teachers'

TABLE 1
Description of Framing Tasks Paired With Examples From the Data

Core Framing Tasks (Snow & Benford, 1988)	*Example*
Diagnostic framing • "A diagnosis of some event or aspect of social life as problematic and in need of alteration" (p. 199) • "Involves the identification of a problem and the attribution of blame or causality" (p. 200)	Struggling students are students who are "choosing to fail my class because they're not doing any work." (Linda, October 6, 2005)
Prognostic framing • "A proposed solution to the diagnosed problem that specifies what needs to be done" (p. 199) • Purpose is to suggest solutions and "to identify strategies, tactics, and targets" (p. 200)	"I think we should go back to e-mailing the teachers, the other teachers of those target students that we want. . . . To have those e-mail conversations with those teachers, to see what works." (Linda, March 30, 2006)

individual learning, though some scholars have highlighted dissatisfaction with an individualist approach to teacher learning (e.g., Barab et al., 2002).

FINDINGS

In this section, I report the Freshman Team's framing and participation patterns across time. The section is organized episodically, with subsections for EPRs from October 2005, January 2005, and March 2006, respectively. Within each subsection, findings related to the analysis of the Team's participation and framing patterns are presented separately. By documenting representative snapshots of key interactions from Team meetings across time, I show how any changes in framing and participation patterns yield empirical evidence of learning within community of practice (see Table 2 for a summary of framing and participation patterns).

Generally speaking, I found that in EPR 1 the Team focused on inflexible student attributes and made suggestions about changes students needed to make. The Team members gained specificity about their struggling students in EPR 2 with a student records analysis, though they did not name any particular strategies they could use to help them. Teachers used representative cases in EPR 3 to help them understand the particulars of why their students were struggling alongside targeted classroom-based interventions designed to help the students in these categories. These EPRs marked the Team's growing orientation toward more diverse reasons for why students struggle alongside classroom-based intervention

TABLE 2
Summary of Framing and Participation Patterns

Patterns	*October 6, 2005*	*January 5, 2006*	*March 30, 2006*
Diagnostic framing	Fixed student attributes (e.g., choosing to fail, being flaky and annoying)	Personal and systemic circumstances (e.g., medical problems, perpetual failure from falling through the cracks)	Category systems detailing abilities students are not good at yet (e.g., Autumns: do not connect grades and work habits)
Prognostic framing	Changes students need to make (e.g., re-norm classes, contact parents, give advice)	Generic solutions (e.g., find out more about students, be serious about interventions)	Classroom-based interventions (e.g., hold student conferences and go over WebGrades, student and peer observations)
Participation	Facilitator-managed round-robin-style turn taking, little interruption and response to peer ideas	Facilitator-managed round-robin-style turn taking, increase in interruption and response to peer ideas, one frame coconstructed by subset of the group at end of meeting	Initial facilitated round-robin-style turn taking; new norm of respectful interruptions to press for depth, open discussion, and flexible coconstruction of frames

strategies and teacher actions. Moreover, teachers' participation within the community of practice grew from respectful turn taking and individual turns of talk to include participation norms that allowed them to press one another for depth, ask questions, and coconstruct framings related to their joint enterprise. When taken together, my analysis of these representative key episodes indicates changes in the participation and reification patterns within the community over time, thereby documenting teacher learning.

EPR 1: Freshman Team Focus on Issues With Struggling Students: "It's Kind of Like They're . . . Choosing to Fail My Class" (Linda, October 6, 2005)

Team framings focused on fixed attributes and changes students need to make. The October meeting from which the first episode is drawn began with discussions related to the teachers' curricular and pedagogical reforms, with discussion about how to teach the next lesson and how they should pace the next

lesson series. Zack suggested that the Team add a debriefing topic to the daily check-in routine at this particular meeting for the purpose of adding focus and substance to their conversations. After some discussion and solicited advice from a member of our university team, Zack asked the Team members to talk about students who were struggling and what they were doing to intervene.

Julie began the struggling student debriefing conversation by diagnosing her struggling students as English language learner (ELL) students and students with lower reading levels:

> As far as students who are struggling what I think is the issues that I'm dealing with is a lot of my ELL students. . . . One who speaks Spanish, one who speaks you know Chinese, and one who speaks Mali and it's like oh my goodness so I mean that's, that's an issue that I'm having as far as the language barrier and then reading level which I think go hand in hand. And the reading level affects the bigger group.

This excerpt typifies how Freshman Team members characterized their struggling students based on seemingly fixed attributes. For example, Linda diagnosed her struggling students as students who are "not doing any work" and "choosing to fail," whereas Zack diagnosed his struggling students as irresponsible students with failing grades "who just don't do anything in class." Rose added that her students struggled in two ways: they were "academically struggling" and they found groupwork difficult because they thought they were smarter than the rest of the group or because they were "flaky" and annoyed the rest of the group.

Though Team members spent the majority of the meeting diagnosing their struggling students based on fixed attributes, they also named intervention strategies they planned to try, all of which involved communicating how students needed to change to meet their expectations. For example, Linda, who viewed struggling students as students who did not work and chose to fail, said that she "didn't know how to address" the problem and indicated her plans to "spend a lot of tomorrow re-norming slash establishing all of the reasons why they are going to get referrals." Linda's proposed plans included going over her expectations and warning students that they would get in trouble if they did not change their behavior and follow the rules. Zack had a similar plan, which involved "keeping on telling them what to do":

> Like a lot of the struggling students don't take out a piece of paper when I say it's time to do a classwork assignment and so just to stay on them and not like ignore them but just keep on repeating and then tell them hey I've told you three times already why aren't you taking out your paper you know.

If struggling students did not "take responsibility" and come and talk to him about their failing grades, Zack also had plans to call students' parents and possibly talk to school administrators, though he hoped that warning students about this

potential call would motivate them to take care of the problem and change their behavior. After some discussion, the Team also decided to contact parents through phone calls and mailings and made plans to follow up with each at the next meeting.

Participation patterns based on participation roles and respectful turn taking. Of their own volition, Freshman Team members adhered strictly to a participation role structure during their meetings that was similar to the structure they learned in their CI training (Cohen, 1994). Zack was the facilitator for this meeting, while three of the other four Team members who were present—Rose, Julie, and Linda—took on one of the remaining roles (e.g., team captain, resource monitor, recorder-reporter). These norms and routines, including daily individual check-ins and weekly rotating participation roles, emerged as part of the Team's shared repertoire (Wenger, 1998) because the teachers wanted every member to have an equal opportunity to contribute ideas and avoid dominance by any one participant. Team members shared previously that practicing these roles within the workgroup would also help them implement the role structure more effectively with students. Team members regularly expressed gratitude to our university team for supporting the group's existence and seemed to feel responsible for optimizing their time together and propagating respectful discourse. Overall participation patterns for the October meeting reflected the Team's facilitator-managed round-robin-style check-in protocol, with individual turns of talk and little interruption.

EPR 2: Freshman Team Evaluation of Struggling Student Records: "Gives Me New Glasses to Look at Him Through" (Julie, January 5, 2006)

Team framings focused on personal and systemic circumstances. Teachers discovered near the end of the semester in December that they had more students in danger of failing than they suspected. Given the problematic consequences that would result from significant student failure, Freshman Team members visited the counseling office as a group at their first meeting in January to see whether students' cumulative records held any clues related to unexpected low performance. Teachers spent most of the meeting (90 min) reviewing student academic history files in teams of two or three. The remaining time (20 min) was spent debriefing the experience, which was analyzed as EPR 2.

Zack, the designated facilitator, launched the debriefing session: "Did you find anything interesting out, and what are you gonna use it for?" Rose went first and said she found that ELL and special education students were having trouble being mainstreamed into the regular classroom, which she attributed to course titles not matching the actual course descriptions, resulting in students being placed into the wrong courses. Rose added that when students no longer qualified for

special services, then there was no support mechanism in place to help these students transition to a mainstream classroom. Rose's overarching point was that ELL and special education students were hurt by transitions when the district did not have a support plan in place for them, resulting in poor performance in their courses. What is more, Rose's treatment of ELL and special education students as struggling students was more complex than the initial framing from EPR 1, in which closed framings that drew on these classifications as fixed attributes were stated.

Julie was surprised to find out that one of her students had a hearing loss and had lost his hearing aid. Julie then revealed a monumental change in attitude about another student's capability after reading his file:

> One student in particular that I see as just being I've seen my perception currently is lazy, not getting it, you know oh, troublemaker, blah blah blah, well look back, and he did really well. You know, he had pretty good grades up until, you know, this year. So like ok I know he can do the math. His test scores show that he can do the math. You know? Or at least he tests well, you know. So um, kind of gives me new glasses to look at him through.

Rose marked this key moment with an interruption to the debriefing process by suggesting that Julie should find out whether something bad had recently happened with that student. Julie informed the group that the student had missed a few weeks of school because of a funeral. Rose wondered how much the student had been affected by the funeral, which reinforced the possibility that poor performance may have been sudden instead of long term. Taken together, their comments implied that, despite student capability, students' personal circumstances strongly affect performance. These comments also signaled shifting framings for the struggling student problem, with plausible explanations beyond individual attributes for why students experience difficulties in school.

After Zack reminded the group that they were short on time, Linda noted that her "failing students have always failed. And, from kindergarten there were behind. And that was kind of a trend, um, for the ones that are way behind." Linda was surprised to find out that her "number one kid" of concern—a student she was convinced should receive special education services—had no red flags in his file, except for one ignored recommendation for special services. Linda expressed surprise that there was nothing in this student's academic history that documented special services or interventions on this student's behalf, as she was shocked that even students with clear needs for support could fall through the systemic cracks for years without anyone appearing to notice. Susan said that her students' files contained information that she expected and gave an example of a student who

performed well on the state test but did not perform well in her class. Susan's commentary implied a mismatch between students' prior and current course grades, which she indicated might have been from students not turning in assignments.

Zack reported that his struggling students' academic histories were consistent with the poor classroom behaviors and work habits he observed:

> Just seeing a lot of the history like one kid, for example, I am thinking of did really poorly throughout his school career, and always having the comment "needs to use class time better" you know "needs to take responsibility for his learning," blah blah blah, all the stuff that I see in my class too and then always getting passed on of course.

Zack used this one student as a representative case for all other struggling students (Horn, 2005). Because these students "always get passed on of course," Zack's comment implied a systemic problem of moving students on with their classes despite prior failure and irresponsibility.

Teachers responded with depth and specificity to the "what did you find out?" part of Zack's debriefing question, though their responses to the "what are you gonna use it for?" part were generic in nature. For example, Rose said that Julie should find out what led to her student's sudden drop in performance, and Susan suggested that Linda follow up with her student who had apparently fallen through the systemic cracks. Zack said that they needed to "be serious" about giving students a second chance and "somehow let him know that this is different," although he did not give details about how the Team should do this work.

These framings focused on students' personal circumstances (medical problems, sudden performance drop) and systemic issues (student misplacement, transitions, perpetual failure). Although teachers gained specificity with students' personal circumstances and systemic issues that contributed to low performance, their diagnoses did not translate into action-related responses, resulting in generic strategies for intervention (i.e., find out more about students' circumstances, "be serious" about interventions, ask students to take a math class in the evening). However, there was evidence that the experience impacted some teachers' attitudes toward their struggling students toward increased capability.

Negotiating meaning: A coconstructed status framing emerges. Participation patterns in this episode were similar to those in the first episode (i.e., facilitator-managed round-robin-style turn taking for the majority of the episode), with two short but significant exceptions. First, Rose departed from the sharing out norm by interrupting a speaker (Julie) to press for greater depth of discussion about a student, which was the first time an interruption of this nature was documented. Though Zack as the meeting facilitator did not question Rose's departure from their turn-taking routines, he reminded them after a few turns of talk that

"we're short on time," thereby illustrating the tension he negotiated between facilitator and gatekeeper (Barab et al., 2002). It is also likely that Rose's status as department chair gave her a few extra degrees of freedom in terms of deviation from the norm (Printy, 2008).

A second example of this participation pattern happened at the end of the meeting, just as the bell signaling a class change was about to ring. After Zack expressed his concerns about giving "students who need to take responsibility" for repeated failure another chance, Rose responded to him by wondering aloud about "a kid who's been failing for ever and ever and ever": "What happened that suddenly? What would you do to suddenly get a kid like that to start doing something? . . . I mean that are always behind. They must not understand anything that's going on." Rose's commentary opened up the discussion for a reframing of Zack's attribution of struggling students' persistent failure to irresponsible classroom behaviors and teachers promoting students when they should not do so. Zack responded to Rose's response with the prognosis that struggling students "might have to take math in the evening," implying that the struggling student may find success in an alternative classroom setting.

Linda took up Rose's line of thinking with the comment that students "must get just so used to it too." Her comment suggested that if students are used to failing then it must be especially difficult for them to overcome a history of failure or to believe that success is possible. The CI training coach happened to be in attendance at this meeting, and though she had taken an observational role in the meeting prior to this time, she added that Zack's student issue may be related to status: "Like the first thing that popped into my head is status. I mean is he—how much does he believe that he's not capable. If he's been being told the same thing over and over and over again." The CI training coach's comment diagnosed the struggling student problem as a status problem, which positioned the problem as one that the Team had been trained to identify and manage with small groupwork (Cohen, 1994; Horn, 2012). Zack responded with additional details that supported the CI coach's connection of the struggling student problem to status, though the way Zack framed his comments lacked the empathy espoused by Rose and Linda:

> That's what he does is sometimes when he gets some you know motivation to like do something and then before long I'll look at him in the group and then he's putting himself down. You know? Like saying acting stupid or just you know either he's not participating or when he does he puts himself down.

Linda reacted to Zack by saying, "Beating other people to the punch though, you know?" Linda's comment challenged Zack by offering a counterframe for why the student exhibited low-status behaviors. This comment suggested that Zack's student acted out as a coping strategy rather than as an act of stupidity.

Rose gave a rationale for their emergent coconstructed framing—struggling students must not understand anything (Rose) and must be used to failing (Linda), which is a status problem (CI coach)—with a replay (Horn, 2005, 2010) of a classroom story about how two struggling students did well in class without two of the other group members there because they did not have to deal with the status problems created by the absent group members:

> They had a wonderful day. It was amazing what they did. And so it really made me wonder about status issues because he is pretty quick at math facts and so I can go and reinforce that and somehow he participated the whole time and so it really made me think that those other two kids lower his status enough that then he just got silly when that happened.

This story gave the group a concrete example of how status influenced participation and, in this case, how prior denial of access prevented participation, rendering the low-status students unable to make effective contributions to the group.

The puzzling student scenario that emerged at the end of the debriefing about how to help students who always performed poorly in school prompted the negotiation of a struggling student frame beyond the individual speaker, which was the first time this type of participation pattern was observed. Rose's bewilderment about students who have experienced perpetual failure opened up the conversation for input from other people, and with contributions from Linda and the CI coach, a coconstructed diagnosis of the struggling student problem as a status problem emerged (Jacoby & Ochs, 1995).

EPR 3: "No Matter What We Do, We Get Down to this Little Core of Kids That . . . Really Drive the Entire School Crazy" (Rose, March 30, 2006)

Team framings based on category systems and classroom-based interventions. Rose, the facilitator for the March 30 meeting, launched the episode with the claim that

> no matter what we do, we get down to this little core of kids that I really can't do anything about in the ninth-grade classes, that really drive the entire school crazy, and we still always get down to that core of kids.

Rose said that even though their prior curricular and pedagogical reforms resulted in smaller numbers of students in this core group, they still

> have these kids like the Taylors and the Kaseys and Erica—who's-high-on-drugs and those things. And it seems like we still, in the school, don't have a good system for those kids. . . . there isn't any concerted effort for those kids who, like Justin, who is now a sophomore and is failing every single class.

Rose's comment started the trend of using specific students as representative cases of a larger group of struggling students for the purpose of fine-tuning reasons why certain students struggled despite capability (Horn, 2005). Taylor, who had been discussed at previous Team meetings, was described as a student who was smart but did not do his work. Kasey was described as a highly disruptive student who, despite occasional bouts of brilliance, consistently derailed engagement in learning for the whole class. Rose highlighted that Erica had a drug problem, which implied that Erica represented a group of students in need of professional interventions well beyond the scope of their classrooms. The Team continued this discussion with mention of students like Paige, who had low skills despite working very hard, and students like Autumn, who did not connect grades with work habits and had never experienced success. Moreover, compared to earlier meetings, the Team members' frames included greater specificity and complexity with regard to why their students were struggling in their mathematics classrooms.

Zack reflected on Rose's use of representative student cases with the painful reality that there would always be students they could not help:

> As painful as it sounds, there's always going to be some students that you just can't help—and that's just a fact of life. But the thing that's frustrating me also is the effect that that little group has on other students. . . . You know, like, that little group in my class is messing with all the rest of the kids. . . . And that's what really frustrates me . . . that they're not allowing me to help other students that I wish I could help, and that do want my help, that's to me also even more frustrating. And so . . . I don't know . . . if we can problem solve around that.

Zack linked the "core group of kids" with the students who caused behavior problems in his classroom because he saw these students as the ones who disrupted his teaching, distracted him from helping students who needed him, and inhibited the learning of other students. Zack then asked the group to "problem solve around that." Whether Zack believed that anything could be done to help these students is debatable. However, as is detailed in the next section, his comment invited commentary on the issue and served the important function of launching a conversation about particular intervention strategies that might help these students.

Participation and reification patterns that reflect open discussion and frame coconstruction. Although the participation patterns in this episode continued facilitated round-robin-style turn taking, as was part of their shared repertoire (Wenger, 1998), there were increased instances of interruptions to press for depth and several periods of open discussion. Consequently, the majority of this episode featured the Team's emphasis on classroom-based intervention strategies born from frames coconstructed within the group, which was new for the

group. For example, when Rose described Paige as a representative case of students with very low skills—"I don't know what we do with kids that are that far behind still"—Julie connected to their field trip to the counselor's office:

> Julie: But I mean like when we went back and looked through everyone's files and looked at the kids who are struggling, and they haven't passed a math class ever!
> Rose: Right—ever—right.
> [overlapping conversations]
> Linda: She was the one who in kindergarten they said, "Please read for this child."
> Rose: I know.
> Linda: Kindergarten.
> Rose: Wow.
> Linda: She's really low on her skills. How do you get like that?
> Julie: Well in elementary school it's just move on to the next grade, move on to the next grade, move on to the next grade.

Rose later suggested that they conduct student observations, with focus "on that kid that we're really wondering about, that we just make a note to ourself that day to try to figure out what that kid is learning that day." She claimed that focusing on one child and figuring out how to help him or her positively "affects all the kids." Rose explained that the information they learned from observing students may eventually help them keep a struggling student in a regular math class instead of resigning him or her to "sitting there vegetating" in a remedial class. Rose added that they could observe one another as well in service of these goals: "So we could have each other do it too. . . . We could go and when we observe we could watch that kid kind of—not being obvious." Rose suggested that this peer observation strategy would be helpful with students like Jessica, representative of students whose actual learning and engagement were a complete puzzle:

> Because we're talking about somebody like Jessica, who doesn't appear to be learning anything. I mean maybe we need to see: Are some of those kids actually learning in our class? . . . Are they really getting anything out of class at all?

Julie responded to Rose's questions with the case of JC, who responded well to "one-on-one attention" such that she could "tell that he knew what was going on; but in a group it was just gone." Susan expressed agreement with Julie.

Zack added, "There's a lot of those students who are at the low end. . . . Their problem might or might not be the content, but a lot of times their problem is that they don't focus." Susan aligned with Zack's idea: "Right, exactly! And they don't want to focus. Like Gerald and JC both." Zack posed a rhetorical question about how to tailor a lesson to these students:

> So like how are you going to tailor your lesson to somebody that doesn't want to focus? I mean that seems kind of hard. Or do you just tell all the class really clearly: "Read this." And then they can, like, read it. I don't know!

Zack's return to his earlier diagnostic patterns prompted Rose to revisit the case of Taylor:

> I was thinking about, for example, Taylor, who's really smart, who will sit there and do nothing. I actually think if I focused on him I might come up with something that would grab him. . . . because when I think about him, he really liked presenting —because I remember that when we presented he did really a good job. So I might actually change something I'm doing if I was more focused on him. Because I might not know what it is right now, but if I was focused on him and I had maybe Julie come in and watch—not being real obvious—when she notices that he gets drawn in, then I might have a better chance of figuring out what it is I need to do. I don't know if it would work but it might be something that we could try and just see: Is there some way that we can move some of these kids if we just were to focus?

Rose's commentary about kids like Taylor shifted attention away from Zack's comments and put the spotlight back on the classroom-based strategies that were the present focus of the Team's discussion, such as a student grades conference that would help students like Autumn link their efforts and assignment completion with their grades.

Rose hypothesized that if they could get the "leader-kids" to turn around by enacting these strategies, then more students "might just come along" with them: "These are the very kids that are making that class bad. So maybe just trying to do that, and maybe going and having somebody observe." Julie agreed and suggested that they go about this work surreptitiously. Rose explained that this strategy would help her with students like Jonathan, a representative case of "irritating" students who talked constantly. Julie opened up the possibility that the student might be "talking about a math problem," which supported Rose's peer observation strategy, as another teacher could take the time to notice what was going on with that student.

Rose concluded with a seemingly heartfelt statement about how she was "just trying to think of something that will help us" because of her fear that they may cast away struggling students who have the potential to turnaround:

> And you think about it, you think, "Lordy, I could've dropped those kids!" But then we have to remember: Well, the other ones that are coming along we would have also dropped. . . . And how would we have distinguished between those kids? There isn't any way to do that.

Julie and Susan expressed agreement with Rose both during and after her statements. It was at this time that Linda suggested that they e-mail all of the teachers of

their failing students for ideas and success stories, which she hypothesized might help with "annoying" students like Jonathan: "Hopefully there'll be a teacher out there that gets along with that student that just annoys you, and can talk to them" and find out ideas that work for that student in their other classes. The Team members agreed and decided to use their next Team meeting session to implement the intervention.

The ways in which teachers negotiated meaning of these framings is noteworthy. Aside from gaining specificity of the struggling student problem through category systems alongside classroom-based intervention strategies, the group was more flexible with interruptions and in-the-moment responses to member ideas. The resulting shift in participation marked important additions to their turn-taking norm, which now included respectful interruptions to press for depth, questioning of ideas, open discussion, and flexible coconstruction of frames.

AN EMPIRICAL EXAMPLE OF LEARNING IN A COMMUNITY OF PRACTICE

Analysis of the struggling student EPRs from the Freshman Team meetings uncovered a shift in how teachers framed the struggling student problem over time, documenting changes in how the Team reified their joint enterprise (Wenger, 1998). In EPR 1, the Team focused on fixed student attributes and gave advice about changes students needed to make. The Team members gained a better understanding of who their struggling students were in EPR 2 with a student records analysis, though they did not name any particular actions they could take to help their students. Although teachers diagnosed relevant contributors to student struggles alongside potentially helpful solution frames, several of which they implemented, these frames were primarily outside the scope of their classroom practices and direct control. In contrast, teachers developed category systems (Horn, 2005) in EPR 3 to help them tease apart myriad differences in why their students were struggling alongside targeted classroom-based interventions designed to help the students in these categories. These EPRs marked the Team's growing orientation toward more diverse reasons for why students struggle alongside classroom-based intervention strategies and teacher actions.

The Team members' changes in their reification of the struggling student problem happened alongside changes in their patterns of participation within the community of practice. At the beginning of the year, the teachers adhered rigidly to a round-robin discussion protocol, with norms that explicitly discouraged speaker interruption. Although the Team's check-in protocol promoted equal opportunities to speak and fewer chances to dominate—which may have been necessary for creating a safe discussion culture—the protocol lessened the likelihood of participants pressing one another for depth or asking follow-up questions. The

Team's participation patterns evolved over time to include more loosely facilitated open discussion, marked by increased interruptions to the speaker, pressing for depth, and the negotiation and coconstruction of the framings of the struggling student problem (Benford & Snow, 2000; Jacoby & Ochs, 1995). It stands to reason that these changes happened in part because of teachers' increasing levels of comfort with one another, the district instructional and CI coaches, and our university team. Thus, concerns about individual dominance likely faded over time, thereby fostering a more flexible conversational style within the facilitated, structured system.

These instances highlight Barab et al.'s (2002) claim that "overlapping yet conflicting activities" (p. 496) drive the dynamics of the system. The teachers' normalization of more diverse framings of and intervention strategies related to the struggling student problem (Horn, 2007; Horn & Little, 2010; Little & Horn, 2007) coincided with the evolution of their patterns of participation in their community of practice, exemplifying what Wenger (1998) characterized as the duality of participation and reification. These complementary changes in participation and reification patterns, evidenced by the Freshman Team's framing of the struggling student problem, together give empirical evidence of learning within the community of practice (Lave & Wenger, 1991; Wenger, 1998).

Although this study did not investigate the issue of whether teachers' improvements in talking about practice translated into improvements in equitable student outcomes, increased pass rates in first-year college preparatory mathematics at Clark anecdotally support this possibility: Pass rates for African American students in the targeted cohort went from 15.7% to 30.1% in 1 year, and low-income students' pass rates went from 21.2% to 40.0% in 1 year. Nevertheless, the benefit of the Team's increased engagement in collaborative patterns of participation alongside orientation to broader explanations for why students struggle and classroom-based intervention strategies and teacher actions frames goes beyond teachers simply learning how to talk about teaching more productively. When many courses of action linked to classroom instruction are available—ideas that were generated and negotiated by and for the teachers—then many more teachers are likely to incorporate these strategies in their work, thereby changing the resources available for their classroom practices (Horn, 2005).

CONCLUSION

This research aimed to describe high school mathematics teachers' learning as they took on curricular and pedagogical reforms in their workgroup. My study required analytic tools that could preserve the messiness of learning and at the same time tell a nuanced learning story in a productive way, accomplished by my joining of the communities of practice and frame analysis literatures. This

study contributes an empirical example of learning in a community of practice, evidenced by what and how teachers negotiated and framed problems of practice over time. These findings allow me to respond directly to growing interest in how teacher learning happens inside a teacher community, especially in the context of community formation (Barab et al., 2002; Dooner et al., 2008; Grossman et al., 2001; National Academy of Education, 2008). I theorize that changes in participation and reification patterns in other communities of practice are mirrored in changes in their collective framing practices of a problem salient to their joint enterprise over time and that tracking these frames alongside changes in participation patterns offers a productive method for analyzing learning within the community. I expect that these changes in participation are catalyzed and shaped by contributions and frames from influential members of the community, though more research is needed to confirm these hypotheses.

The field would benefit from studies that further specify how teacher learning happens in a community of practice, especially studies that make connections from well-documented ideas in other disciplines. Such connections would not only expand thinking about teacher community and learning in the field but also help create and support better learning experiences for teachers.

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