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ABSTRACT

This study contributes to the knowledge base regarding the ways in which school-based, ongoing, professional learning communities mediate teacher learning. Specifically, it investigates an organic learning group as they met in various contexts over a full school year, engaging in conversations around their teaching practices that focused on supporting students’ explanations of scientific phenomena. The group consisted of ten middle school science teachers from three schools in the same public school district, their district science coordinator and a professor of science education.

Drawing on traditions of ethnography and discourse analysis, this case study: 1) characterizes each episode of the group’s conversations around practice in terms of its potential for generating transformative learning opportunities, 2) identifies which spontaneous and designed features of those conversations accounted for differences in the generative nature of the talk, and 3) explains how those features mediated the generative nature of the talk. In this group, the differences between more- and less- generative talk could be attributed to five features: the context of the conversation; the tools participants used to represent their practice; the stance with which they represented and took up one another’s practices in the talk; the resources they drew on (in terms of expertise); the conversational routines in which they engaged. These five features interacted in complex, patterned ways to mediate the generative nature of the group’s talk.
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Chapter 1

Introduction

This study addresses a gap in the teacher education literature in the area of teachers’ professional conversations around practice and their relationship to teacher learning. By analyzing the discourse of a group of educators as they met in various professional development contexts over the course of one school year, I have constructed an explanation of how various aspects of their conversations mediated their learning opportunities.

This chapter begins with an orientation to a pervasive challenge to teacher learning in professional development contexts: the persistence of “traditional” discourse norms. This orientation includes a brief history of shifts in thinking about designing, facilitating and participating in professional development. Next I present the research problem and the research questions that guided the study. The chapter concludes with a brief overview of the remaining chapters.

Learning to Teach

Teaching is an incredibly complex endeavor that presents teachers with new challenges on a regular basis. For example, over their careers teachers regularly engage with new students, new curricula, new state- and district mandates, and changing demographics. While teachers can and do learn independently by reflecting on their practice, this unstructured, unsupported, individual reflection often results in idiosyncratic development, in which taken-for-granted beliefs remain essentially unchallenged (Ball & Cohen, 1999). As such, “teacher education” must be conceived in terms of supporting teacher learning across their entire careers, not as something
teachers “complete” as undergraduates before entering the classroom (Mizell, 2010). Quality professional development (PD) then, is crucial to both teacher- and student learning.

Professional development has been a part of teachers’ careers since the 1920’s, and has evolved in many ways in response to several stimuli, including progressive and conservative policies and social practices, curriculum movements, standards movements, international standardized testing and research on how people learn, to name just a few. With a few notable exceptions (for example, The Denver Plan of the 1920’s, the Eight Year Study of the 1930’s), professional development experiences were generally designed within what is now referred to as the “traditional” paradigm (Renyi, 1996) from the 1920’s well into the 1970’s and 1980’s (Ponder, Maher & Adams, 2010). Around that time, a new paradigm began to emerge, in response to research in how people learn, and to the failure of numerous large-scale calls for reform in teaching. This new paradigm for professional development, while widely advocated by scholars, has not yet become the norm for most teachers.

**Traditional professional development and its limitations**

Historically, professional development for teachers was generally conceptualized using a “training” paradigm (Grant, 1997). “Teacher training” or “inservice education” days generally used a top-down approach intended to train teachers to implement externally produced knowledge such as a new teaching method, curriculum, or standards in ways that demonstrated fidelity to the intentions of their creators. Inservice training often took the form of a single workshop that used a transmission model of learning, situating the knowledge to be acquired generically, with little to no regard for context. Clark and Florio-Ruane (2001) argue that professional development designed within the traditional paradigm was “mostly disappointing and ineffective” (p. 4) and summarize four interrelated reasons for its failure.
First, many teachers feel little to no ownership over their professional development experiences. Too often, well-intended administrators, university faculty, or commercial professional development facilitators design and implement programs based on what they think teachers need, without actually soliciting any input from the teachers who will participate in the program. Teachers in this position often feel “put upon, manipulated, and not taken seriously as professionals” (Clarke & Florio-Ruane, 2001, p. 5). This kind of resentment generally translates to professional development that has little effect on teaching practices, and even worse, can leave teachers feeling disenfranchised.

Second, professional development designed within the traditional paradigm often assumes a deficit model (Hargreaves & Dawe, 1990). That is, it views teachers as needing to be “fixed,” by providing knowledge that is generated by “experts” (often university faculty) outside the participants’ local contexts. Cochrane-Smith and Lytle (1999) refer to this externally generated knowledge as “knowledge-for-practice” (p. 253). Professional development based on knowledge-for-practice runs the risk of ignoring not only teachers’ needs (as described above), but also their talents and the knowledge they have generated through their own teaching experiences (which Cochrane-Smith and Lytle, 1999, call “knowledge-in-practice”). Professional development based on a deficit model views teachers as knowledge users and intends to transmit knowledge to them, rather than viewing teachers as capable actors in the knowledge generation process. These experiences can contribute to teachers’ feelings of resentment and disenfranchisement, not to mention bring about little learning.

Third, many professional development programs assume that “one size fits all,” especially those that are designed for use in many different school settings. This approach to teacher learning fails to recognize that teachers participating in the same program may come from different communities with a wide variety of cultural norms, needs, strengths and resources. It assumes that teachers can take the knowledge that they learn in these professional development
settings and apply them in their particular teaching contexts. Research in the learning sciences challenges this assumption about the nature of knowledge as being independent from context, and also challenges the notion of people’s ability to “transfer” knowledge from one context to another (Brown, Collins & Duguid, 1989). This research suggests that knowledge is fundamentally situated in and is a product of the context in which it was generated, and that “transferring” knowledge from one context to another is better conceived of as “transforming” practices to succeed within the constraints and affordances of a new context. The success of this transformation depends on the learner’s attunement to the constraints and affordances of the both the original and novel contexts (Greeno, 1997). In other words, unless teachers pay special attention to the constraints and affordances of the context in which they learn new teaching practices (the workshop, study group, etc.), along with the constraints and affordances of their own teaching context, they may find it difficult to apply these practices in their own classroom, once again resulting in little change.

Fourth, many professional development programs are designed using short-term thinking. In these cases, the learning experiences themselves are brief, and are intended as “quick-fixes” to problems that can be solved in a short period of time. This approach ignores the fact that teaching, learning and schooling are complex interactions of myriad variables, making problems difficult to define, solutions difficult to design, and change a slow process. Too often, teachers are not given enough ongoing support to learn or to change their practices in a meaningful way, often resulting in the abandonment of new practices and possibly the distrust of “new” practices in general.

In the 1970’s, educational researchers began engaging in more systematic studies of teacher professional development than in previous years (Showers, Joyce, & Bennett, 1987). Although some have argued that the traditional paradigm for designing professional development may be appropriate for acquiring specific, discrete skills (Little, 1993; Grant, 1997.), the majority
of the studies since the 1970’s (along with the conventional knowledge of those who implement and participate in professional development) suggest that professional development experiences designed using the traditional paradigm have extremely limited power for meaningful teacher learning and for transforming teaching practices.

**Contemporary views of professional development**

The realization of the limitations of “traditional” professional development, along with several calls for reform in teaching led to an increase in formal research on professional development over the last few decades. At the same time, research in the learning sciences resulted in new views of the nature of knowledge and learning. Used together, these lines of research have helped to generate a new paradigm for designing professional development experiences that are more likely to support meaningful teacher learning and changes in teaching practices.

**Contemporary views of the nature of knowledge and learning**

Conceptualizations of learning have evolved from behavioristic notions of generic knowledge- and skill acquisition to one in which knowledge is constructed rather than acquired. In this modern view, knowledge is not assumed to be “generic” and easily transferrable, but instead is fundamentally situated in and a product of the context in which it was constructed, mediated by a learner’s prior knowledge and experiences (Brown, Collins & Duguid, 1989; Wertsch, 1991). Within the constructivist learning paradigm exists a continuum of perspectives about how and where knowledge is constructed and resides (Blumenfeld, Marx, Patrick, Krajcik, & Soloway, 1997). At one end of the continuum, cognitive perspectives focus on the knowledge
that is constructed by and resides within an individual learner, in response to his context (Shuell, 1986). The sociocultural end of the constructivist continuum considers learning to be social, rather than individual in nature. In this view, knowledge is constructed by a community of learners, is mediated by the interactions between its members and the tools they use, and is distributed among the community (Greeno, 1997). Some sociocultural perspectives focus on knowledge as the shared discourse and practices of the community, and conceptualize learning as changes in the members’ participation in the community’s discourse and practices, or changes to the discourse or practices themselves (Lave & Wenger, 1991). Overall, the evolution of conceptions of learning may be characterized as shifting from acquisition to construction to enculturation (Putnam & Borko, 2000). It is important to note that many scholars use both cognitive and sociocultural perspectives to generate a more complete view of learning (Cobb, 1994; Driver, Asoko, Leach, Mortimer, & Scott, 1994).

**Shifts in thinking about designing professional development**

Despite the increased number of systematic studies of professional development in the last few decades, surprisingly little is known about what teachers do and do not learn in “traditional” professional development activities (Wilson & Berne, 1999). Nonetheless, disappointing experiences with traditional professional development led many professional developers and scholars to reject the traditional paradigm outright, “replacing the old with new images of professional development” (Wilson & Berne, 1999, p. 175). These new images made use of research on how people learn.

In these new images, teachers are no longer seen as having “deficits” needing to be fixed, or as empty vessels waiting to be filled with knowledge generated by “experts” that they should implement wholesale in their “generic” classrooms. Instead, teachers are viewed as intellectual,
reflective practitioners who are capable of generating knowledge-of-practice (Cochran-Smith & Lytle, 1999) that is appropriate for their particular teaching context. Cochran-Smith and Lytle contrast knowledge-of-practice with knowledge-for-practice and knowledge-in-practice. On the one hand, knowledge-for-practice is considered ‘formal’ knowledge or theory, generated by those outside the school context (usually university-based researchers) “for teachers to use in order to improve practice” (Cochran-Smith & Lytle, 1999, p. 250). On the other hand, knowledge-in-practice is the essential practical knowledge embedded in teachers’ everyday work that they generate through practice and reflection. Unlike these two forms of knowledge, knowledge-of-practice cannot be classified as either “formal” or “practical.” Instead, it is the knowledge generated “when teachers treat their own classrooms and schools as sites for intentional investigation at the same time that they treat the knowledge and theory produced by others as generative material for interrogation and interpretation” (Cochran-Smith & Lytle, 1999, p. 250).

In this new view, professional developers are now viewed as facilitators of learning, rather than as teachers of teachers. Effective professional development experiences are viewed as those that provide ongoing support over long periods of time, are situated in teachers’ everyday work as inquiries into teaching and learning, where teachers work together and with facilitators as a community of learners (not just teachers). Drawing on the work of Sparks (1995), Little (1993) and Sykes (1996), the National Foundation for the Improvement of Education summarized these shifts (see Table 1-1, from Renyi, 1996, p. xvi) as did the National Research Council (1996, Table 1-2). Taken together, Tables 1-1 and 1-2 encompass the significant shifts in thinking about professional development that have been promoted over the last two decades.
Table 1-1: Shifts in models of teachers’ professional development (Renyi, 1996).

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated, individual learning</td>
<td>Learning both individually and in the context of groups, such as the whole school faculty and teacher networks interested in particular subjects.</td>
</tr>
<tr>
<td>Fragmented, one-shot “training”</td>
<td>Coherent, long-range learning</td>
</tr>
<tr>
<td>District-level, one-size-fits-all programs</td>
<td>School-based learning tailored to the needs of all the students in the building</td>
</tr>
<tr>
<td>Bureaucratically convenient</td>
<td>Focused on student needs</td>
</tr>
<tr>
<td>Outside the workplace</td>
<td>Embedded in the job and closely related to both student and teacher needs</td>
</tr>
<tr>
<td>Experts telling teachers what to do</td>
<td>Teachers taking an active role in their own growth</td>
</tr>
<tr>
<td>Skills that can be used by everyone and therefore available in depth to no one</td>
<td>Involvement of all teachers and instructional leaders in developing new approaches to teaching based on their needs</td>
</tr>
<tr>
<td>Teachers as passive receivers</td>
<td>Teachers and administrators as active makers of their own learning</td>
</tr>
<tr>
<td>Adult learning as an add-on that is not essential to schooling</td>
<td>Adult learning as a fundamental way of teaching and a transformation of schooling</td>
</tr>
<tr>
<td>Measuring effectiveness by attendance at workshops</td>
<td>Measuring effectiveness by improvements in teaching and learning</td>
</tr>
</tbody>
</table>

Table 1-2: Changes in Emphases Encompassed by the Standards for Professional Development for Teachers of Science (NRC, 1996).

<table>
<thead>
<tr>
<th>Less emphasis on</th>
<th>More emphasis on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission of teaching knowledge and skills by lectures</td>
<td>Inquiry into teaching and learning</td>
</tr>
<tr>
<td>Learning science by lecture and reading</td>
<td>Learning science through investigation and inquiry</td>
</tr>
<tr>
<td>Separation of science and teaching knowledge</td>
<td>Integration of science and teaching knowledge</td>
</tr>
<tr>
<td>Separation of theory and practice</td>
<td>Integration of theory and practice in school settings</td>
</tr>
<tr>
<td>Individual learning</td>
<td>Collegial and collaborative learning</td>
</tr>
<tr>
<td>Fragmented, one-shot sessions</td>
<td>Long-term coherent plans</td>
</tr>
<tr>
<td>Courses and workshops</td>
<td>A variety of professional development activities</td>
</tr>
<tr>
<td>Reliance on external expertise</td>
<td>Mix of internal and external expertise</td>
</tr>
<tr>
<td>Staff developers as educators</td>
<td>Staff developers as facilitators, consultants, and planners</td>
</tr>
<tr>
<td>Teacher as technician</td>
<td>Teacher as intellectual, reflective practitioner</td>
</tr>
<tr>
<td>Teacher as consumer of knowledge about teaching</td>
<td>Teacher as producer of knowledge about teaching</td>
</tr>
<tr>
<td>Teacher as follower</td>
<td>Teacher as leader</td>
</tr>
<tr>
<td>Teacher as an individual based in a classroom</td>
<td>Teacher as a member of a collegial professional community</td>
</tr>
<tr>
<td>Teacher as target of change</td>
<td>Teacher as source and facilitator of change</td>
</tr>
</tbody>
</table>

While these recommended shifts are not yet the norm in every school, many educators are joining together in ongoing, face-to-face groups for professional development purposes. Often, these
groups take the form of school-based learning communities who engage in a variety of activities, including analyzing student work or videos of classroom teaching, and writing or adapting curriculum. Although different groups may engage in the same activities, how the groups engage in these activities may look (and sound) quite different, depending on the particular dispositions, cultural norms and discourse practices of the group.

**Traditional discourse practices in teacher learning groups**

As professional development (PD) settings began to shift to reflect the models described in the previous section, teachers began to form learning communities that regularly engaged in conversations around practice. Many PD facilitators and researchers quickly noticed that although teachers were trying out new PD contexts, they engaged in conversations in very “traditional” ways. For example, teachers often experience differences of opinion as uncomfortable, and therefore avoid voicing alternative ideas (voicing only support for others’ ideas), or they characterize different ideas as variations on the dominant view, to maintain congeniality and affective satisfaction (Grossman, Wineburg & Woolworth, 2001). They also maintain congenial relations by refraining from asking questions that probe colleagues’ thinking, as these questions may be perceived as threatening (Nelson, 2010). Instead, they tend to ask somewhat superficial technical and clarifying questions (Nelson, Slavit & Deuel, 2012).

Teachers often tell stories from classroom experiences, which do not necessarily attend to the specifics of learning. These stories are often offered authoritatively as advice, as exemplars, but not generally offered as objects of scrutiny (Nelson, 2010; Little 1990). Listeners scan these contributions for useful information, but rarely voice probing questions or critique. (Little, 1990; Nelson et al., 2012). Some of these teacher groups examine public artifacts of their practices, such as video of classroom teaching or samples of student work. As with the stories they tell,
teachers frequently provide access to these artifacts in order to prove (rather than improve) their effectiveness (Nelson, 2012). When examining data, teachers are also known to refer to broad issues of teaching and learning, rather than focusing on the minute particularities represented in the data, and rely on stories (rather than data) to support their ideas. Some of this difficulty maintaining a narrow focus on the data stems from teachers’ lack of experience with the process of inquiry (Nelson, 2010; van Es, 2012), and is related to their conceptions of what counts as evidence during the inquiry process.

Traditionally, teachers frequently advise one another on “best practices.” Generally, less-experienced teachers seek advice, while more experienced teachers provide advice, and rarely are advised practices held up to scrutiny. These dispositions and discourse practices are unlikely to disrupt teachers’ taken-for-granted ways of thinking about teaching and learning that are developed through the apprenticeship of observation and reinforced as they are socialized into the profession. As such, “traditional” teacher conversations around practice are not likely to support substantive learning or changes in practice (Nelson, Deuel, Slavit & Kennedy, 2010). These traditional norms can likely be attributed to traditional school cultures dominated by isolation, individualism, privacy and congeniality.

*School culture*

As described by Hargreaves (2001), teachers have traditionally been “imprisoned within and protected by a state of classroom isolation that shielded them from scrutiny but also bred conservatism, individualism and uncertainty” (p. 503). The traditional physical structure of schools isolates many teachers, preventing them from spending much time outside their classroom or with other teachers (Hargreaves, 1994, 2001). As a result, it is not uncommon for teachers in the same school, grade or department to teach for many years next door to one
another, yet never see one another teach, much less give and receive feedback about one
another’s teaching. The traditional time structures of schools also isolate teachers by limiting
opportunities for co-planning or conversations about teaching (Hargreaves, 1994), as teachers
often have planning periods at different times throughout the day, or no planning periods at all.
After school, teachers’ time is often filled by meetings during which there is little time to talk
about students, teaching or learning. Even when teachers do have time to talk or observe one
other teach, they often use that time to meet their immediate demands (Hargreaves, 1994), such as
grading, preparing for lessons, or calling parents. As a result, isolation as part of teaching culture
can be perceived both as an imposed condition and an adaptive strategy (Flinders, 1988).

Due in part to their isolation, many teachers develop a disposition of privatism and
individualism. (Lortie, 1975; Hargreaves, 2001). Teaching is an incredibly complex task, and due
to the lack of feedback that results from the imposed and adaptive isolation in schools, teachers
often feel very uncertain and somewhat anxious about their practices (Lortie, 1975). As a result,
teachers often value their privacy, as it shields them from the judgment of others. (Hargreaves,
1994; Little, 1990). The value of privacy often leads to feelings of individualism (Lortie, 1975;
Flinders, 1988; Hargreaves, 1994). That is, many teachers so value their privacy that they equate
‘autonomy’ with non-interference in their teaching practices or in the practices of others. This
sense of non-interference often results in highly individual and idiosyncratic development. As
Ball (1994) describes, “The common view that ‘each teacher has to find his or her own style’ is a
direct result of working within a discourse of practice that maintains the individualism and
isolation of teaching” (p. 25).

Schools are also commonly dominated by norms of congeniality (Nelson, Deuel, Slavit &
Kennedy, 2010; Grossman, Wineburg & Woolworth, 2001), especially in interactions between
elementary teachers, the vast majority of whom are women (Pfeiffer & Featherstone, 1996).
Teachers demonstrate congeniality when they politely agree to disagree, or when they “behave as
if we all agree” (Grossman et al., 2001, p. 955). Public disagreement in schools, no matter how respectfully expressed, is often considered confrontational and therefore avoided. (Pfeiffer & Featherstone, 1997; Achinstein, 2001; Lieberman & Miller, 2008).

**Inquiry-oriented discourse**

Considering the dominant school culture to which most teachers are accustomed, it is no surprise that many teachers engage in conversations around practice in congenial ways that value individualism, privacy and non-interference. But if professional development contexts are going to support meaningful learning, teachers will need inquiry-oriented dispositions towards learning with and from colleagues, along with non-traditional discourse practices to facilitate that learning.

Ideally, participants in teacher learning groups believe that individual teachers’ practices and ways of thinking should be made public and thoughtfully examined in order to surface and confront teachers’ assumptions about content, students, teaching and learning. (Ball & Cohen, 1994; Nelson, 2010). Lord (1994) characterizes this disposition as an aspect of as “Critical colleagueship.” As a result of this stance, members regularly ask each other questions that press for elaboration and probe one another’s rationales. When teachers open up their practices by sharing samples of student work or video of their teaching, they do not intend to provide exemplars, but instead provide objects of group inquiry. The goal of this inquiry is group learning, reflecting the group’s desire for intellectual (rather than merely affective) satisfaction (Lord, 1994). The discussion around such records of practice is characterized by tentative statements that invite dialog, rather than statements of certainty or authority (Nelson, 2012), and sticks closely to the data, rather than veering off into generalized stories of experience (van Es, 2012; Braaten, 2011). Likewise, diversity among ideas is seen not as threatening, but instead as an opportunity for learning (Ball & Cohen, 1999). As a result differences of opinion, alternative
claims, and varying interpretations of evidence are regularly voiced and taken up in conversation. (Grossman, 2001).

While members of an inquiry-oriented community respect each other’s individuality and do not expect everyone to teach in exactly the same ways, they seek to develop a shared repertoire of teaching practices and a shared language for making sense of teaching and learning (Ball & Cohen, 1999; Lave & Wenger, 1991). They believe that knowledge about teaching and learning is constructed by the community, rather than imparted by any particular member or outside source. They value the contributions of all members, not just those seen as experts or more experienced. As a result, conversational turns build on one another, and talk is distributed among many members. (van Es, 2012; Nelson, 2012).

Proponents of these dispositions and discourse practices argue that they allow teachers’ longstanding beliefs and assumptions to be surfaced and confronted (Ball & Cohen, 1999). While the inquiry-oriented dispositions and discourse practices described here certainly do not guarantee any particular kind of teacher learning, they remove the limitations on learning imposed by norms of privacy, non-interference, individualism and congeniality, supporting the potential for more substantive learning and changes in teaching practices. While some teacher groups have learned to engage in inquiry-oriented discourse, this kind of teacher talk is not yet the norm in most schools. Traditional- and inquiry-oriented dispositions, norms, discourse practices and hypothesized relationships to learning are summarized in Figure 1-1.
Research Problem

While the relationship between teachers’ professional discourse practices and the kinds of learning they support are well reasoned and based on contemporary theories of learning, the literature contains very few studies that provide empirical evidence to support such claims. Furthermore, there are even fewer empirical studies that explain how teacher professional conversations mediate teacher learning. This gap in our understanding needs to be addressed with purposeful investigations of the moment-to-moment interactions in teachers’ conversations, and the ways in which those interactions mediate teacher learning. This study aims to address that gap.
**Research Questions**

The following research questions guided the study:

How do conversations around practice mediate a teacher learning group’s opportunities to learn about teaching?

a) Which designed and spontaneous features of the group’s conversations around practice accounted for differences in the generative nature of those conversations?

b) How did those features mediate the generative nature of the group’s talk?

**Overview of the Dissertation**

In Chapter One of this dissertation, I have articulated a pervasive problem in teacher education, and presented an argument for the need for this study. In Chapter Two, I present the theoretical framework that guided the study and review the existing literature around teacher professional conversations and their relationship to teacher learning. In Chapter Three I introduce the methodological framework that guided the study, along with the specific methods I used to generate and analyze data, a description of the context and participants, and some attention to issues of trustworthiness. In Chapter Four I present the findings of the study, including extended transcript excerpts from the group’s meetings to support my claims. In Chapter Five I conclude the dissertation by presenting a discussion of the findings, along with the implications of those findings for future practice and research, and the limitations of the study.
Chapter 2

Conceptual Framework and Review of Literature

In this chapter, I explain the theories and concepts that I used to frame the study, and review the existing literature around the relationships between teacher conversations and teacher learning. The chapter begins with the conceptual framework, including discussions of sociocultural perspectives of learning, positioning theory, additive versus transformative learning, and Opportunity to Learn (OTL). Following the conceptual framework, I reiterate the research questions guiding the study. The chapter concludes with a review of the extant literature relevant to this study, including studies that investigate teacher learning groups’ discourse norms, expertise, positioning, stance, using artifacts of practice, and facilitation, as they relate to teacher learning.

Theoretical Perspectives

In order to consider any question about teacher learning in professional development, one must first articulate a theoretical perspective on learning. In this section I discuss the general theoretical perspective of learning that I used to frame the study, and define three constructs that were particularly important to consider as in framing the data analysis: Positioning, Additive versus Transformative Learning, and Generative Talk.

Sociocultural and situative perspectives of learning

In this study, I draw on sociocultural and situative perspectives of learning (Vygotsky,
1978; Wertsch, 1991; Brown, Collins, & Duguid, 1989; Greeno, 1997). While there is no single accepted situative/sociocultural perspective on learning (Gee, 2008), from this view learning is generally understood as a process of acculturation into the social practices of a community. Furthermore, learning is mediated by learners’ prior knowledge and experiences, by the interactions between members, and by interactions between members and the tools they use (Brown, Collins & Duguid, 1989). Knowledge is co-constructed by a community of learners, is distributed across the community, and is fundamentally situated within the activity, context, and culture in which it is constructed and used (Brown, Collins, & Duguid, 1989). A sociocultural perspective does not deny individual learning, but views learning as first achieved by engaging in a community’s social and cultural practices, and then appropriated by individuals within that community (Vygotsky, 1978; Gallucci, 2008).

**Individual versus Group Learning**

Scholars in the learning sciences (e.g. Cobb, 1994; Driver et al., 1994) have argued that learning has both individual and sociocultural features, and that learning should be viewed “as both a process of active individual construction and a process of enculturation into… [a community’s] practices” (Cobb, 1994, p. 13). As such, the decision between the individual teacher and the teacher learning group as the unit of analysis depends on the researcher’s questions and purposes (Borko, 2004).

In this study, participants engage in teaching practices in their individual classrooms, which are situated within the particular cultures of the school and community. They come together to learn about and from practice by engaging in conversation-based professional development, which includes its own social and cultural practices that are closely related to those of their classrooms and schools (as discussed in a Chapter 1). In these conversations, participants
make their practices public, using various representational tools. Through talk, they co-construct shared meaning about teaching and learning by publicly negotiating interpretations of teaching practice and student learning.

Lave and Wenger (1991) described learning as a process of legitimate peripheral participation, in which learners “participate in communities of practitioners…the mastery of knowledge and skill is recognized when novices move toward full participation in the sociocultural practices of the community” (p.29). In terms of talk as a vehicle for learning, they argue that “the purpose is not to learn from talk as a substitute for legitimate peripheral participation, it is to learn to talk as a key to legitimate peripheral participation,” (Lave and Wenger, 1991, p. 109). This notion of “talking within” a community’s practices is particularly relevant for understanding why teacher groups must (over time) engage all of their members in sense-making conversations around practice. While novice members can certainly learn from listening to others’ interpretations of practice, the goal of the group should be to enculturate every member into the social practice of making meaning of teaching through the group’s talk.

An often overlooked aspect of Lave and Wenger’s (1991) construct of legitimate peripheral participation is the inherent contradiction between continuity and displacement. That is, in order for everyone to learn (not just the novices), there has be both continuity of the group’s practices, but also displacement of those practices. When newcomers adopt the community’s existing practices, the group experiences continuity. When the practices themselves are transformed, the group experiences displacement. Without transformation of the group’s existing practices, learning would be limited to the newcomers, as they adopt the group’s existing practices. Transformation of practices often depends on what Wenger (1998) calls “generational encounters” – meaning the inherent conflicts between the viewpoints of “old-timers” and “newcomers.” In order for these conflicts to afford learning opportunities for everyone, they have to be taken up rather than avoided, and the contributions of the newcomers have to be at least
entertained. Otherwise the community of practice simply serves to reproduce existing practices, which represents a very conservative model of learning. As Lave and Wenger so eloquently argue, “Insofar as this continual interaction of new perspectives is sanctioned, everyone’s participation is legitimately peripheral in some respect. In other words, everyone can to some degree be considered a ‘newcomer’ to the future of a changing community,” (p. 117).

Because I am interested in the group’s co-constructed talk and the ways in which it mediates learning opportunities for the teachers as a community, in this study I have chosen the group (rather than individual teachers) as the unit of analysis. That being said, I pay close attention to the role that individuals play in the way that talk is constructed (see “Positioning” below). Historically, the literature in teacher education has focused on individual learning. Through this dissertation however, I am entering an ongoing conversation in the literature that shifts away from a solely individual view of learning toward a view of learning that takes into consideration both individual and group learning and the interactions between them.

**Positioning**

Lave and Wenger’s (1991) attention to “newcomers,” “old-timers,” peripherality, and the tension between continuity and displacement highlight the importance of paying attention to the different ways in which a group’s talk positions its individual participants. Positioning within a community acts as one of several mediating features of interaction. Positioning can be intentional or tacit, and occurs through both verbal and non-verbal discourse (van Langenhove & Harré, 1999). Through this discourse, individual speakers can position themselves as well as position one another. They can choose to accept, challenge, or renegotiate this positioning (van Langenhove & Harré, 1999), although such repositioning often depends on the positions that others assume. As explained by Glazier (2009), “It is in the interaction among the participants –
essentially the interactional positioning – that the story lies” (p. 827).

The ways in which a group’s talk positions participants has important implications for individual and group learning (Mann, 2001; Glazier, 2009). For example, teachers who are positioned as agentic in solving their own problems of practice may experience a different kind of learning than those who are positioned as helpless or dependent upon others’ expertise. Groups in which all individuals are positioned as having equal capacity for making valuable contributions may experience a different kind of learning than those in which the contributions of some participants are positioned as more valuable than others’.

Additive versus Transformative Learning

Schugurensky (2002) distinguishes between “additive” and “transformative” learning. Additive learning refers to “the addition of knowledge, the improvement of skills and the development of values that expand and strengthen existing knowledge, skills and values” (Schugurensky, 2002, p. 6). In professional development settings such as workshops, teachers commonly learn in additive ways. They add new practices to their repertoire, which they understand as “effective” within their existing paradigms for thinking about teaching and learning. Although additive learning can certainly translate to changes in teachers’ practices, those changes tend to be somewhat minimal or superficial. For example, a community of teachers who wish to increase students’ participation in their classrooms may learn to ask their students more questions. If they continue to define “participation” as “students responding to the teacher’s questions,” then their increased questioning techniques represent a minimal, surface-level change to their practice. This kind of learning could be considered additive.

In contrast, transformative learning refers to “learning experiences that lead us to challenge our assumptions and values, and to radically change our existing prior knowledge and
approaches,” (Schugurensky, 2002, p. 6). Transformative learning experiences are more likely to bring about substantive changes in practice. For example, if the aforementioned teacher group begins to conceive of “participation” in a different way, such as “students listening to, thinking about and responding to the ideas of their classmates,” then they may begin to ask not only more questions, but also ask different kinds of questions that are designed to get their students interacting with each other’s ideas, rather than just with the teachers’ ideas. These changes are considered substantive because they represent a new way of understanding the nature of participation. This kind of learning could be considered transformative. In this study, “Generative” talk (defined in the next section) refers specifically to the generation of opportunities for transformative (rather than additive) group learning.

“Generative” Teacher Talk

In this study, I use the notion of “generative” teacher talk as a lead construct. Generative talk does not guarantee (nor serve as evidence of) teacher learning, but instead serves as a potential affordance or “opportunity” for substantive teacher learning and changes in teaching practices. (Throughout this study, I use the phrase “generative talk” to mean the kind of talk that affords transformative, group learning opportunities. As such, I use the phrase “learning opportunity” somewhat interchangeably with “generative talk.”) Looking across the literature, I identified four aspects of teacher talk thought to generate learning opportunities: public, transparent practices; emphasized attention to rationales; theory-practice connections; distributed agency. I explain each of these aspects of generative talk below.

Public, transparent practices
Generative teacher talk makes classroom practices visible with a great degree of transparency (Horn & Little, 2010). As Barsalou (1999) argued, “comprehension is grounded in perceptual simulations that prepare agents for situated action” (p. 77). Teachers’ practices may be made visible through oral accounts such as rehearsals of future teaching or replays of prior teaching (Horn, 2010), and/or through artifacts of practice such as lesson plans, student work or videos of teaching. Achieving a high degree of transparency frequently involves teachers probing one another for more specific details of classroom procedures and teachers’ rationales (Horn, 2010). In the absence of a personal observation of others’ teaching, discourse that makes practice transparent can provide the group with another resource for constructing their own models and simulations for taking action in the classroom. During the analysis phase of the study, I searched for instances in the teachers’ talk where they make their practices visible with a high degree of transparency through narratives and/or artifacts, paying special attention to instances of probing for details or rationale, and how teachers responded to that probing. Conversely, I also searched for counterexamples where teachers shared their practices, but did not provide enough procedural or rationale details to achieve a high degree of transparency.

**Emphasized attention to rationales**

Generative teacher talk includes attention to the rationales behind teaching practices, not just to the procedures involved in those practices (Nelson, Deuel, Slavit, & Kennedy, 2010). Ideally, this attention includes consideration of multiple perspectives and provides a space for revising one’s thinking (Ball & Cohen, 1999; Horn & Little, 2010). Teaching is an inherently complex endeavor with no single best solutions appropriate to every context. When teachers articulate their rationales and seek multiple interpretations, they create a space for revising their thinking in substantive ways. In my analysis, I searched for instances of talk in which explicit
attention was paid to rationales for practice, and in which multiple interpretations were posed. I analyzed how that talk was taken up (or not taken up) by others in the group. Conversely, I also sought and analyzed instances where the conversation focused on procedures (rather than rationales) or where a single interpretation was posed or accepted without being further taken up (problematized) by the group.

**Theory-practice connections**

Generative teacher talk connects teaching principles (generalizations) to unorganized contextual experiences. Horn and Little (2010) argue that these kinds of connections provide “a means of developing teaching knowledge that is deeply rooted in embodied accounts of classroom life, joining important concepts about teaching to particulars of practice” (p. 197). Gee (2008) argued that building models (generalizations) from contextualized experiences allows learners to generate simulations that help them to make sense of specific situations they encounter, and to prepare for action in the world. In my analysis, I searched for shifts between abstract talk of teaching principles (often in the present indefinite tense) and contextualized talk of teaching (often in past or future tense), and analyzed how this talk is constructed and taken up by the group. Conversely, I also identified and analyzed instances where the talk focused primarily on the specifics of teaching, or on abstract teaching principles, without substantial connections made between the two.

**Distributed agency**

Generative teacher talk positions teachers with substantial agency for sense making and problem solving (Horn & Little, 2010; Ball & Cohen, 1999; Cochrane-Smith & Lytle, 1999). It
does not position teachers as helpless, or as dependent on the expertise of others. Teachers do not simply advise one another and move on (nor does a facilitator simply advise the teachers and move on). Instead this kind of talk acknowledges teachers’ abilities to solve their own problems and answer their own questions, and provides a space for such actions (Horn & Little, 2010). In my analysis, I searched for instances where teachers expressed an experienced or anticipated problem of practice (or a problem of their understanding of a practice) and paid close attention to the degree of agency with which the teacher (or the group) was positioned while the group took up the problem (or question). I looked at positioning from multiple perspectives, including the ways in which: 1) the group positioned the teacher who was the speaker or narrator of the problem of practice, 2) the speaker/narrator positioned him or herself, 3) the speaker/narrator positioned the group, and 4) the group positioned itself, in terms of agency for sense making and problem solving.

**Research Questions**

Used together, the constructs of positioning, additive versus transformative learning, and generative talk create a framework that allows me to carefully analyze a teacher group’s talk from a sociocultural perspective of teacher learning. Specifically, I posed the following research questions to guide the study:

How do conversations around practice mediate a teacher learning group’s opportunities to learn about teaching?

c) Which designed and spontaneous features of the group’s conversations around practice accounted for differences in the generative nature of those conversations?

d) How did those features mediate the generative nature of the group’s talk?
Review of Existing Literature

In the literature around teacher learning, there are many conceptual articles that conjecture about what teacher talk should sound like, or about the relationship between talk and learning (described above in “Generative” Talk). In addition to these conceptual pieces, a small but growing number of studies empirically analyze teacher talk. Most of these studies investigate how teacher talk changes over time, based on the assumption that these shifts can mediate teacher learning. Very few studies empirically investigate a relationship between teacher discourse and teacher learning, and even fewer study how teacher talk and teacher learning connects to teaching practices. In this review of literature then, I included the few studies that closely investigated the relationship between teacher talk and teacher learning, but also cast a wider net to include theoretical and empirical literature that 1) analyzed teacher talk (but didn’t necessarily link it to teacher learning), 2) connected teacher learning to teacher talk (but didn’t actually analyze the discourse), or 3) connected conceptions of teacher “community” to teacher learning (assuming that the two are related). Looking across these studies, I identified six aspects of teacher talk that have been studied in terms of teacher learning: group discourse norms, expertise, positioning, stance, the use of artifacts, and facilitation. Taken together, this synthesis describes the landscape of the field’s existing literature around teachers’ conversations in professional development settings and their relationship to teacher learning. As noted above, the teacher education literature has historically focused on individual learning. Because individual learning plays an important role in group learning (as described above), studies of both individual and group learning are included in this review.
Discourse Norms

As described in Chapter 1, there exists a growing consensus within the professional development literature that in order for conversations around practice to support transformative teacher learning, teachers must learn to engage in inquiry-oriented discourse (Ball & Cohen, 1999; Grossman, Wineburg & Woolworth, 2001; Borko, 2004; McLaughlin & Talbert, 2006; Nelson, Deuel, Slavit & Kennedy, 2010; Little, 2012; van Es, 2012). Specifically, conversations around practice should aim to make that practice public and transparent. Representations of practice should be offered and treated as objects of inquiry, rather than as assumed exemplars. Teachers should pose questions to one another that probe rationales and seek evidence for claims about student learning. Likewise, teachers must be willing to offer alternative claims, evidence and rationales (as opposed to only support and praise). However, such discourse practices are in conflict with the norms of privacy, autonomy and non-interference that are common in schools and professional development settings (Hargreaves, 2001; Talbert, 2006).

Researchers generally report that teacher groups have a difficult time learning to engage in inquiry-oriented discourse practices, especially when groups first begin to work together. That being said, a small but growing number of studies have investigated how teacher groups learned to enact new discourse norms that are thought to support teacher learning. In these studies, researchers commonly find that depersonalizing the focus of the conversations can support productive discourse norms.

As in most studies of teacher conversations, Pfeiffer and Featherstone (1997) found that the teachers in a learning group were initially hesitant to publicly disagree with one another. However, they found that watching videos of an “expert” teacher who was not a participant in the group served as a catalyst for learning to publicly disagree by providing a distant, external context for the conversation. The teachers first began to disagree with the expert’s teaching (in her
absence). Next they began to disagree with each other about the expert’s teaching (in her absence). Then they began to disagree with each other about “the possible future practices of a teacher present.” Eventually they learned to disagree with each other about “the actual practice of a teacher present” (Pfeiffer and Featherstone, 1997, p. 33). While disagreement within a group doesn’t guarantee teacher learning, these authors found that as the group learned to engage in more critical discourse, they began to apply those same norms to their students’ mathematical discourse in their own classrooms, representing an important (albeit beginning) shift in their teaching practices and in their conceptions of what it means to teach math.

Across the professional development literature, researchers report that pressing and questioning one’s peers are the most challenging discourse norms for teacher groups to learn to enact (Arya, Christ, Chiu, 2014; Borko, Koellner & Jacobs, 2014; van Es, 2012; Timperley, 2009; Earl, 2009). These findings come as no surprise given the long-standing school culture of privacy and noninterference (Talbert, 2009). A few studies however, have reported success in developing productive discourse norms. van Es (2012) found that a group of elementary teachers in a Video Club were eventually high-functioning in terms of raising questions and pressing one another to explain and elaborate their thinking, but only after the group had become comfortable with one another, developing collegial relationships. Furthermore, she conjectures that centering the focus of the group on analyzing student thinking (as opposed to teacher behaviors) may have served as a catalyst for helping the group to adopt norms of pressing and probing. These findings are similar to Pfeiffer and Featherstone’s findings that depersonalizing the focus of the conversations can support productive discourse norms. Both of these studies point to the importance of facilitation choices in developing non-traditional discourse norms (discussed below).
Expertise

In any learning group, participants are likely to have differing degrees and types of expertise. This expertise can serve as a resource to support teacher learning. As Little (2012) argues succinctly, “various kinds of expertise matter” (p. 151). Participants in learning groups may draw on: expertise based on theoretical knowledge about learning and teaching, practical expertise based on experience teaching in a particular context, or facilitation expertise, to name a few. To date, very few studies have specifically focused on the construct of expertise as a mediating feature of teacher learning. In one notable study, Horn and Kane (2015) characterized three groups of teachers’ expertise with ambitious math teaching practices using “observational rubrics designed by the project’s coach and facilitator” (p. 383). Using discourse analysis, they also characterized the kinds of opportunities to learn (OTLs) that were generated in each group’s unfacilitated conversations, specifically, “how epistemic claims and representations worked in the context of [the group’s] sense making” about student learning in math. Horn and Kane (2015) found that “teacher groups whose active participants demonstrated the greatest facility with ambitious instruction also had the richest conversational OTLs” (p. 373). They attribute this association to the groups’ accumulated advantage. That is, teachers with “advantageous prior experiences are able to leverage new learning events more effectively” (p. 380). They explain this association:

Because collaborative work in teaching involves problem posing and the articulation of practice, teachers’ conceptions get built into the framing and discussion of pedagogical problems. Accomplished teachers are thus positioned to learn more from talking with colleagues. (p. 373).

This study points to the limitations of (unfacilitated) teacher collaboration, when those teachers have not yet achieved a particular degree of expertise. They argue that teacher collaborations may
afford more learning opportunities when they are facilitated by an instructional coach or professional development provider who has achieved a greater degree of expertise with the teaching practices that serve as the group’s focus. The impact of facilitation on group conversations and teacher learning are discussed in the “Facilitation” section below.

Positioning

A few studies have used positioning as a framework for understanding the powerful ways that group interactions can mediate teacher learning. Positioning refers to “the assignment of fluid ‘parts’ or ‘roles’ to speakers in the discursive construction of personal stories that make a person’s actions intelligible and relatively determinate as social acts,” (van Langenhove & Harré, 1999, p. 17). These studies have focused specifically on positioning in terms of expertise and group affiliation. While expertise can serve as a resource for teacher learning (as described above), these studies found that it can also constrain teacher learning when used to statically position teachers with varying degrees of expertise within the same group.

In one study of positioning and teacher learning, Glazier (2009) investigated a group of teachers consisting of one African-American teacher and four white teachers who were examining multicultural literature for its potential use in the classroom. The African-American teacher regularly positioned himself as the group’s “cultural expert” by using particular prosodic and paralinguistic cues, and by interpreting the lived experiences of people of color, speaking with authority and certainty. The other group members affirmed his position by acknowledging his interpretations as valid, by deferring to him to provide those interpretations for the group, and by not pushing back on his interpretations, while still pushing back on the other (white) teachers’ interpretations. The author found that although the African-American teacher’s storyline “informed the group of otherwise white teachers, his position as cultural ‘expert’ limited his and
his colleagues’ ability to reposition themselves” (p. 826). That is, although some participants developed a new awareness of their white, middle class, American privilege and its impact on their beliefs and practices, Glazier argued that the static positioning of this particular participant constrained learning, both for the “expert” and his colleagues. She explained, “[the expert] cannot be a learner, and his colleagues can only learn what he provides in his storyline. This context becomes a place in which questioning is not necessarily okay” (Glazier, 2009, p. 833).

In Adamson and Walker’s (2011) study of a learning group of English as a foreign language (EFL) teachers and a professor of EFL learning, tensions arose when the teachers in the group felt that the professor was positioning herself as a content expert, while positioning the teachers as novices. In response, the teachers shifted the language of the discussion from English (the professor’s native language) to Cantonese (the teachers’ native language), thereby repositioning the professor as an outsider, as her mastery of Cantonese was not as proficient as the teachers’. This static positioning constrained her ability to contribute to or learn from the group. While the teachers did report developments in their own pedagogical knowledge, the professor expressed disappointment in the teachers’ limited subject-related learning, which she attributed to the way she was positioned in the group.

Elliott and colleagues’ (2009) study of a group of elementary and middle school teacher leaders who were learning to facilitate teacher learning groups around math reported that static positioning according to perceived degree of expertise both constrained and afforded learning in the group in different ways. The teachers tended to position themselves and each other as more- or less expert around teaching math, generally positioning the middle school teachers as more expert than the elementary teachers. Like the studies described above, these researchers found that this static positioning constrained learning when elementary teachers “deferred to middle school teachers and didn’t pursue appropriate mathematical ideas” (Elliott et al., 2009, p. 373). But they also found that in some instances, teachers who had positioned themselves as “not good
at math” asked “what she or he believed to be a naïve question, and got everyone to dig deeply into mathematics” (Elliot et al., 2009, p. 375). In that sense, the positioning afforded the group’s learning.

Taken together, these studies point to the inevitability of positioning within teacher learning groups, and the ways that positioning can mediate individual and group learning. Individual acts of positioning do not inherently constrain teacher groups’ opportunity to learn. For example, in each of the studies described above, positioning potentially afforded learning by allowing the group to draw on individual participants’ expertise. When individuals’ positions within a group are fluid, every member of the group has the opportunity to both learn from others and to contribute to others’ learning over time. However, when positions become static—when individuals are consistently positioned in particular ways over multiple conversations—learning can be constrained, both for individuals and the overall group. As in each of the studies described here, when particular individuals are statically positioned as more- or less expert (or “insiders” versus “outsiders”), the group may be limited to considering only particular members’ contributions, rather than legitimately taking up everyone’s contributions. This pattern of participation may support the adoption and reproduction of the group’s existing practices, but it does not necessarily support the potential evolution of those practices. While this kind of learning may be initially transformative for particular individuals, over time it is conservative in comparison to the kind of learning that takes place when the practices themselves are transformed.

**Stance**

Stance is a common construct used in the theoretical literature around teacher communities and teacher learning. Cochran-Smith & Lytle (2001) define stance as “the positions
teachers and others who work together in inquiry communities take toward knowledge and its relationships to practice, and the purposes of schooling” (p. 49-50). Stance-taking can occur both individually and by a group. For example, individual teachers’ may take stances toward their own teaching, and a group may take an overall stance toward their collective teaching. It is important to note that every individual in a group may not necessarily take the same stance as the overall group.

Cochran-Smith & Lytle (1999) endorse the construct of ‘inquiry as stance,’ in which teachers “work within inquiry communities to generate local knowledge, envision and theorize their practice, and interpret and interrogate the theory and research of others” (p. 289). In their chapter, “Toward a Practice-Based Theory of Professional Education,” Ball and Cohen (1999) also argued in favor of teachers developing an inquiry-oriented stance. Using such a stance, teacher’s conversations around practice would focus on “possibilities, methods of reasoning, alternative conjectures, and supporting evidence and arguments,” instead of “a definitiveness of answers and fixes” (p. 17). They argued that by engaging in conversations from an inquiry stance:

“teachers’ practice could be improved by acknowledging the limits of knowledge in practice, expanding teachers’ capacity to grasp the nature of these uncertainties, and improving their capacity to manage and learn from them with thoughtful analytic—that is, not purely idiosyncratic—consideration of alternatives” (p. 17)

A few empirical studies have investigated stance by examining teacher talk within various teacher learning groups. Several of these studies have developed frameworks for analyzing stance. For example, based on their longitudinal study of several groups of middle school science and math teachers who joined together to inquire into student-learning data, Nelson, Slavit and Deuel (2010, 2012) identified two dimensions of stance that characterize teacher groups: their epistemological stance toward student-learning data and their stance toward dialogic interactions. In terms of stance toward student-learning data, Nelson and colleagues
(2012) characterized group talk as lying along a proving–improving continuum. When talking with a proving stance, teacher groups attempted to “prove strengths in practice by using data to show student learning gains” (Nelson, 2012, p. 17). When talking with an improving stance, teacher groups used student-learning data to “surface limitations in classroom practices… [to] engage in a collaborative exploration of how to improve classroom practice in ways that generalize problems of practice to larger principles of teaching” (Nelson et al., 2012, p. 15). Based on their years of experience with and studies of teacher learning groups, Nelson and colleagues (2012) conjecture that teachers who adopt an improving stance are more likely to experience substantive teacher learning and changes in practices (although they do not investigate that conjecture in this study).

In terms of a teacher group’s stance toward dialogic interactions, Nelson and colleagues (2012) characterize group talk as lying along a sustained negotiation–not negotiation continuum. Teacher groups with a stance toward negotiation, “build on each other’s comments, questions, and actions,” make efforts to “elicit and understand each other’s ideas and values,” and seek to “develop common understandings grounded in experience and evidence.” (Nelson, 2012, p. 25). Furthermore, during sustained negotiation, “cognitive conflicts are surfaced and willingly explored by the group members” (Nelson, 2012, p. 25). In group talk that is characterized as not negotiation, “participants do not build on or from each other’s statements, the talk is disconnected across conversational turns” (Nelson, 2012, p. 25-26). Furthermore, “cultures of politeness and privacy shape conversations to avoid questions that probe differences in practices and values” (Nelson, 2012, p. 26). Again, this study did not explicitly investigate the relationship between negotiation and learning, but the authors conjecture that groups with a stance toward sustained negotiation are more likely to experience substantive learning than those who do not.

In a related study, Slavit, Nelson, & Deuel (2013) found a relationship between the two dimensions of stance. That is, “more improving-oriented stances toward student-learning data
reciprocated with more negotiation-based teacher interactions, whereas more proving-oriented stances reciprocated with lesser degrees of negotiation,” (Slavit, et al., 2013, p. 15). Furthermore, this study uncovered a number of features that influence teachers’ stances in conversations around student-learning data, including: goals set by administration, perceived intentions of principals, content knowledge, skills for analyzing learning outcomes, group composition and leadership. Again, this study did not set out to link stance with teacher learning but rather proceeded from the assumption that an improving stance coupled with a disposition toward negotiation supports teacher learning. This study’s attention to the features that influence teacher groups’ stances point out the fluid nature of stance. That is, stance is not a fixed trait of individuals (or groups), but instead is a fluid trait of conversations.

Drawing on the framework of Nelson and colleagues (2010), Braaten (2011) further parsed an overall inquiry stance into “four threads of stance-taking that could emerge during [science] teachers’ conversations with each other” (p. 40): stances toward science, toward student learning, toward classroom teaching, and toward socio-professional [collegial] work. In terms of stances toward science, student learning, and classroom teaching, Braaten (2011) characterized individuals’ stances, but in terms of stance toward socio-professional work, the group was the unit of analysis. She developed a continuum ranging from problematic (inquiry-oriented) to unproblematic, to characterize the stances of secondary science teachers in a year-long Video Club (Sherin, 2004) that was focused on ambitious science teaching practices. In Braaten’s (2011) study, the group’s stance toward socio-professional work became more problematic (inquiry-oriented) overall, but she found that not all individual members’ stances toward science, student learning and teaching aligned with this shift. Some participants’ stances remained consistently unproblematic, some had remained consistently problematic from the start, and others were “on the fence,” shifting back and forth between stances or plateauing somewhere between problematized and unproblematized. Of particular importance was her finding that
“those individuals who maintained an unproblematized stance towards socio-professional work - meaning that they did not participate in the norms, interactions, or purposes that came to characterize Video Club - were also the individuals whose clusters of stances towards science, student learning, and classroom teaching remained generally unproblematized” (Braaten, 2011, p. 73). Slavit’s (2013) study echoes Braaten’s (2011) findings about the fluid nature of stance.

Furthermore, Braaten (2011) points out that stance can shift in different directions over time.

Braaten’s (2011) study presents one of the only empirical attempts to investigate possible links between stance and teacher practices. By observing three of the Video Club participants in their classrooms weekly (during the same year as the Video Club), she found that the participants’ “enacted practices were consistent with their stances taken towards science, learning, and teaching during Video Club meetings” (p. 152). That is, the teacher who maintained a consistently problematic (inquiry-oriented) stance throughout the Video Club also regularly enacted ambitious science teaching practices in her classroom, including engaging her students in dialogic (rather than authoritative) modes of classroom discourse. Conversely, the teacher who maintained a consistently unproblematic stance generally used fewer ambitious science teaching practices in her classroom, and generally engaged her students in authoritative modes of classroom discourse. Interestingly, one teacher remained “on the fence,” fluctuating between different stances throughout the year, and “plateauing” somewhere between problematized and unproblematized in the middle of the school year. This same teacher did experience a shift in his teaching practices (toward more ambitious practices and dialogic modes of classroom discourse), but neither Braaten nor the teacher attributed those changes to a shift in stance. Instead, “this shift happened only when important features of [the teacher’s] local school context changed, relieving some of his pedagogical and political tensions” (Braaten, 2011, p. 149). Specifically, the teacher’s practices shifted once: 1) his students had completed the year’s standardized test and 2) his district’s science instructional coach (who was also a member of the Video Club) presented him
with an opportunity “to cast aside the typical science kit for the eighth grade chemistry unit and replace it with a new science kit” that aligned more with the ambitious science teaching practices endorsed by the Video Club (p. 149). Interestingly, once his practices shifted, his stance in video club did not necessarily reflect a similar shift. While Braaten’s study is limited to a very small sample size, it highlights: 1) the possible connections between teachers’ stances and their teaching practices, and 2) the important influence of other features (aside from stance) on practice, including conceptual, political, pedagogical and cultural tensions (Braaten, 2011). In other words, even when teachers take an inquiry stance, their actual classroom practice may not reflect that stance, due to other contextual constraints.

Taken together, these studies of stance point to the need for more research about how stance relates to teacher learning and to changes in practice. Across the literature, an inquiry stance has been long been associated with teacher learning, but Braaten’s (2011) study points to the need to better understand that relationship, including the contextual features that allow teachers who have learned to think differently about practice to actually put those changes into practice.

**Using Artifacts of Practice**

The literature around teacher learning commonly endorses the use of artifacts of practice in teachers’ professional conversations (Ball & Cohen, 1999; Little, 2002; Kazemi & Franke, 2004; Lewis, Friedkin, Baker, & Perry, 2011). Artifacts may include video of classroom teaching—from participants’ classrooms (Sherin, 2004; van Es, 2012), or from teachers who are not part of the learning group (Pfeiffer & Featherstone, 1997)—samples of student work (Kazemi & Franke, 2004), or other student-learning data (Nelson, Slavit & Deuel, 2012). Scholars argue that using artifacts in learning conversations makes classroom practice more public and
transparent (Ball & Cohen, 1999), can “shift teachers’ focus from one of general pedagogy to one that is particularly connected to their own students” (Kazemi, & Franke, 2004, p. 204), and supports the development of a common language and repertoire of practices (Kazemi & Franke, 2004; Ball & Cohen, 1999). In one notable counter-example, Horn (2010) found that teachers could productively represent their practices verbally (without artifacts), through replays and rehearsals (narrations of past or anticipated practice), but noted that these verbal representations were only productive when colleagues pressed one another for details about procedures, rationales and outcomes.

While using artifacts in conversations around practice is generally recommended, across the literature researchers report that teachers often find it difficult to use artifacts productively (van Es, 2012; Pfeiffer & Featherstone, 1997; Nelson et al, 2012; Coles, 2012; Earl, 2009; Timperley, 2009). Few teachers are familiar with the process of evidence-based inquiry into teaching and learning (Nelson et al, 2012), and as a result they tend to make comments that are general, evaluative, superficial and/or procedural (Coles, 2012; Earl, 2009; Timperley, 2009). Furthermore, Coles (2012) noticed that when teachers began conversations around artifacts with general, evaluative comments, the remainder of the group’s comments tended to follow suit. He argued that teachers’ initial remarks about artifacts of practice tend to frame the groups’ thinking about those artifacts. A few studies do report improvements with teachers’ use of artifacts over time. In van Es’s (2012) study of a Video Club, teachers were eventually able to productively analyze videos from participants’ classrooms, but only after they had established group norms for interacting with one another.

Most studies of teacher professional conversations do not explicitly attempt to investigate the relationship between teachers’ use of artifacts in conversation and instances of teacher learning. In one rare exception, Kazemi and Franke (2004) used a transformation of participation (Rogoff, 1997) framework for learning to investigate this relationship. They found that by
focusing on student work, elementary teachers learned to: 1) attend to student mathematical thinking (and value its role in teaching), 2) recognize students’ mathematical competencies, and 3) develop potential instructional trajectories in math. These shifts were supported by explicit facilitation moves (discussed below).

While these findings are promising, much more research is needed to better understand how teachers can learn to use artifacts of practice more productively. Perhaps more importantly, additional research is needed to better understand whether and how using artifacts in conversations around practice supports teacher learning and changes in teaching practices.

Facilitation

Throughout the literature, scholars argue that effective facilitation is pivotal to developing cultural norms and analytical practices that are conducive to teacher learning. They also point out that it is extremely difficult to learn how to effectively facilitate a group in order to develop these norms and practices (Lasky et al., 2009; Timperely, 2009; Elliot & Kazemi, 2009; Little, 2012; Earl & Timperley, 2009). In studies specifically focused on facilitation of group talk, facilitators used a number of common strategies to address these challenges, with varying degrees of success.

One common facilitation strategy is the use of structured discussion protocols. While many groups use them with procedural ease, Little and Curry (2009) found that protocols can both afford and constrain learning. On the one hand, they found that protocols were useful in exposing broad uncertainties and yielding individual insights. On the other hand, the teachers in the study tended to privilege the form of the protocol (following the “rules” of the protocol, adhering to time limits) over the substance of the protocol (addressing critical problems of practice), resulting in somewhat superficial examination of the shared records of practice. This
study points out that the apparent ease of a protocol’s format may mask the “conditions and resources needed for their effective use” (Little & Curry, 2009, p. 39). An effective facilitator then, would need to know why and how to make on-the-fly modifications to a protocol when a group privileges form over substance.

As a strategy for addressing teachers’ tendencies to make general, evaluative statements (e.g. “the kids are confused”), several facilitators asked teachers to first attend to specific, *descriptive* details of the record of practice, without any kinds of generalizations, assumptions or judgments before analyzing the evidence (Coles, 2012; Groschner, 2014). Coles (2012) argued that by asking the teachers to begin with specific descriptions without evaluation, they can be positioned to think in new, different ways that are more conducive to learning. Timperley (2009) used Coles’ (2012) strategy of asking teachers to first describe (rather than evaluate) artifacts, but found that the practice did not come naturally to the teacher group. She found that posing descriptive questions focused on specific aspects of the artifacts helped to scaffold the teachers’ descriptions and analyses, keeping them focused on a defined purpose.

To address the challenge of engaging teachers in the uncommon norms of questioning, pressing and challenging their colleagues, several researchers suggest that facilitators model these norms frequently (van Es et al., 2014; Elliot & Kazemi, 2009; Earl 2009). Some researchers however, did not find modeling useful in regard to the uncommon norm of challenging one’s colleagues. Using statistical discourse analysis, Arya and colleagues (2014) traced the conversational behaviors of facilitators and teachers in a group. They found that in general, facilitators’ behaviors in recent conversation turns were linked to teachers’ subsequent turn behaviors, *except* in cases of challenging. Coles (2012) argued that even more important than modeling a difficult discourse norm is ‘metacommenting,’ or explicitly drawing participants’ attention to use of the discourse norm. He speculates that “metacommenting on, being explicit about these norms… must support others taking them on” (Coles, 2012, p. 182). Other
researchers also found that explicit attention to group norms helped develop particular desired behaviors (Borko et al., 2014; Gröschner et al., 2014; Zhang 2011), although none of these studies specifically addressed the norm of “challenging.”

Other research points to facilitation strategies for mitigating the kind of static positioning that can constrain individual and group learning (discussed above). Elliot and colleagues (2009) found that asking teachers to share strategies for solving mathematical problems—but not the solutions to those problems—helped to prevent teachers who positioned themselves as “less expert” from deferring to those who they positioned as more expert. They also found that before engaging in mathematical tasks as a group, asking the teachers to examine student work on a similar task also served to position teachers as having similar degrees of expertise.

A number of recent studies have sought to identify, characterize and categorize the various ‘moves’ used by facilitators of teacher groups (van Es, Tunney, Goldsmith & Seago 2014; Gröschner, Seidel, Pehmer & Kiemer, 2014; Arya, Christ & Chiu, 2014; Zhang, Lundenberg & Eberhart, 2011; Coles, 2012). Although the authors use different terminology, and categorize the moves differently, a few themes were common among the studies. The most effective moves included contextualizing the artifact of practice, drawing or refocusing attention to the evidence found in an artifact, posing specific questions, revoicing teachers’ contributions, pressing and challenging teachers’ claims and beliefs, explicitly defining group norms, making connections, and modeling various behaviors. All of these studies demonstrate that the usefulness of each move is highly context dependent. For example, Zhang and colleagues (2011) found that questioning and revoicing moves could be either productive or disruptive, depending on the how the facilitator used them.

Taken together, these studies begin to address the need for a knowledge base regarding effective teacher group facilitation. They draw attention to the particular challenges of effective facilitation, provide some initial explanations for these challenges, and make some suggestions
for ameliorating them. This work is important and useful, yet incomplete.

Reflecting on the entire set of literature reviewed here, it is very clear that while consensus exists around the potential power of teacher groups’ conversations around practice, some unfortunate facts remain. Evidence-based, inquiry-oriented conversations are not the norm for most teacher groups. Many teachers find difficulty in engaging in inquiry-oriented discourse norms, and few teachers are experienced or skilled at interpreting artifacts of practice in ways that inform their teaching. Furthermore, learning to facilitate groups to engage in evidence-based inquiry is equally challenging. Perhaps most troubling is our lack of understanding about how engaging in evidence-based, inquiry-oriented conversations supports teacher learning. While the field of teacher educators have begun to make sense of these issues, much additional research is needed.

Chapter Conclusion

In this chapter, I have articulated the conceptual and theoretical framework I used in the study, posed the specific research questions that guided the study, and reviewed the existing literature relevant to conversations around practice as a form of professional development. That review points to the need for more research around the relationship between teacher talk and teacher learning. This study makes a first step toward addressing that gap in the literature. In the next chapter, I describe the methodological framework and specific methods used in the study.
Chapter 3

Methods

This chapter describes the methodological framework and specific methods I used to generate and analyze data in this study. Because research questions always drive the entire design process, this chapter begins by articulating those questions. Next, I describe and justify the methodological framework and researcher perspective that informed my design choices. Then, I describe the specific context of the study (including the setting and participants) and the methods I used to generate and analyze data. This chapter concludes with a discussion of ethical considerations, and methods of establishing trustworthiness.

Research Questions

The following research questions guided the study:

How do conversations around practice mediate a teacher learning group’s opportunities to learn about teaching?

a) Which designed and spontaneous features of the group’s conversations around practice accounted for differences in the generative nature of those conversations?

b) How did those features mediate the generative nature of the group’s talk?

Methodological Framework

Case study
This inquiry can be broadly described as a qualitative, interpretive, single case study. Yin (2009) defines case study as “an empirical inquiry that investigates a contemporary phenomenon in-depth and within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident” (p.18). Case study is an appropriate design for this inquiry because the group’s interaction is inseparably embedded within its unique context. That is, the conversations of this group cannot be understood without also understanding the context within which they were constructed.

In case study research, a ‘case’ is a bound system (Creswell, 2012). That is, “a unit, entity, or phenomenon with defined boundaries that the researcher can demarcate” (Merriam, 1998, p. 27). Briefly, this case can be demarcated as a group of educators (middle school teachers from the same district, their district science department coordinator, and a university professor) learning to work together in a new way over the course of one school year. The phenomenon under study within this case is the group’s conversation, and more specifically the discourse practices in which they engaged.

Merriam (1988) identifies various types of case studies: sociologic, psychological, historical and ethnographic. Ethnographic case studies are particularly interested in providing a cultural interpretation of a phenomenon. While this study is not a strict ethnography, I use ethnographic methods (Wolcott, 1985) to generate data for the purpose of understanding the ways in which the group’s conversation mediated its opportunity to learn about teaching. More specifically, I drew on the traditions of ethnographic microanalysis of interaction (Erickson, 1992), commonly referred to as ‘microethnography.’

**Microethnography**

Microethnography can be described as “a close study of interaction through
ethnographically oriented analysis of audiovisual records” (Erickson, 1992, p. 202). Like all ethnographic studies, microethnography seeks to provide a cultural interpretation of a phenomenon, and uses the data generation methods of participant observation and interviews to construct those cultural interpretations. In microethnography, the phenomenon of interest is interaction. Like all educational ethnographies, educational microethnography more specifically seeks to identify and describe local processes that produce outcomes in educational settings. However, microethnography has three additional aims:

1. to document those processes in even greater detail and precision than is possible with ordinary participant observation and interviewing
2. to test carefully the validity of characterizations of intent and meaning that more general ethnography may claim for the participants who are studied
3. to identify how routine processes of interaction are organized, in contrast to describing what interaction occurs (Erickson, 1992, p. 204)

Furthermore, microethnography is particularly appropriate when:

1. the distinctive shape and character of events unfolds moment by moment during which it is important to have accurate information on the speech and nonverbal behavior of particular participants in the scene.
2. one wishes to identify subtle nuances of meaning that occur in speech and nonverbal action-subtleties that may be shifting over the course of activity that takes place.
3. one wishes to reproduce an exemplary practice
4. one wants to change an existing educational practice, in attempting to change interaction patterns (Erickson, 1992, p. 205).

Microethnography then, is an appropriate approach to support the case study because I aimed to construct in fine detail, a description of the face-to-face interaction of a group of educators.
working together in a novel context. In addition, I sought to construct an explanation of how that interaction (conversation) mediated the group’s learning opportunities, within the particular cultural context of this group of educators.

**Role of the researcher**

Spradley (1980) described six types of participation in which a researcher may engage, which is related to his or her degree of involvement. These types range from nonparticipation (no involvement, such as an ethnographic study of television shows) at one end of the spectrum, to passive participation (low involvement), through moderate, active and complete participation (the highest degree of involvement, such as a study of a culture in which the researcher is already a member). During the monthly group meetings (See “Context” below), I engaged in the group as a passive participant observer. Specifically, I was present at the meetings, I listened to, watched, and took notes about the interactions of the group, but I did not speak during the meetings or attempt to engage in any kind of interaction with the participants. I made this choice for two reasons. First, I wanted to influence the interactions of the group as little as possible. Of course, my mere presence in the room (along with the video cameras and the participants’ knowledge that I was studying them) undoubtedly impacted the group’s interaction to some degree (which qualifies my participation as passive rather than nonparticipation). But I hoped to minimize that impact by remaining silent. Second, remaining silent helped me to avoid overload of too many inputs at one time. My silence created a space in which I was able to generate better ‘big picture’ observations than if I had engaged closely with the participants during the group meetings.

Although I did not speak during the group interviews, I conducted ethnographic, video-elicitation interviews throughout the year (See “Data Sources and Collection Methods” below). In this role, my participation can be characterized as “moderate” (rather than passive), because
watching video of the group and answering questions about the group’s interactions likely had some effect on individuals’ behaviors in subsequent group meetings. I hoped to reduce the impact of my interviews by asking participants very open-ended questions about what they saw happening in the video (e.g. “Tell me what you see happening in this clip”), and avoiding any indication of judgment, be it positive or negative.

**Researcher’s Perspective**

Peshkin (1988) argues that researchers should “systematically seek out their subjectivity… [so that they may] be aware of how their subjectivity may be shaping their inquiry and its outcomes” (p. 17). Seeking out my own subjectivity includes articulating those experiences and qualities that may help me to powerfully interpret the conversations of teachers in professional development groups, as well as the experiences and qualities that could skew that interpretation. In reflecting on my personal and professional history, I have identified four experiences that I believe are likely to shape my thinking in this study, all of which relate to my own attempts to understand the conversations of various teacher groups with whom I have worked.

The first experience relevant to this study occurred during my first teaching job, in which I was a member of a first grade team of five teachers. We were known as the most ‘cohesive’ team in the school, meeting weekly to share resources and plan together. As first grade teachers, the team understandably focused largely on our literacy instruction, but I was disappointed in the team’s lack of interest in our science teaching. At the time, I felt enormous pressure to ‘do what everyone else was doing,’ despite feeling that our science teaching was completely inadequate. As a novice teacher I was not comfortable suggesting radical changes to our teaching, despite feeling desperate to put the constructivist principles I learned as a preservice
teacher into practice. In the third year of teaching on this team, I began considering a switch to middle school, where I could focus exclusively on teaching science. In the interim, I transferred to fifth grade, a team known for being highly individually autonomous. In light of the fact that the school had not yet adopted new curricula to meet the newly adopted state standards, my principal gave me free reign to teach science however I deemed best. Although I met with my new team regularly, and we shared resources and ideas, we were essentially each doing our own thing.

Reflecting back on this experience, several questions haunt me. Why did I translate the support and ‘cohesiveness’ of my first grade team into feelings of pressure to conform? What would have happened if I suggested changes to our science teaching, or enacted those changes regardless of my team’s willingness to do the same? When I became a member of the fifth grade team, why did I succumb to those new cultural norms, maintaining a high level of isolation and autonomy instead of inviting more collaboration? In both teams, my desire to adopt the cultural norms of this team hindered my willingness to attempt to adapt those norms. In this case, I learned by adopting the community’s practices, but because I refused any attempts to adapt those practices, I hindered the evolution of our community’s practices and the team’s opportunity to learn.

A second experience that shapes my perspective in this study occurred during my second teaching job, as an eighth grade science teacher in a different district than my elementary experience. In this new school I was welcomed by an eighth grade team of two women who highly valued direct instruction and strict adherence to the district-adopted textbook. Initially we tried to make our classes very similar. Attempting to avoid the mistake I made with my previous team, I decided to speak up about some troubling aspects of our teaching. For example, based on my reading of the National Science Education Standards (National Research Council, 1996), I suggested that our sequence of teaching the microscopic atomic structure of elements at the beginning of our chemistry instruction, followed by the macroscopic properties of matter later was developmentally inappropriate for learners of this age. Eventually I found myself called into
my principal’s office with one of my teammates, while the other was too upset with me to attend. I learned very quickly that this team’s cultural norms welcomed ‘sharing’ but prohibited any kind of challenge, and included a strong avoidance of confrontation. In response, we all agreed to disagree and began to teach in individually autonomous ways, a decision supported by our principal. While I was relieved that I could teach in the ways I felt were best for my students, once again I longed for a group of colleagues with whom I could develop my teaching practices. After nine years in that job, I decided to leave the classroom before the ‘plateau’ that I was experiencing evolved into complete teacher burnout. Reflecting back on this team I am amazed at how quickly we abandoned our attempts at collaboration. Like my previous teams, there did not seem to exist a happy medium between isolation and conformity. Were my teammates offended by my challenges because I violated traditional teacher norms of autonomy, or the norms of that particular group? Whatever the reason, by politely agreeing to disagree and returning to isolation and autonomy, we all missed a potential opportunity to learn with and from one another.

A third experience relevant to this study is my participation in the greater faculty of the middle school where I worked. Although I did not form a community with my eighth grade science team, I actively participated in the greater community of the school faculty. Having worked at the school for nine years, I felt comfortable enough to speak up regularly at faculty meetings, often asking pointed questions and expressing dissent. These kinds of interactions were a regular part of the faculty’s exchanges, and though they sometimes became emotionally charged, for the most part they were simply an expected part of our life as a middle school faculty. I had been part of the school long enough that my colleagues knew me well, and in the nine years that I worked at the school, my collegial behavior was never admonished. In fact, my willingness to ask “pointed” questions was frequently acknowledged by my colleagues and administrators as being useful to generating productive dialog. These experiences have led me to value frank conversations about potentially controversial subjects, because I see them not as
negative “confrontations” but instead as opportunities to rethink taken for granted assumptions about education.

The last experience that I believe impacts my thinking about this study occurred more recently, when I participated in a school-university partnership between Mountain State University and the Valley School District (both pseudonyms). When I joined the Mountain State/Valley School District partnership, I failed to recognize that the cultural norms of my new community were different than those I was used to. The community of people who work in this school-university partnership are a tight-knit group with a longstanding history of collaboration. In the weekly meetings of approximately ten university- and district-based partnership representatives, the group did engage in negotiation around particular issues, but did so less frequently and much more “gently” compared to my previous community. Furthermore, having participated in the partnership for a number of years, the members of this community had a shared historic, institutional knowledge. As a result, people posed few questions about the community’s values, practices and policies, and even fewer questions about the rationale behind those values, practices and policies. Oblivious to these norms, I posed many questions on a regular basis, often probing the rationale behind them. Being too new to the community to have established much personal or professional credibility, some of my behaviors were not well received by the group. Luckily for me, a couple of people were kind enough to take me aside and explain to me that my questions sometimes came across as “pointy”—argumentative and judgmental, rather than as an attempt to understand something that didn’t make sense to me. Over time I learned how to interact within the group’s cultural norms. In particular, I learned how to better ask questions and express dissent without offending my colleagues. Reflecting on that time, I am fascinated by the differences between the cultural norms of the school-university partnership community and those of my previous school faculty. I wonder what features shaped each community’s norms. I also wonder whether and how those norms impacted what and how each
community learned through their joint work.

These experiences both enhance and complicate my ability to interpret the events I observe. On the one hand, my experiences have taught me to be keenly observant of important aspects of a group’s cultural norms, such as positioning, the degree of authority with which individuals put forth ideas, the group’s stance toward dissent and the ways in which the group navigates conflict. On the other hand, having such emotionally charged memories of my own interactions with various teacher groups may tempt me to project my own experience onto theirs. As I chose the aspects of conversation worthy of attention in the group in this study, I strived to remain open to the fact that some of the norms I most wanted to understand may not be enacted in this group, and that the members of this group may not value the same cultural norms that I do. As well, I actively sought out other aspects to which I was not necessarily instinctively drawn. As I attempted to interpret the group’s conversations, I aimed to generate only those claims for which I had sufficient evidence, rather than ones I most ‘wanted’ to make. As I analyzed my data, I thoroughly and genuinely searched for alternative interpretations. Throughout data collection, video elicitation interviews served as a useful member-checking strategy to curb excessive bias. The fact that someone else facilitated the group also helped to reduce bias. This group was not ‘mine,’ I did not get to make the facilitation decisions, nor set the goals for the discourse practices or learning outcomes. This lack of control provided some ‘psychic space’ between me and the phenomenon, which allowed me to understand this group’s conversations in its own terms, rather than solely in mine.

In addition to experiences engaging in teacher communities, I have also had experiences as a doctoral student that have shaped my perspective as the researcher in this study. First, I have taken multiple courses in qualitative research, where I learned about the different worldviews that researchers may assume, the types of research questions that arise from each worldview, the different methodologies and methods that are appropriate for investigating these questions,
including various methods of analyzing qualitative data. In particular, a course in discourse analysis has helped me understand how to look beyond ‘what’ is said in a conversation to better understand the meaning behind the interaction. My own forays into research have also reinforced my understanding of the importance of always keeping the research question at the forefront of any study, from the design stage all the way through the analysis.

One last feature that shapes my perspective as the researcher is my experience participating in the school district in which the study takes place, and the relationships I have developed with the participants. In terms of participating in the schools district (and understanding its culture), since the Fall of 2011, I have played several different roles within the school district, including: teaching undergraduate education courses to and supervising student teachers in the district, participating as a co-learner in a professional development group for inservice teachers, collaborating with inservice teachers around science teaching, collaborating with a teacher as a co-researcher, and facilitating a study group around science teaching. In these roles I have interacted with many different preservice and inservice teachers, as well as district principals, curriculum directors and other district administrators. Through these experiences, I have come to characterize the culture of the district in a particular way, and have also come to better understand how the teachers who work in the district characterize the district’s culture. In particular, I see this district as placing a strong emphasis on reflective practice, including the commonplace practice of inquiring into one’s own teaching. I believe that emphasis stems at least in part from the longstanding partnership between the district and the local university. At the same time, I see many teachers engaging in inquiry as a process, without necessarily embracing inquiry as a disposition, a distinction that some teachers may not realize exists.

Regarding the particular participants in this study, I have come to know them in various settings. In the 2013-2014 school year, I was supervising a group of preservice teachers at West Middle School and learned from a friend that four of the school’s science teachers (Matt, Brent,
Keith and Cheri) had attended a 2013 workshop (see “Context” below), facilitated by Sam, a university faculty member with whom I had worked. I was curious to see how these teachers put the ambitious teaching practices they learned in the workshop into play in their own classrooms, and so I asked Sam to introduce me to these teachers. Matt, Brent and Keith were extremely welcoming (Cheri was on maternity leave), and all three talked very frankly with me about their victories and challenges in teaching in such an ambitious way. I came to know Sam more closely during this time as well. Although I had never enrolled in any of his courses, during the 2013-2014 school year I had several conversations with him in which we discussed the possibility of forming an ongoing learning group with these teachers, as well as the goals for this group, both in terms of teacher learning and university research. When Sam facilitated the summer workshop again in 2014, eight of the teachers who would later participate in my study attended. I attended the week-long workshop and observed the group as a moderate participant, interacting occasionally with each of the eight teachers during small group work and breaks.

Context

The teacher learning group

This study investigated a teacher learning group focused on supporting students’ explanations of scientific phenomena, composed of ten middle school science teachers from all three middle schools (East, West, Central) in the Valley School District, the district’s secondary science curriculum coordinator, and an associate professor of science education from Mountain State University, which is located in the same city as the Valley School District. The learning group formed at the beginning of the 2014-2015 school year, as a result of the teachers’ participation in one or both of two different teacher groups in previous years: 1) a Valley School
District-based group and 2) a Mountain State University-based group.

In terms of the district-based group, all 7th and 8th grade science teachers in the Valley School District were required to attend an hour-long meeting on the 4th Tuesday of month, as part of their contractual obligations, every year. This meeting was facilitated by the district’s secondary science coordinator, a rotating position among secondary science teachers in the district. Historically, the meeting served as an opportunity for the curriculum coordinator to disseminate information passed down from district administrators, to attend to any science department business, and if time allowed, for teachers to share what they were doing in their classrooms.

The university-based group was part of an NSF-funded Science Partnership grant. As part of that grant, a week-long summer workshop was offered to teachers in grade 5-8 in a number of districts. The summer workshops began in 2011 and were co-facilitated by several university-based faculty members in the sciences and science education. These workshops introduced teachers to ambitious science teaching practice, focusing heavily on supporting students’ explanations for scientific phenomena. (In this study, I refer to this kind of science teaching as “Explanation-Driven Instruction” or EDI, but this title is not shared by any member of the Science Partnership project or any participant in my study.) EDI represents a very different kind of science teaching than has been traditionally used in public schools in the United States. In a nutshell, “traditional” science teaching generally uses curricula that are organized around individual science “topics” (e.g. Motion, Forces, Energy), whereas EDI is organized around complex, real-world scientific phenomena (e.g. a lake freezing in winter, the Statue of Liberty “rusting”). On the surface, EDI and traditional science teaching can appear very similar, since they both may include lectures, hands-on investigations, group discussions, and scientific explanations. Furthermore, EDI and traditional science teaching could even contain the exact same hands-on investigations and scientific explanations. The major difference between these two
approaches to science teaching is the way that the investigations are framed in the talk with the students. In traditional science teaching, teachers are responsible (to varying degrees) for interpreting the results of the investigations, revealing the connections between the investigations, and constructing explanations for scientific phenomena. That is, teachers provide students with explanations of scientific phenomena, or at least, teachers do the “heavy lifting” in the co-construction of these explanations in class. In EDI, students take a much more prominent role in making these connections and in constructing the explanations, with the support of their teacher.

In 2011 and 2012, one teacher from the Valley School District (Brent) participated in both the district- and university-based groups. In the following school years (2011-2012, 2012-2013), Brent tried out some of the ideas he learned in the workshop, and talked with his colleagues at his school (West Middle School) about what he was learning and trying in his class. In 2013, Brent’s West colleagues Cheri, Matt and Keith attended the summer workshop with Brent, and collaborated around what they had learned all throughout the 2013-2014 school year. (Cheri was on maternity leave that year, but stayed in communication with her West colleagues about the new things they were trying). During that year’s monthly district-mandated science department meetings (described above), Brent, Matt and Keith talked to their colleagues from the other middle schools about what they were trying in their classrooms. As a result of these intra- and inter-school conversations, along with the encouragement of the district science coordinator, nine middle school teachers from the district attended the 2014 workshop, including all five West teachers (Brent, Matt, Keith, Cheri and Sean), two of the four East Middle School teachers (Brandon and Jill) and the one Central Middle School teacher (Jessica).

At the end of the 2014 workshop, some of the Valley School District teachers talked with one of the co-facilitators of the workshop (Sam) about continuing their learning together during the 2014-2015 school year. With the support of the district science coordinator (Tim), Sam invited all of the 7th and 8th grade science teachers from the Valley School District—even those
who had never attended his summer workshops—to attend meeting in August 2014 to explore opportunities for learning together during the school year. All of the teachers either: 1) attended that August 2014 meeting, or 2) indicated that they were interested in participating in some kind of learning group around EDI (but were unable to attend the meeting). At that meeting, Sam, Tim and the teachers in attendance agreed that they would use the contractually-mandated district monthly meetings to continue learning about EDI. Tim also offered Sam the opportunity to facilitate one or more of the three half-day district inservice workshops during the year for this purpose. Figure 3-1 summarizes relevant demographic data for each member of the learning group. The red numbers in Figure 3-1 represent the number of times each participant had attended the summer workshops prior to August 2014, when my study began.
Across the school year (2014-2015), the group met eleven times, for a total of approximately 22 hours (see Figure 3-2). The four monthly meetings occurred after school, rotating between West and East Middle Schools. (Many of the monthly meetings were cancelled due to snow days, school holidays or other conflicts.) The three inservice workshops occurred during the day (school was not in session), and rotated between the middle schools and Valley High School. The two planning sessions for the “Studio Days” (defined below) occurred during the day (the 7th grade teachers were given a half-day release and they met off campus; the West 8 teachers used their common planning period). The Studio Days occurred during the day (teachers were given a full-day release). Note that across the eleven meetings, different people acted as facilitators. When Sam was not available to facilitate a monthly meeting or an inservice, Tim facilitated the meetings. Sam was not available to co-plan with the teachers for the Studio Day, so the teachers facilitated themselves during those meetings (no one person assumed the role of facilitator). The Studio Days were not contractually mandated, thus not all teachers attended the planning session and/or the Studio Day itself.

<table>
<thead>
<tr>
<th>Date</th>
<th>Meeting type</th>
<th>Facilitator</th>
<th>Hours</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>09/24/14</td>
<td>Monthly meeting</td>
<td>Sam</td>
<td>1</td>
<td>East MS</td>
</tr>
<tr>
<td>10/28/14</td>
<td>Monthly meeting</td>
<td>Sam</td>
<td>1</td>
<td>West MS</td>
</tr>
<tr>
<td>10/31/14</td>
<td>Inservice</td>
<td>Sam</td>
<td>3</td>
<td>Valley HS</td>
</tr>
<tr>
<td>11/26/14</td>
<td>Inservice</td>
<td>Tim</td>
<td>1.5</td>
<td>East MS</td>
</tr>
<tr>
<td>02/24/15</td>
<td>Monthly meeting</td>
<td>Tim</td>
<td>1</td>
<td>West MS</td>
</tr>
<tr>
<td>03/11/15</td>
<td>Inservice</td>
<td>Sam</td>
<td>3</td>
<td>Valley HS</td>
</tr>
<tr>
<td>04/28/15</td>
<td>Monthly meeting</td>
<td>Tim</td>
<td>1</td>
<td>East MS</td>
</tr>
<tr>
<td>05/04/15</td>
<td>Planning for 8th grade Studio Day</td>
<td>West 8 teachers</td>
<td>0.75</td>
<td>West MS</td>
</tr>
<tr>
<td>05/05/15</td>
<td>8th grade Studio Day</td>
<td>Sam</td>
<td>3.5</td>
<td>West MS</td>
</tr>
<tr>
<td>05/06/15</td>
<td>Planning for 7th grade Studio Day</td>
<td>7th grade teachers</td>
<td>2.75</td>
<td>Off campus</td>
</tr>
<tr>
<td>05/14/15</td>
<td>7th grade Studio Day</td>
<td>Sam</td>
<td>3.5</td>
<td>West MS</td>
</tr>
</tbody>
</table>

A “Studio Day” is a contemporary professional development context similar to Lesson
Study (Lewis, 2002), but in a shorter period of time. Studio Days may take different forms, depending on who is designing and participating in them, but in this study, the Studio Day events took place as follows. First, a grade-level group co-planned a lesson. Then, one member of the group (the “volunteer teacher”) taught the lesson to his or her students in his or her own classroom while the other members observed, in person. Following the lesson, the group reflected on the lesson (when students were not present) and revised it for a second iteration. The volunteer teacher then taught the lesson a second time. The cycle repeated throughout the day, for a total of five iterations of the lesson. Depending on the volunteer teacher’s class schedule, some iterations were not separated by periods of reflection and revision. An example of a Studio Day schedule can be found in Figure 3-3. (Note: AREA stands for Academic Remediation and Enrichment Activities)

<table>
<thead>
<tr>
<th>Period</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeroom</td>
<td>Teachers explain lesson plan to Sam</td>
</tr>
<tr>
<td>1</td>
<td>Finalize lesson plan</td>
</tr>
<tr>
<td>2</td>
<td>Teach lesson: Iteration 1</td>
</tr>
<tr>
<td>3</td>
<td>Reflect on lesson plan</td>
</tr>
<tr>
<td>4</td>
<td>Revise lesson plan</td>
</tr>
<tr>
<td>5</td>
<td>Teach lesson: Iteration 2</td>
</tr>
<tr>
<td>6</td>
<td>Teach lesson: Iteration 3</td>
</tr>
<tr>
<td>Lunch</td>
<td>Reflect on and revise lesson plan</td>
</tr>
<tr>
<td>7</td>
<td>Teach lesson: Iteration 4</td>
</tr>
<tr>
<td>8</td>
<td>Teach lesson: Iteration 5</td>
</tr>
<tr>
<td>AREA</td>
<td>Reflect on lesson</td>
</tr>
</tbody>
</table>

*Figure 3-3. Schedule for 8th grade Studio Day*

**Data Sources and Collection Methods**

Drawing on traditions of ethnography (and microethnography in particular), I generated data by recording video and audio of all group meetings, interviewing group members (including the university faculty member and the district coordinator) and by keeping field notes based on my engagement in the group as a passive participant observer. I collected this data over the
course of ten months, from September 2014 to June 2015.

**Video/audio recordings of group meetings**

Video and audio recordings of the group’s conversations provided the primary data source in this study. At each meeting, I recorded audio and video using one camera on a tripod, which I placed far enough away from the group to capture all participants in the frame. I moved the camera as necessary when the group’s configuration in the room changed. I recorded additional audio using one or two audio recorders, which I placed close to the participants. Following each group meeting, I updated a video log in which I recorded the date, meeting type, facilitator, location, participants and meeting topics. That log is found in Appendix A.

**Interviews**

In order to better understand the meanings behind the discourse practices of this group, I also conducted semi-structured interviews throughout the year. Interviews ranged in length from fifteen minutes to forty-five minutes. Early in the school year, I conducted ethnographic interviews focused on participants’ histories, including their experiences with professional development and with the other members of the group, as well as their reasons for joining and their expectations for participating in the group.

Throughout the year, I conducted interviews to help me understand the dynamics of the group’s meetings. As part of these interviews, I used some sort of “stimulus” to elicit participants’ interpretations: a video clip, transcript excerpt, and/or event map (see “Methods of Data Analysis,” below) from a previous meeting. To prepare these stimuli, I identified instances of conversation that I wanted to know more about, from the perspective of the participants. Often,
these instances included participants engaging in some of the less common discourse norms such as “pushing back.” I prepared a video clip and/or transcript excerpt to show a participant. (When I was interested in a participant’s interpretation of the overall meeting, I also used the basic event map as in Figure 3-4.) Based on these stimuli, I wrote very open-ended questions to pose to the participants. For example, in the September 24 meeting, Tim engaged in the practice of “pushing back,” by opposing a claim made by Sam (the facilitator). In response to this instance, I wrote the question: “Tell me about what’s happening in this clip.” I also prepared follow-up questions to ask Tim in case his response did not address the specific aspects of the instance that interested me, such as “Can you tell me a little about how you decided to say that?” I tried to phrase these questions as open-ended and judgment-free as possible. A sample interview transcript excerpt is found in Appendix B.

In the final interview of each participant, I posed questions about the last meeting that the participant attended, and about that participant’s experiences across the year. Except for the very first and last interviews, I did not interview every person after every meeting. Furthermore, I did not always show each person that I interviewed the same video clips or ask the same questions. Each interview was carefully constructed with the goal of understanding particular instances, from the points of view of those involved. A log of interviews is found in Appendix C.

Field Notes

During the group meetings I engaged as a passive participant observer (See “Role of the researcher,” below), during which I took field notes (typed). In these “raw” field notes I wrote stream of consciousness, moment-to-moment observations, along with some ‘big picture’ descriptions and interpretations of the dynamics and topics of the conversation, approximately 1-2 single-spaced pages in length for each meeting. After each meeting, I reviewed the video and
added additional observations to the field notes, usually another 1-2 pages. As part of my ongoing analyses, I then used these “raw” field notes to write more detailed observations and structured interpretations (“cooked notes”) in order to achieve a “thick description” (Geertz, 1973). An example of “raw” and “cooked” field notes can be found in Appendix D.

**Methods of Analyzing Data**

Drawing on Spradley’s (1980) Ethnographic Research Cycle, I generated and analyzed data concurrently and recursively throughout fieldwork and writing. My overall process is represented in Figure 3-2. As a result of engaging this process over time, my research questions evolved, as did the ways in which I analyzed my data. In the following sections, I describe the four phases of analysis that allowed me to construct an explanation of how the group’s conversations around practice mediated its opportunity to learn. To make sense of the group meeting data, I drew on traditions of Discourse Analysis (DA). There are many variations of discourse analysis, but all DA approaches attempt to make sense of language in use (Strauss & Feiz, 2014). My approach to DA focuses on sociocultural aspects of the group’s discourse, rather than on linguistic features. Because this study seeks to understand how various sociocultural aspects of conversation mediate the group’s opportunity to learn, DA is appropriate for this study.
Phase One: Initial Analysis

Following each meeting, I began my analysis by identifying the major phases of activity and the shifts between them. Phases generally focused on a particular topic, and a change in that topic indicated a shift to a new phase. I used StudioCode© software to facilitate this analysis. Figure 3-3 contains a screen shot of a StudioCode© “timeline” for the conversation that occurred during Periods 1 and 2 of the May 14, 2015 7th grade Studio Day. In this particular conversation spanning approximately one hour and ten minutes, I identified eight separate topics within the overall conversation.
Using the timeline, I created an event map (Kelly, 2004; Brown & Spang, 2008; Kelly & Chen, 1999) to represent the different phases of activity in text form. An event map is an analytical structure used to identify the major and minor events within a data set. Event maps serve as “representations of the phases of activity constructed by participants as they work to accomplish their collective and personal goals” (Kelly, 2004, p. 2).

The first event maps were quite basic, containing just the general topic of each phase, and the times of the shifts between them. Once I had listed each phase, I then identified (in bold) the phases in which the group talked specifically about some aspect of science teaching practice. An example of this kind of event map, from the May 5, 2015 8th grade Studio Day (Periods 3-4) is contained in Figure 3-6.
Figure 3-6. Basic event map from the May 5, 2015 8th grade Studio Day (Periods 3-4).

Once I identified the phases of conversation that centered around practice (in bold on the event map), I then created a transcript of those phases, using Microsoft Excel (See Figure 3-7 for an excerpt from the transcript of the September 24, 2014 meeting.) In the transcript I included the line number, phase start times, speakers’ names, verbatim speech (and any relevant non-verbal data such as gestures), and phase topics. Within each phase of activity, I then identified smaller sequence units, or “cohesive thematically-tied interactions” (Kelly & Chen, 1999, p. 892). On the transcript, I indicated the shifts between each sequence unit and named each sequence (Column E in Figure 3-5.)
Next, I began line-by-line coding. Originally, my research question focused somewhat narrowly on the group’s discourse practices. Drawing on my literature-based conceptual framework, I generated twelve “top-down” basic codes, for various discourse practices. Those codes are contained in Figure 3-8. (Note some examples of those codes in use in Figure 3-7, Column F.)
As I coded my data, I also identified instances of conversation that I wanted to know more about, from the perspective of the participants. As described in the “Data Sources and Collection Methods” above, these instances often included participants engaging in some of the less common inquiry-oriented norms such as “pushing back.” To learn more about these instances, I prepared some sort of stimulus, depending on the length of the instance (video clip, transcript excerpt, or event map), and asked participants very open ended questions about them. (See “Data Sources and Collection Methods” above for more details about these interviews)

Like the group meetings, each interview served as a discourse event in which participants engaged in various discourse practices. However, because the interviews served as means of triangulating data, I was interested in the content of what the participants said, rather than the ways in which they used language in the interview. Therefore, I did not use the same techniques of discourse analysis that I used with the video recordings of group meetings to interpret the interviews. Instead, I drew on traditions of qualitative thematic analysis (Braun & Clark, 2006). In addition, because my study attempts to explain a social process, I also drew on

<table>
<thead>
<tr>
<th>Traditional Communities</th>
<th>Inquiry Communities</th>
</tr>
</thead>
<tbody>
<tr>
<td>TechQ</td>
<td>RatQ</td>
</tr>
<tr>
<td>Cert</td>
<td>Tent</td>
</tr>
<tr>
<td>Affirm</td>
<td>Oppose</td>
</tr>
<tr>
<td>Deny</td>
<td>Diff</td>
</tr>
<tr>
<td>Exemp</td>
<td>Scrutin</td>
</tr>
<tr>
<td>Story</td>
<td>Data</td>
</tr>
<tr>
<td>Disco</td>
<td>Connect</td>
</tr>
</tbody>
</table>

Asking technical and clarifying questions
Speaking with certainty, authority
Offering supportive claims, evidence and rationales/Affirming
Denying differences, characterizing differences as variations of the dominant view
Using evidence as exemplars
Attending to broad issues through stories of classroom practice
Conversational turns are disconnected, dominated by more experienced members
Asking questions that probe rationale, seek evidence
Speaking tentatively, inviting dialogue
Offering alternative claims, evidence, and rationales (pushing back)/Opposing
Acknowledging and using differences in perspectives productively
Using evidence as object of scrutiny
Attending to specific data from records of practices
Conversational turns build on one another, distributed among speakers

Figure 3-8. Original codes for discourse practices.

As I coded my data, I also identified instances of conversation that I wanted to know more about, from the perspective of the participants. As described in the “Data Sources and Collection Methods” above, these instances often included participants engaging in some of the less common inquiry-oriented norms such as “pushing back.” To learn more about these instances, I prepared some sort of stimulus, depending on the length of the instance (video clip, transcript excerpt, or event map), and asked participants very open ended questions about them. (See “Data Sources and Collection Methods” above for more details about these interviews)

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traditions of grounded theory analysis (Charmaz, 2006; Glaser & Strauss, 1967) to analyze the
interviews.

Appendix E contains an excerpt of a transcribed interview, and demonstrates the analysis
process I describe in this section. First, I transcribed the interview, and highlighted any words or
phrases in the transcript that seemed relevant to answering my research questions. For example, I
highlighted “Matt did know it.” Based on the advice of Charmaz (2006), I then generated an
initial code for each highlighted phrase, interpreting the underlying process, using gerunds that
stick very close to the participant’s actual words. For example, I coded the phrase “Matt did know
it” as “Assessing a teacher’s understanding.” (See Appendix E). Second, I clustered initial codes
that were identical or closely related, naming each cluster as a sub-category and providing a brief
explanation of its meaning (axial coding, Charmaz, 2006). For example, I created the subcategory
“Pushing Back: teacher’s level of understanding” with the explanation, “If the teacher does not
understand a concept, it may not be appropriate to push back on his idea” (See Appendix E).
Third, I clustered related subcategories, naming each cluster as a category and providing a brief
explanation of its meaning (theoretical coding, Charmaz, 2006). For example, I created the
category “Features Sam considers when deciding whether and when to “push back” on a teacher’s
idea/statement”, and included eight features that were derived from the subcategories. (See
Appendix E). Fourth, I wrote a short narrative of each category, interpreting the meaning of the
codes in that category. For example, in the category “Pushing Back,” I wrote “Sam takes into
account several features when he is deciding whether and when to “push back” on a teacher’s
idea during the PD group meetings. It is important to note that this decision making process is
spontaneous, organic and likely to be largely subconscious. These features include…” (See
Appendix E). I applied this same four-step process to each interview transcript.
After I analyzed the interviews for themes, I looked across the representations of the three data sources: 1) coded video transcripts, 2) thematically analyzed interviews, and 3) field notes. Based on my reading of these three sources, I then wrote a short interpretive memo of the overall meeting, focusing on whatever aspects of the meeting helped me to think about my research question. An example of such a memo is found in Appendix F. I completed this sequence of analytic events following each group meeting.

**Phase Two: Adding New Foci**

As the meetings continued and I engaged in the procedures described in phase one, I began to feel as though my focus on discourse practices as the sole feature of the conversation was too narrow to construct a powerful explanation of how the conversation mediated the group’s learning opportunities. Over time, I began to pay attention to a number of other features of the group’s talk. In ethnographic research, these kinds of changes are common and expected, as the researcher engages the ethnographic research cycle (Spradley, 1980, described above) all throughout data collection and analysis.

In particular, I began to pay more attention to the ways in which the talk positioned individuals in terms of perceived expertise. Specifically, I noted who was posing questions/expressing struggles versus who was providing answers/solutions. I also paid attention to the intended “receiver” of those questions, noting non-verbal aspects such as body positioning and eye gaze. That is, I noted whether questions were posed to the entire group, or to particular individuals. Furthermore, in addition to using the codes listed in Figure 3-8 to analyze the type of discourse moves in the talk, I began to pay more attention to who was using each move.

My increased attention to positioning was based partly on my own observations, but partly based on my analyses of the individual interviews. That is, issues of positioning emerged
through my analyses of several early interviews—even interviews in which I did not pose any questions intended to elicit this information. In response to this emergent theme, over time I asked participants questions intended to specifically learn more about how they positioned themselves and others in the group in relation to one another. The following excerpt from my Reflexive Journal captures this emerging shift:

I am particularly interested in what this interview means in terms of the positioning between Sam and the teachers. Cheri wants Sam to observe her classroom teaching and provide a “critique.” The fact that she used the word “critique” really struck me. To me, it implies that she positions Sam as an “expert” who could and should evaluate her performance in the classroom. In contrast, she could position him as a “co-sense maker” who has a different kind of expertise than she does. I will be sure to return to her perception of this positioning in future interviews. Also, I need to ask Sam how he ideally want to be positioned, how he thinks is actually positioned, and how he tries to position himself. (December 4, 2014)

The interviews then, served both as a tool for uncovering an unexpected theme, and as a tool to further investigate that theme. As I attended to positioning and other new features of the group’s conversations, I added new codes to my transcripts. Having widened the scope my analysis, I revised my research question to ask about the mediating features of the conversation more broadly—not just about discourse practices. (These features are explained in detail as part of my Findings.)

As I analyzed the group’s talk over time, I began to feel that the small grain size of my analysis—on individual moves—was constraining my ability to explain how the conversation mediated the group’s learning opportunities. I decided to “zoom out” to the level of the “conversational routine” as my unit of analysis. Horn and Little (2010) define a conversational routine as “the patterned and recurrent ways that conversations unfold within a social group. Routines are constituted by moves, turns of talk that shape the interaction’s progress by setting up and constraining the response of the subsequent speakers (p. 184).” They argued that in the study of teachers’ conversations, “distinctions at the level of routines are most useful in understanding opportunities to learn (p. 184).” Zooming out to this meso-level unit of analysis allowed me to tie
together multiple discourse moves and instances of positioning in a single conversational feature (the conversational routine) in a way that was more meaningful than focusing on either of these micro-level practices individually. I explain each kind of conversational routine I identified as part of my Findings (Chapter 4).

Lastly, I added codes to specifically identify aspects of more- and less-generative talk. I added four categories of codes, based on my review of the literature: transparency of practices; attention to rationales; theory-practice connections; and agency. Each of these categories is explained in detail in Chapter 2 (See “Generative Talk”). As I made each of these changes throughout the year, I went back to the beginning of the data set to update my analysis of previous meetings, using the new codes for consistency across the data corpus. As a result, I reviewed the developing data set several times, with the last pass of the data (after the school year ended) extending from the very first to very last meeting.

**Phase Three: Looking for patterns**

In the next phase, I created an event map spanning the entire school year that identified all of the conversations around practice in each meeting. To help me identify relationships among the data, I added to the event map: 1) my codes for all the potential mediating features that I observed (stance, tools, contexts, conversational routines, resources), 2) my codes for all of the aspects of more- and less generative talk. An excerpt of this event map is found in Figure 3-7.

Laying all of the coding out in this way allowed me to characterize each episode as more- or less generative in terms of learning opportunities (including episodes of “mixed” generativity). I then compared the mediating features of all the conversations within a particular category (“affording,” “constraining” or “affording and constraining”) to find the features that they generally had in common. Then I compared those sets of features across the three categories to
better understand how they differed. Based on these techniques, I identified a general set of features associated with affordances for learning, and a different set of features associated with constraints to learning. These associations are included as part of my Findings (e.g. Figure 4-2).
<table>
<thead>
<tr>
<th>Meeting Date</th>
<th>Episode &quot;name&quot;</th>
<th>Stance Improving Proving</th>
<th>Tools Reporting Artifacts</th>
<th>Contexts</th>
<th>Conversational Routines for Take-up</th>
<th>Resources Expertise</th>
<th>Contextual Theoretical Facilitation</th>
<th>More Generative Talk (Learning Afforded)</th>
<th>Less Generative Talk (Learning Constrained)</th>
</tr>
</thead>
<tbody>
<tr>
<td>09/24/14 Sept Monthly Meeting</td>
<td>It was nice today</td>
<td>P</td>
<td>R</td>
<td>Reflect</td>
<td>C</td>
<td>Trans</td>
<td>Trans</td>
<td>Connect</td>
<td>Connect</td>
</tr>
<tr>
<td></td>
<td>I got a question</td>
<td>I</td>
<td>R</td>
<td>Reflect</td>
<td>Q&amp;A</td>
<td>Trans</td>
<td>Ration</td>
<td>Connect</td>
<td>Connect</td>
</tr>
<tr>
<td></td>
<td>Mystery Powders</td>
<td>I</td>
<td>R</td>
<td>Reflect</td>
<td>Q&amp;A</td>
<td>Trans</td>
<td>Ration</td>
<td>Connect</td>
<td>Connect</td>
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<tr>
<td></td>
<td>Soap Making</td>
<td>I</td>
<td>R</td>
<td>Reflect</td>
<td>CSM</td>
<td>Opaque</td>
<td>Proc</td>
<td>Pract</td>
<td>Imbal</td>
</tr>
<tr>
<td>10/28/14 Oct monthly meeting</td>
<td>reluctant to participate</td>
<td>I</td>
<td>R</td>
<td>Reflect</td>
<td>CSM</td>
<td>Opaque</td>
<td>Proc</td>
<td>Pract</td>
<td>Imbal</td>
</tr>
<tr>
<td></td>
<td>confusing vocabulary</td>
<td>I</td>
<td>R</td>
<td>Reflect</td>
<td>CSM</td>
<td>Opaque</td>
<td>Proc</td>
<td>Pract</td>
<td>Imbal</td>
</tr>
<tr>
<td></td>
<td>Lack of Engagement</td>
<td>I</td>
<td>R</td>
<td>Reflect</td>
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Phase Four: Selecting and writing about “representative” conversations

Having analyzed all ten of the group’s meetings using the methods described above, I next selected four particular episodes to present in the Findings, in order to demonstrate the variety of ways in which context, tools, stance, resources and conversational routines interacted to mediate the generative nature of the group’s talk (Research sub-question #2). I selected these meetings purposefully, looking across the data set for examples where the mediating features constructed 1) more generative talk, 2) less generative talk, and 3) interacted in complex ways to construct some aspects of more generative talk, and other aspects of less generative talk. Only two meetings fell under the category of clearly more-generative: the 7th and 8th grade Studio Days in May. Three meetings fell under the category of clearly less-generative: the October monthly meeting, the November inservice, and the February monthly meeting. Five meetings fell under the “mixed” category: the September monthly meeting, the October and March inservice meetings, and the 7th and 8th grade Studio Day planning meetings in May. Looking closely at the features of the meetings in each category, I noticed that the ways in which the designed and spontaneous features mediated the generative nature of the group’s talk were very similar.

Although I analyzed each meeting in depth, I chose four conversations to present in the Findings, in order to prevent excessive repetition: one episode of more generative talk, one episode of less generative talk, and two episodes of “mixed” talk. Although the two “mixed” conversations come from the same meeting, the mediating features interacted in very different ways to construct the various aspects of more- and less generative talk.

My choice of the four conversations was not arbitrary. Instead, I chose the meetings that most clearly and concisely demonstrated how the conversational features mediated the group’s learning opportunities. The four conversations included in the Findings come from the May 7th grade Studio Day (more generative talk), the February monthly meeting (less generative talk), and two conversations come from the September monthly meeting (mixed talk). To support my
written explanation, I also created a visual diagram using Inspiration© to represent the complex relationships between the mediating features, and the aspects of more and less generative talk (See Figures 4-6, 4-7, 4-8, and 4-9 in Chapter 4). As described above, the interview data were particularly useful to me during the analysis phase, in terms of uncovering an unexpected theme (positioning), and as a tool to further investigate that theme. Thus, the interview data were used to identify areas for analysis. As my focus centered on how the features of the group’s talk mediated their learning opportunities, I did not include interview data in the findings chapter, as these data do not sufficiently address the overall research questions.

**Ethical considerations**

I took several ethical issues into consideration, and tried to reduce potential harm to the participants and to maintain the integrity of the research, in several ways. First, only the participants and I had access to the video recordings of group meetings, and only I had access to the interview data. I hoped that these guarantees of privacy would allow participants to feel more comfortable to speak freely, without fear of ramifications from others outside or inside the group. Second, I made every attempt to protect the identity of the participants and institutions in which they work, including the use of pseudonyms. Third, in accordance with standard research ethics, I did not reveal any information or interpretations generated through the research to any of the study’s participants, or to their colleagues and administrators. I explained to my participants that the ethical standards of research prevent me from revealing anything to others (or even to them), even if it would result in positive benefits. This ethical consideration created the one of the greatest dilemmas for me, as I had several insights along the way that I thought might prove useful to Sam or Tim, in terms of design and facilitation choices, as well as insights about positioning that I thought might prove useful to several different participants. This dilemma
forced me to choose my interview questions extremely carefully, as I wanted to have as little impact on the group’s dynamics as possible, yet still have an insider’s perspective of those dynamics.

**Trustworthiness**

In interpretive, naturalistic research, the constructs of “validity” and “reliability” that are characteristic to positivist work are better understood in terms of “trustworthiness.” Guba (1981) articulated four criteria that should be considered in determining a study’s trustworthiness: credibility, transferability, dependability and confirmability. In this section, I address each of these criteria as they apply to this study.

**Credibility**

Merriam (1998) explained that in qualitative research, credibility addresses the extent to which the findings are congruent with reality, somewhat similar to the construct of internal validity in positivist research. I attempted to promote credibility in this study using several strategies identified in Shenton’s (2004) review of the literature around trustworthiness in qualitative research.

*Adopting well-established research methods.* This study is designed within the established methodological frameworks of case study and microethnography, using methods that are characteristic of those approaches.

*Developing an early familiarity with the culture of the participating organizations.* I spent a great deal of time over the three years prior to the study in the Valley School District, in two of its three middle schools where the teacher participants work, attempting to understand the
general cultures of the district as a whole and of each individual middle school. In the year prior to the study, I visited the classrooms of three of the teacher participants and had numerous conversations with them inside and outside of class about their approaches to teaching, learning and professional development. In July 2014, I attended every session of the weeklong NSF science partnership workshop with all of the participants, listening in on their small and whole group conversations, and talking with participants during “down” times.

**Using multiple methods of data generation.** In this study, I used participant observation, conducted multiple types of interviews, and recorded audiovisual data to provide multiple perspectives and to ameliorate the limitations of each method. Furthermore, I attempted to use all of my data sources to triangulate my codes and interpretations (Creswell, 2012).

**Employing tactics to ensure honesty of informants.** As described previously, I attempted to promote my informants’ honesty by restricting access to the data, using pseudonyms, and reassuring participants of my ethical obligations to protect them.

**Engaging in negative case analysis.** Per the standards of microanalysis described by Erickson (1992), I exhaustively searched the entire data corpus to identify typical and atypical instances of interaction when developing interpretations. Furthermore, I tested my developing hypotheses about “typicality” by analyzing each conversation several times, taking different perspectives each time.

**Frequently debriefing with supporting colleagues.** Throughout the study, and especially during my analysis and writing phases, I regularly met with my dissertation co-chairs for advice and guidance, submitting several drafts of each chapter for their feedback. I also sought out the input of a group of colleagues to help me interpret a particularly complex conversation (“West 8’s Chemistry Phenomena,” analyzed in Chapter 4). I shared my interpretive codes with these colleagues, played the original group audio for them, and asked them how they would code the conversation. Their input greatly helped me make sense of that conversation.
Writing reflective commentary. In the “researcher’s perspective” section, I attempted to articulate my personal experiences and qualities that may bias my interpretation of events in this study. Per Spradley’s (1980) advice, I kept a reflexive researcher’s journal to record both “objective observations” and “subjective feelings,” (1980, p.58), in attempt to practice introspection. In the journal, I commented on my observations, hunches, wonderings and struggles, and used writing as a process of sorting out the ethical dilemmas I encountered. A sample entry from the journal is found in Appendix G.

Member checking. I used each participant interview as an opportunity to check my developing interpretation of events against the participants’ interpretations. Although I did not interview every participant after every meeting, I made sure to interview the key participants from conversations that required a higher degree of inference, when compared to my codes. The video elicitation interviews served as a particularly useful method of member checking, as participants often had different interpretations of the group dynamics than I did, or they noticed things about the video that I had not.

For example, when watching the video of the March 11, 2015 inservice, I noticed Matt’s physical body positioning (frequently placing his forehead in his hand). I interpreted this body language as frustration, and I attributed it to the somewhat tangential conversation that Sam and Kathy were having, which included a great deal of laughter. I showed the video to Matt and asked him to interpret his body language. He admitted that he was quite frustrated during the conversation, but he attributed that frustration to his own struggle to figure out his rapidly approaching physics unit that was still quite unclear to him. I pointed out the tangential conversation between Sam and Kathy, and asked him to talk about it. He described it as “light hearted” but didn’t associate it with his frustration. Finally, I asked him outright whether he was at all frustrated by the tangential conversation. His facial expression indicated surprise at my interpretation, and he insisted that his frustration was based on his own internal struggle to plan a
good physics unit, and not to anything else happening in the conversation. In that moment, I let Matt’s interpretation stand, but reflected on it later.

During that reflection, I considered the numerous times I’d witnessed Matt express frustration with his own teaching. For example, he frequently said, “I’m in the weeds, man.” During the October 31, 2014 meeting, Matt shared, “Last year when we ran out of collaboration time and I was going through this for the first year. Like, I still did a better job of teaching than I think I've done before, but like, my world went to shit pretty much like, real fast. Yeah, I need someone to talk to about this. Like, I don't know where I’m going with it. Like, I'm totally lost,” which his colleague Brent confirmed, “He gets depressed a lot.” In light of such evidence, I felt no need to question whether Matt’s expressed interpretation of the conversation was genuine.

Any time a participant’s interpretation differed from my own, I made sure to reflect on existing evidence in the data set. At no time during the study did I have reason to doubt that the participants’ expressed interpretations were not genuine.

Examining previous research findings. I have attempted to exhaustively read the literature that is in any way relevant to my study, including studies in the learning sciences, teacher education, adult education, professional development, analyses of group discourse, and organizational learning.

Providing a thick description of the phenomenon. In the Findings chapter, I used significant excerpts of conversations to demonstrate—as transparently as possible—the nuances of the interaction of this group, and supported those excerpts with descriptions from my field notes.

Transferability

Unlike positivist research, which attempts to generate claims that are generalizable across
populations, interpretive case studies in naturalistic settings appreciate the important impact of context on a phenomenon, and aim instead for findings that are transferable to some degree to similar contexts. Transferability is decided not by the researcher, but by the reader of the research, who decides whether the research context is similar enough to his or her own context to warrant the transfer of any findings (Bassey, 1981). Per the advice of Lincoln and Guba (1985) and Pitts (1994), I attempted to provide sufficient contextual information and clearly articulated the boundaries of the case so that the reader can make informed decisions about transferability.

**Dependability**

Unlike positivist research, which attempts to generate repeatable findings when conducted in identical contexts, interpretive researchers appreciate the changing nature of phenomenon under scrutiny, and instead strive for dependability. Dependability in a qualitative study means that a future researcher could repeat the study using the same methods, but would not necessarily expect the same results. In this study, I strived for methodological transparency, describing my research processes in great detail.

**Confirmability**

Interpretive research rejects the positivist construct of complete objectivity in research, and instead attempts to “ensure as far as possible that the works’ findings are the result of the experiences and ideas of the informants, rather than the characteristics and preferences of the researcher” (Shenton, 2004). In this study, I attempted to promote confirmability by articulating my own predispositions (Miles & Huberman, 1994), acknowledging the beliefs underpinning my interpretive and methodological choices, explaining my reasoning for choosing one approach
over another, admitting the weaknesses of the methods I employed, and including sufficient detail in describing my methods of data generation and analysis (Shenton, 2004).

**Chapter Summary**

In this chapter, I have described the methodological framework and specific methods I used to generate and analyze data in this study. I provided the research questions, and described and justified the methodological framework and researcher perspective that informed my design choices. I also described the specific context of the study (including the setting and participants) and the particular methods I used to generate and analyze data. Finally, I discussed the ethical considerations of the study, and the methods I used to establish trustworthiness. In the next Chapter, I present my findings, based on the methods of analysis I described in this chapter.
Chapter 4

Findings

In this chapter, I present the findings of my analyses. These findings address the central research question in this study:

How do conversations around practice mediate a teacher learning group’s opportunities to learn about teaching?

a) Which designed and spontaneous features of the group’s conversations around practice accounted for differences in the generative nature of those conversations?

b) How did those features mediate the generative nature of the group’s talk?

I address the first sub-question in the section titled “Mediating Features,” and the second sub-question in the section titled, “Mediating Learning Opportunities.”

Mediating Features

Using the methods I described in Chapter 3, I identified five features of the group’s conversations that consistently mediated the group’s learning opportunities. These features include: 1) the context in which the conversation occurred, 2) the tools that participants used to represent their practices, 3) the stance with which participants represented their practice, 4) the resources that participants drew upon while engaging in conversation, and 5) the conversational routines in which the group engaged when taking up practice. I describe the five mediating features in this section, and list them in Figure 4-1.
As the year unfolded, the group’s conversations took place in a number of different contexts. By “context” I refer to the overall goal of the conversation, and how this goal is achieved through discourse processes, regardless of the type of meeting (monthly meeting, inservice, Studio Day) within which it occurred. It is important to note that the goals were not always explicitly stated or negotiated, and even when they were, the goals sometimes evolved implicitly as the conversation unfolded. The conversations generally fell into five different kinds of contexts: reflecting on unshared practices, imagining future practice, checking in, planning shared practices, reflecting on/revising shared practices. Because multiple conversations (defined as “phases” in Chapter 3) occurred in each meeting, multiple contexts also occurred within some meetings. The type of contexts that occurred in each meeting can be found in Appendix G.

“Planning shared practices” refers to conversations in which all of the participants in the
conversation planned a single, one-period lesson that one of them would teach while the others observed. These plans were somewhat detailed in terms of procedures. This context only occurred in preparation for the May Studio Day lessons.

While “imagining future practice,” participants discussed possible future plans around a content area that they shared (e.g., “Physics”). These plans generally spanned days or weeks of instruction and did not include detailed procedures. In this context, there was no expectation that every participant in the group would necessarily put those plans into action. This context occurred prominently in the March inservice and briefly during the May planning session for the 7th grade Studio Day.

In the context of “reflecting on/revising shared practices,” participants discussed a lesson that they had all co-planned, and had observed one participant teach. Based on these observations, participants revised the procedures of the lesson. In this study, this context only occurred during the May Studio Days. As part of the Studio Day design, multiple iterations of the conversation (and the demonstration lesson) occurred in the same day.

In this study, participants “reflected on unshared practices” when they represented their individual practices, with the explicit expectation that the group would take up those practices in some way. This context is called “reflecting on unshared practices” because even when the represented practices were shared by multiple members of the group, those practices were not shared by every participant in the conversation. In this context, there was no expectation that every participant would represent his or her practice. The group reflected on unshared practices in every meeting except the February and April monthly meetings.

When “checking in,” participants took turns individually representing their practices. Although participants sometimes did take up one another’s practices in this context, there was no explicit expectation that the group would do so. During a check-in, every participant was expected to take a turn representing their practices over the course of the meeting. This context
only occurred during the February monthly meeting. The individual aspects of each type of context are represented in Appendix H.

**Tools for Representing Practice**

In every conversation, teaching practices were represented in some way. The vast majority of the time, participants used verbal narratives as a tool for representing their own practices, what Horn (2010) called “replays” and “rehearsals.” In a few instances, this narrative was supplemented with some sort of visual artifact. For example, when Jill represented the model that she imagined the students would create as part of the May 7th grade Studio Day lesson, she drew an example of an ideal model on the board. Visual artifacts can take many forms, including written lesson plans (and any accompanying data collection forms that students would use in that lesson), concept maps, video of teaching, teacher drawings, or samples of student work, just to name a few. In this study, the group used video (of a teacher who was unknown to the group) in one meeting, a sample of one student’s work in one meeting, used teacher drawings in two meetings, and created written lesson plans (and accompanying student data collection forms) in four iterations during the May 7th grade Studio Day. Otherwise they relied solely on narratives to represent teaching practices.

**Stance**

When participants verbally represented teaching practices in conversation (by describing their own practices or by taking up others’ practices), they generally took a stance toward the purpose of that representation. As described in the literature review (Chapter 2), stance is represented by the degree of certainty in participants’ language, and by the degree to which
participants invite others to take up their representations. Drawing on the work of Nelson, Slavit and Deuel (2012), I characterized stance as existing along a proving-improving continuum. When representing practice with an improving stance, participants used tentative language, called public attention to the limitations of their practice, expressed explicit wishes to improve practice, and/or invited colleagues to take up their representation. When representing with a proving stance, participants used much more certain language (assuming the effectiveness of the practices they represented), and did not explicitly invite colleagues to take up their representations (or explicitly turned away from talking about their practice). It is important to note that in this study, when participants represented practice with a proving stance, it was often in the service of helping a colleague who had publicly expressed a particular struggle, or in response to a particular question posed by someone in the group.

**Resources**

In every conversation, the group drew on one or more kinds of expertise as resources for representing and making sense of practice: contextual, theoretical, and facilitation expertise. I characterize contextual expertise as the knowledge and skills associated with teaching a particular group of students day to day. For example, while reflecting on and revising the lesson during the 7th grade Studio Day, Sean drew on contextual expertise by situating the lesson within the sequence of his regular classroom instruction. Contextual expertise is constructed within, and is specific to, the personal teaching experiences of the individual, and therefore requires personal experience in the occupation of “teacher.” Contextual expertise closely relates to Cochran-Smith and Lytle’s (1999) notion of “knowledge-in-practice” (defined in Chapter 1).

Theoretical expertise includes knowledge of educational theories and findings of educational studies. In this group, that expertise included knowledge of the underlying curricular
theory of EDI. For example, during the October inservice, Sam drew on theoretical expertise when he gave the teachers an overview of EDI. Theoretical expertise requires access to the “knowledge base” around education, which is often (but not solely) generated by educational researchers in occupations outside the K-12 classroom. Theoretical expertise closely relates to Cochran-Smith and Lytle’s (1999) notion of “knowledge-for-practice” (defined in Chapter 1).

In this study, facilitation expertise refers to knowledge and skills specifically associated with supporting talk about teaching and learning (in the service of teacher learning), and/or supporting how the group functions as a whole. Participants draw on facilitation expertise when they think about and act on the structures that govern people’s participation in conversation. For example, teachers in this study sometimes represented problems of practice and requested “help” from the group in solving those problems. Others in the group could draw on facilitation expertise by thinking about how their responses would function in providing that “help.” They might consider the developmental needs of others in the group, and then respond with either decisive advice, or with questions designed to scaffold others’ thinking, whichever is most appropriate for the group. Facilitation expertise could also include consideration of (and response to) other features, such as the goal or the time limits of the conversation, and the particular dynamics of the group. Facilitation expertise is usually developed through a combination of accessing the knowledge base around facilitation, and by putting that knowledge into practice, engaging groups in conversation.

Often, people associate contextual expertise with K12 teachers, theoretical expertise with associated with university faculty, and facilitation expertise with university- and district-based teacher educators or administrators. However, any person can develop any (or all) of the different kinds of expertise, depending on their access to external knowledge bases (“literature”) and past or present experiences. For example, university-based educators who are former teachers may have contextual expertise, and teachers who are familiar with some aspect of educational research
literature may have theoretical expertise. A person’s current occupation is certainly not the sole feature in developing (and deciding when to draw on) different kinds of expertise. It is important to note that participants do not always draw on their developed expertise in conversations.

**Conversational Routines**

As the group talked about practice, their conversations generally took the shape of one of five “routines.” Horn and Little (2010) defined conversational routines as the “patterned and recurrent ways that conversations unfold within a social group. Routines are constituted by moves, turns of talk that shape the interaction’s progress by setting up and constraining the response of the subsequent speakers,” (p. 184). In this study, routines are characterized by the different ways that the group took up one another’s practices, in terms of how much time they spent and the degree of depth that they took up one another’s practices, and in terms of the ways they positioned one another with regard to perceived expertise. I characterized the conversational routines of this group as: no/minimal take-up, affirming and elaborating, quick advising, extended advising and collective sense-making. All five routines are defined below, and in this section I provide transcript excerpts to illustrate two routines: no/minimal take-up and affirming and elaborating. In the “Mediating OTL” section of this chapter, I provide extensive examples of the remaining three routines: quick advising, extended advising, and collective sense-making.

**No/minimal take-up.** In this kind of conversational routine, a participant shared his or her practice, then either no one responded to the representation at all, or one person asked a quick, procedural question, before moving on to a new topic. As a result, the talk around the practice was extremely brief. Take for example, this excerpt from the February monthly meeting:
Here, Brandon represented his practice (lines 455-458), in response to Tim’s invitation to share (line 454). The only response was to Brandon’s representation was Tim’s quick, “Alright.” (line 459), before turning to the next person, “Jill?” No one asked Brandon to explain what he meant by project-based learning, or took up his representation in any other way during the meeting.

Across the data set, this kind of routine was very uncommon, with the exception of the February meeting, where it occurred in six of the nine conversations (defined as “phases” in Chapter 3) from that meeting.

**Affirming and elaborating.** This kind of conversational routine was also brief, but included some take-up by others in the group. In this routine, a participant represented a teaching practice, then at least one other participant took up that representation by supporting it with some kind of affirmation and added on, usually with another related representation that elaborated on the first representation. Take for example this excerpt from the September monthly meeting. The conversation began with Sean representing his practice.

In this turn, Sean essentially made the claim that the practice of using the claims-evidence-
framework (CER, one aspect of EDI) is effective (line 106), because it engages students (lines 104-106). Brent took up Sean’s claim by representing his own practice of using CER (the “it” in line 107).

| 107  | Brent: Apparently it had some [of my] students arguing with [my team’s] social studies teacher, because the English and Social Studies Departments do CER now as well. But she tries to have them do an example of CER and she says, “Okay, let's build an argument about what's the best pizza in town.” And she says, “Okay, this would be my claim, evidence, and reasoning. And the evidence is the sauce and the reasoning is that the sauce is spicy and tasty.” And my students jump all over her. They go, “No, that’s evidence because that is an observable characteristic.” And they, like, start getting into an argument saying, “That's not what [our science teacher] would say about it.” I’m like, “Oh sorry. But yeah, I agree with them. They're right, you're wrong.” But that was an interesting conversation. ‘Cause they are really – they bought into it fairly well. |
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Here, Brent’s representation affirmed Sean’s claim about the effectiveness of using CER and the degree to which it engages students (line 118), supported by a representation from his own classroom (lines 107-117). Cheri then followed Brent’s lead by representing her practice.

| 119  | Cheri: Yeah, it's interesting for me coming back [after a one-year leave of absence], because it's my first time through this. I told Matt and Brent at one of our meetings that I feel like I'm doing kind of a crappy job with this right now, but it's better than anything I've ever done. The engagement level is really high, and having had the workshop twice—and I communicated with [Matt and Brent] even when I wasn't there last year, so it's not that I was going in blind—but I can really say that the engagement level’s incredibly high. And I've had teacher feedback like, “Oh, they're talking about these powders in other classes.” So I mean, just a little feedback from first time doing it, it's going well. |
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Like Brent, Cheri’s representation affirmed the effectiveness (lines 122, 128) and engagement level (lines122-123, 125) of using CER, supported with evidence of feedback from other teachers (lines 125-127). After Cheri’s turn the topic changed, and no one returned to Sean’s, Brent’s or Cheri’s representations at any time throughout the meeting. This conversational routine was quite rare, occurring in only three of the thirty-one episodes of conversations around practice.

Quick advising. This conversational routine generally began with a teacher expressing a
problem of practice. Others in the group then took up that problem by providing some kind of advice to the teacher (as opposed to collectively negotiating potential solutions). In these conversations, the talk positioned the teacher who posed the problem as a “learner,” versus the people providing advice as more-expert “contributors” (as opposed to co-contributors to each other’s learning). “Quick advising” conversations were longer than “no/minimal take-up” and “affirming and elaborating” conversation, but generally lasted no more than a few minutes. These conversations were brief because: 1) the group posed few questions to the “learner” teacher about his/her practice, and/or 2) the advice of the “contributors” was not taken up to a great extent (or in some cases, at all). Quick advising occurred sporadically, in four conversations across the year. Two examples of quick advising conversations can be found in the “Mediating Learning Opportunities” section below. (See “Josh’s struggle” and “West 8’s Chemistry Phenomena.”)

**Probing and advising.** This conversational routine was similar to “quick advising” in the sense that it generally began with a teacher representing a problem of practice, followed by others in the group taking up that problem by providing advice to the teacher, thereby positioning one (or some) participants as “learners” and others as “contributors.” However, “probing and advising” routines generally took more time (10-20+ minutes), because: 1) the group pressed the “learner” teacher to make his or her procedures and/or rationale more transparent, and 2) the “contributors” provided extensive advice, which was sometimes taken up by others through affirming and elaborating. In these conversations, that advice was not contested or problematized by anyone in the group. Extended advising was very common in the group’s talk, occurring at least once in every meeting except for the planning session for the 8th grade Studio Day in May, and the 8th Grade Studio Day reflecting/revising periods. An example of an “probing and advising” conversation can be found in the “Mediating Learning Opportunities” section below. (See “Matt’s Problem of Practice.”)

**Collective sense-making.** This routine was similar to “probing and advising” in the sense
that these conversations generally began with a problem of practice, lasted at least 10 minutes, and included many requests for participants to make their practices (imagined or actual) more transparent to the group. However, in “collective sense-making” conversations, participants were not positioned as less-expert learners versus more-expert contributors, but rather as negotiators who solved problems collectively, and who therefore had the potential to contribute to one another’s learning. During collective sense-making, participants frequently pushed back on one another’s ideas and interpretations and suggested alternative ideas, which required the group to evaluate several practices against one another. Collective sense-making was the dominant routine during the Studio Day conversations and the planning sessions for the Studio Day lessons, but rarely occurred in the other meetings. An example of collective sense-making can be found in the “Mediating OTL” section below. (See “7th grade Studio Day, Period 2: Finalizing the lesson plan.”)

**Summary of Mediating Features**

In this section, I identified five features that mediated the group’s learning opportunities: 1) the designed context in which the conversation occurred, 2) the tools that participants used to represent their practice, 3) the stance with which participants represented their practice, 4) the resources that participants drew upon while engaging in conversation, and 5) the conversational routines in which the group engaged when taking up practice. I also described and illustrated several varieties of each mediating feature. In the next section, I explain which varieties of each feature was associated with affording versus constraining the group’s opportunity to learn.
Features Associated with More- and Less Generative Talk

As described in Chapter 3 (“Phase Three: Looking for patterns”), during my analysis I coded each meeting in terms of the five mediating features (context, tools, stance, resources, conversational routines –described in the previous section) and the four aspects of more- and less generative talk (transparent versus opaque practices; emphasized versus limited attention to rationales; theory-practice connections versus a focus on theory or practice; distributed agency versus limited or imbalanced agency – described in “Generative Talk” in Chapter 2).

Following that coding, I characterized each conversation along a continuum of (overall) more- generative (affording learning opportunities) versus less generative (constraining learning opportunities). The conversations at each “end” of the continuum shared a unique group of varieties of each mediating feature. For example, in the conversations that I characterized as the most generative, the participants typically drew on multiple types of expertise, whereas in the conversations that I characterized as the least generative, the group generally drew on a single type of expertise. The varieties of each mediating feature that were associated with more- or less generative talk are represented in Figure 4-2. It is important to note that although Figure 4-2 presents this relationship in dichotomous terms (more- and less generative) for simplicity, in reality the conversations existed along a more- generative/less-generative continuum, with several conversations “in the middle,” containing a complex mix of aspects of more- and less generative talk. Also note in Figure 4-2 that the different kinds of contexts and conversational routines are also represented as a continuum (rather than dichotomously). For example, in terms of context, both “Planning and reflecting on shared practices” and “Reflecting on unshared practices” appear on the “Affording” side of Figure 4-2. But “Planning and reflecting on shared practices” is placed to the left of “Reflecting on unshared practices” within the “Contexts” row to indicate that the context on the left produced more affordances for learning than the context immediately to its
Figure 4-2. Conversational features associated with more- and less generative talk.

Although Figure 4-2 describes the associations between mediating features and more- or less generative talk (research question #1), it does not explain how those features mediated the generative nature of the group’s talk (research question #2). These complex interactions are explored in the next section, “Mediating Learning Opportunities.”

Mediating Learning Opportunities

In this section, I analyze conversation excerpts from three of the group’s meetings, in order to demonstrate how context, tools, stance, resources and conversational routines mediated the generative nature of the group’s talk (Research question #2). I selected these meetings purposefully, looking across the data set for examples where the mediating features constructed...
1) more generative talk, 2) less generative talk, and 3) “mixed” talk. Only two meetings fell under the category of more generative talk (affording learning opportunities): the 7th and 8th grade Studio Days in May. Three meetings fell under the category of less generative talk (constraining learning opportunities): the October monthly meeting, the November inservice, and the February monthly meeting. Five meetings fell under the “mixed” category: the September monthly meeting, the October and March inservice meetings, and the 7th and 8th grade Studio Day planning meetings in May. Looking closely at the features (stance, tools, contexts, resources, routines) of the meetings in each category (more generative/ less generative/ mixed), I noticed similarities in how the features mediated the generative nature of the group’s talk. Although I analyzed each meeting in depth, I chose four conversations to present in this chapter, in order to prevent excessive repetition: one conversation that clearly afforded the group’s learning opportunities (more generative talk), one that clearly constrained the group’s learning opportunities (less generative talk), and two “mixed” conversations that constructed some aspects of more generative talk and some aspects of less generative talk. Although the two mixed conversations come from the same meeting, the features interacted in very different ways to mediate the generative nature of the group’s talk.

My choice of the four conversations was not arbitrary. Instead, I chose the meetings that most clearly and concisely demonstrated how the conversational features mediate the generative nature of the group’s talk. The four conversations included in the following sections come from the May 7th grade Studio Day (More Generative talk), the February monthly meeting (Less Generative talk), and two conversations come from the September monthly meeting (Mixed Talk).

In each section, I begin with background information about the overall meeting to orient the reader. Next I present excerpts from the transcript. Because some excerpts come from longer conversations, I include some narrative to replace long sections of talk. Then I analyze the
excerpts through the lens of the four aspects of Generative Talk (transparency of practice, attention to rationales, theory-practice connections, agency), demonstrating how the five designed and spontaneous features (context, stance, tools, resources and conversational routines) interacted to mediate the generative nature of the group’s talk in various ways. Lastly, I summarize the interactions using both text and figures.

More Generative Talk: 7th grade Studio Day

The conversations that occurred during the 7th and 8th grade “Studio Days” in May best demonstrate how context, tools, stance, resources and conversational routines interacted to construct talk that generates opportunities for learning about teaching. Because the conversations in the two Studio Days are so similar, for the sake of brevity, in this section I present and analyze transcript excerpts from only the 7th grade Studio Day (May 14, 2015). The 7th grade Studio Day took place in Sean’s classroom at West Middle School. Throughout the day (periods 3, 5, 6, 7, 8) Sean taught a lesson on depositional environments (Earth science) that all of the 7th grade teachers (from both middle schools) had loosely planned together on May 6, 2015. The lesson included a hands-on activity in which the students worked in small groups to shake a large container full of water and different sized sediments of the same kind of rock. The goal of the lesson was for each group to generate an initial model (a drawing on a white board) showing where the different sized sediments would deposit in an environment such as a river delta. During the lesson, Sean, Sam and the other teachers circulated around the room individually or in pairs, listening to students’ conversations and posing scaffolding questions when appropriate. At the end of the lesson, student groups presented their models and debated the merits of each model, attempting to converge on a single class model. During periods when Sean had no students, the group worked together to plan, reflect on, and/or revise the lesson. The overall schedule of the
day is contained in Figure 4-3. Note: AREA stands for “Academic Remediation and Enrichment Activities.”

<table>
<thead>
<tr>
<th>Period</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Teachers explain lesson plan to Sam</td>
</tr>
<tr>
<td>2</td>
<td>Finalize lesson plan</td>
</tr>
<tr>
<td>3</td>
<td>Teach Lesson: Iteration 1</td>
</tr>
<tr>
<td>4</td>
<td>Reflect on and revise lesson plan</td>
</tr>
<tr>
<td>5</td>
<td>Teach lesson: Iteration 2</td>
</tr>
<tr>
<td>Lunch</td>
<td>Reflect on and revise lesson plan</td>
</tr>
<tr>
<td>6</td>
<td>Teach lesson: Iteration 3</td>
</tr>
<tr>
<td>7</td>
<td>Teach lesson: Iteration 4</td>
</tr>
<tr>
<td>8</td>
<td>Teach lesson: Iteration 5</td>
</tr>
<tr>
<td>AREA</td>
<td>Reflect on lesson and overall Studio Day process</td>
</tr>
</tbody>
</table>

*Figure 4-3. 7th Grade Studio Day Schedule.*

Because the conversations that occurred across the day are so similar, instead of analyzing all five periods of conversation (Periods 1, 2, 4, Lunch, and AREA), I have chosen excerpts from two periods that best demonstrate how tools, stance, context, resources and conversational routines interacted to afford learning opportunities across the day. These two excerpts come from Period 2 and Lunch.

### 7th Grade Studio Day, Period 2: Finalizing the lesson plan

During Period 2, the group attempted to converge on a final lesson plan for Sean to teach during Period 3. An excerpt of this conversation is found in Figure 4-4. In this part of the conversation, the context, tools, stance, resources and conversational routine interacted to construct all four aspects of more generative talk. That is, this conversation afforded opportunities to learn about teaching by making participants’ actual and imagined practices more transparent, distributing agency for problem solving and sense making across the group, connecting the underlying principles of EDI to the specific context of this lesson, and placing emphasis on the rationales for participants’ proposed practices.
So the other thing that I think is going to be potentially difficult, is that you've got this points to jar of layered sediments in water and so the kids are going to think that is the layer direction [hand motion], right? Because they're going to think of sediments being laid down this way and so they're going to say, “Oh, well, why aren’t the layers like that way?” Because it makes a certain amount of sense, right? You've got the the slope of the ground is this way [hand motion]. The sediments are being deposited. So I think there's going to be some scaffolding required to think about how you get from this pattern [points to jar] to that pattern [points to stratigraphy map].

Well, if they did all three drawings [periods of deposition] in one model, they can compare it to the stratigraphy. And they can say, “Oh, these larger sediments kind of form a horizontal layer here when the sea level lowers.” [Jill draws model on board]

Yeah, the other problem with the diagram that we're giving them up there is that the vertical exaggeration on those is pretty significant.

And that was what I was getting into, something to me that's a little further down the road, because now we start to extend this with the delta growing, okay. With the delta growing, now that drop off happens later and so you get your bigger sediment here, your smaller smaller sediment there, and that incline is maintained. Yeah, it moves out. Eventually we can get to this idea of the river, of the land growing, the delta moving, but that's like way down there [in future lessons].

But –I agree – but I think this is exactly the struggle that we always have whenever we start trying to actually explain a real phenomena, which is there's so much complexity that when you make a choice of what you ask them to think about, you potentially give them misconceptions about stuff you're going to ask them to think about later. So is this [points to Jill's drawing] what you're expecting the kids to draw?

Yeah.

What Sam's saying is, if you look at the fact that the layers are slanted, and we've been operating under the understanding that they are essentially horizontal…

Can’t we just give them an ocean basin that's more realistic instead of almost a 45° angle? We could give it to them on a 15°.

Well, or we could just draw this one long and shallow and expect that they're going to have to draw a lot of little dots.

I should have made this more shallow. I'm realizing that now. Still, they can kind of see that this right here is all the large sediment. And say, “Look at this.” I mean…

Yeah, I agree with you. But again, this is the problem. Like, we understand it, and so we look at the diagram and it makes sense to us how it compares. But when I look at this from a naive point of view, I'm like, “Oh well there’s the layers of rock.” Right. ‘Cause you made them different colors. And if I look at this…

If we have them identify them, or maybe we want to have them color code the large medium and small sediment.

That would be another way to do it. They could do the big sediments in blue, the medium sediments in black and the small sediments in orange.

If they’re all in one model.

And we can just check that they're moving their sea level down a little bit each time.

And then you could start to see, all of that does sort of form a layer that's roughly horizontal. And then you could talk about this fact, “Okay, well, to be able to do this we made this slope a lot steeper than it would be typically.”
**Transparency of practices.** In this conversation, the context of co-planning a lesson and using tools to represent practice allowed participants to provide one another with very transparent access to the practices that they proposed. Rather than speaking in very broad strokes about this lesson, they described very specific details of proposed procedures, and used visual tools (drawings) to make their ideas even more accessible. For example, Jill suggested that the students’ model should include three different time periods representing the changing speed of the water that moves the sediments as they enter the river delta (lines 9-11). She made her idea even more transparent by drawing a potential model on the board for the group to see. Looking at Jill’s model, the group then addresses an important feature – the slope of the lake’s bottom (lines 12-13, 15-17, 29-30).

Even more specifically, the group discussed a system for color coding the sediments according to their particle size (lines 39-42), and the ways in which Sean could later call the students’ attention to the exaggerated slope (lines 44-45). These practices would have been much more opaque had the group assumed that they held a shared conception of the model that students would draw during the lesson (which was not true). Instead, they provided important details, both verbally and visually, to ensure that each person had access to the proposed practices. The context of co-planning and the use of tools generated this transparency.

**Theory-practice connections.** As the group engaged in the very practical task of co-constructing a lesson plan, they also connected their plans to some generalized principles about teaching and learning. These theory-practice connections were generated by the combination of context and resources. That is, the Studio Day context invited Sam to join the teachers in the practical task of planning the lesson. The combination of teachers and a teacher educator provided the group with a very valuable resource: multiple types of expertise. That is, the teachers contributed their contextual expertise, while Sam contributed his expertise in EDI (theoretical). For example, at the very beginning of their discussion about the model that they
would ask the students to draw (lines 1-8) Sam implicitly pointed to a general principle of teaching—when asking students to explain everyday scientific phenomena, student misconceptions are inevitable and need to be anticipated and addressed. He contextualized this principle by describing potential student thinking, “so the kids are going to think that is the layer direction, right? Because they’re going to think of sediments being laid down this way,” (lines 2-4) and also made the practical suggestion, “there’s going to be some scaffolding required to think about how you get from this pattern to that pattern” (lines 6-8). The teachers took up the call to address potential misconceptions with a number of practical suggestions (lines 9-11, 12-13). In response, Sam once again returned to the principle of inevitable misconceptions, this time naming the principle explicitly and in generalized terms, “whenever we start trying to actually explain a real phenomenon… there’s so much complexity that when you make a choice of what you ask them to think about, you potentially give them misconceptions about stuff you’re going to ask them to think about later” (line 20-23). Keith then contextualized that general principle within the lesson, stating, “What Sam’s saying is, if you look at the fact that the layers are slanted, and we’ve been operating under the understanding that they are essentially horizontal” (lines 26-27). The conversation then maintained a contextual focus (lines 29-34), until Sam pushed back again, using a generalized teaching principle as his reasoning—teachers’ and students’ viewpoints are likely to be different, and students’ viewpoints need to be anticipated and considered. He began this turn in rather general terms, stating “But again, this is the problem. Like, we understand it, and so we look at the diagram and it makes sense to us how it compares” (line 35-36), and then gave the idea a context, saying “when I look at this from a naïve point of view, I’m like, ‘Oh well there’s the layers of rock.’ Right. ‘Cause you made them different colors” (lines 37-38). Rather than focusing solely on accomplishing the practical goal of designing a lesson for this context, the talk moved back and forth from the contextual to the general. These fluid connections were made possible by the combination of the teachers’ contextual expertise and Sam’s theoretical expertise,
brought together in the Studio Day context.

**Distributed agency.** In this excerpt, the combination of context and stance allowed the group to engage in collective sense-making, which positioned each participant as a capable sense maker, effectively distributing agency across the group. In terms of context, no one person—neither Sam (as the EDI expert) nor Sean (as the volunteer teacher)—was responsible for planning the lesson. Rather, the group as a whole was mutually responsible for achieving consensus. Although Sean was the volunteer teacher, his turns of talk did not dominate the air time. Instead, Sean contributed a future context for framing the present lesson (lines 14-19), and affirmed Jill’s suggestion for including multiple times in the model (line 46). Sam, Keith and Jill all contributed ideas about potential student misconceptions or about how to draw the model, each of which were taken up and considered by the group. Although Sam was the only person who actively pushed back against others’ ideas (lines 20-24, 35-38), he left the decisions about how to modify the model to the entire group (rather than making those decisions himself). Furthermore, the iterative nature of a Studio Day (multiple enactments of and revisions to a lesson) and the improving stance taken by the participants also contributed to the group’s conversational routine of collective sense-making and subsequent distributed agency. Because the Studio Day allowed opportunities for revising the lesson multiple times throughout the day, the participants were relieved of any pressure to get the lesson plan immediately “right”. This freedom contributed to participants’ improving stance, as there was no need for categorical certainty. Each person spoke quite tentatively, using uncertain language, and remained open to others’ ideas, rather than simply defending their own.

Sam set the tone of an improving stance at the beginning of the excerpt when he pointed out the inevitable challenge of potential student misconceptions. As the EDI expert, he could have spoken with more certainty or prescribed a particular approach for the group to use (proving stance). Instead, he used tentative language, saying, “I think there’s going to be some scaffolding
required to think about how you get from this pattern to that pattern” (line 6-8), and then allowed
the group to take up this challenge collectively. Sam’s improving stance was then taken up
throughout the conversation. For example, when Jill drew a model on the board, she described it
tentatively, saying “if they did all three drawings in one model they can compare it to the
stratigraphy.” (lines 9-10). In contrast, she could have made this suggestion with a more certainty
(e.g. “they should do all three drawings in one model”). Potentially, this kind of certainty could
end the conversation and position Jill with more agency than her colleagues. Instead, as they
attempted to converge on a single model, the group considered multiple possibilities, continuing
to use tentative language. For example, Keith suggested a different alternative, “We could give it
to them on a fifteen-degree angle,” (line 30). Sam proposed yet a different (tentative) possibility,
offering, “Well, or we could just draw this one long and shallow and expect that they’re going to
have to draw a lot of little dots” (lines 31-32). Jill tentatively suggested yet another idea,
proposing, “maybe we want to have them color code the large medium and small sediment” (lines
39-40). Rather than assessing one of these options as “best,” Sam characterized Jill’s color coding
as “another way to do it,” (line 41). At any time, any of the participants could have used more
certain language (proving stance) which could potentially discourage others from pushing back or
suggesting alternatives, essentially ending the conversation without paying much attention to the
rationale underlying the decision. Instead, the group remained open to possibilities. Used to
achieve the overall goal of consensus, their improving stance allowed them to engage in
collective sense-making, positioning each participant with agency.

**Emphasized attention to rationales.** In this excerpt, participants not only made their
proposed procedures transparent, they also emphasized the rationales underlying those
procedures. As described above, the context of co-planning a lesson that was shared by the group
combined with the improving stance taken by each participant allowed this group to engage in a
conversational routine of collective sense-making. This conversational routine required
participants to emphasize the reasoning behind their suggestions (rationales). For example, to support his suggestion of the need to scaffold students’ models, Sam reasoned that the students were likely to conflate the layering of sediments in the jar and the layering of sediments in their model (line 1-9). Jill supported her idea of incorporating different times into the model by reasoning that it would help to alleviate this issue (lines 9-11). To support his suggestion of changing the angle of the lake bottom from forty-five to fifteen degrees, Keith pointed to the potential student misconceptions that a vertically exaggerated lake bottom may create (lines 12-13). Pushing back on Jill’s idea, Sam reasoned that she was thinking about the model from an expert point of view, rather than from the students’ naïve points of view (line 35-38). Overall, rather than just “brainstorming” ideas for what procedures the lesson should include, the participants’ goal of consensus encouraged them to engage in collective sense-making, which in turn provided access to participants’ underlying rationales for the suggestions they made.

Taken together, the context, tools, stance, resources and conversational routine interacted to construct a conversation that made participants’ imagined practices more transparent, distributed agency for problem solving and sense making across the group, connected the underlying principles of EDI to the specific context of this lesson, and placed emphasis on the rationales for participants’ proposed practices. Although this Studio Day excerpt represents one of the “best” conversations in terms of learning opportunities, it is important to note one important limitation: a lack of the use of tools. That is, throughout the day, as the group revised the lesson (based on their observations of the previous lessons), they never referred to actual samples of student work. As described in the next section, this choice had important implications for the group’s learning opportunities.
During Period 4, Lunch, and AREA (end of day), the group gathered to reflect on and revise the lesson, based on what they observed in the previous periods. While the overall quality of the conversations that took place in Period 4, Lunch and AREA were very similar to the one analyzed above (Period 2), the main difference is that in these conversations, the teachers had the opportunity to reflect on the practices they’d observed across the various class periods. More importantly, they had the opportunity to use actual student work as tools for mediating their learning. That is, at the end of each period, Josh used his phone to take photos of each group’s white board (model). However, the group did not refer to these photos when reflecting on and revising the lesson. Instead, they verbally narrated what they remembered to one another. Note in the transcript below (Figure 4-5) that in each participant’s turn, the teachers narrated their interactions with a particular group during Period 5, but they did not actually get out the photos that they took of each group’s model.

While the teachers’ narrations of the students’ models may have been somewhat accurate, the fact that the narrations were strictly verbal left the students’ thinking opaque, and positioned the teacher who interacted with each group as the sole sense maker of that group’s thinking. Had the group analyzed the photos of the actual student models, they may have had different interpretations of the students’ thinking. These differing interpretations could have potentially served as an opportunity for additional collective sense-making. More importantly, that sense-making would have been based on more concrete evidence than a teacher’s narration can provide, thereby lending more credibility to the group’s interpretations of student thinking. Interestingly, the same thing happened in the 8th grade Studio Day. That is, the students drew models of their ideas (on butcher paper), but the group never examined the models during the reflection periods.
Jill: Okay this group over here [Group 1] really kind of... they got the idea that the river was fast moving. They understood that the larger sediment is going to fall out first when it slows down. But they were still thinking, “Well it's going to fall.” They were still thinking that the lake was somehow still moving fast. So I think it's about emphasizing that the river is very fast moving and then in the transition to that larger body it dramatically slows down.

Josh: They didn't draw it on the bottom. In that group [Group 2], it was at the top still. And I said, “why did you draw that at the top?” They started erasing. I said, “No, no, no. I just want you to explain it.” And they said, “Because it’s not going to settle yet.” And I said, “why?” And he said, “Well, it's lighter.” I said, “lighter and the current's going to carry it further.”

Keith: This group [Group 3], in their first model, I said, “Okay, so you did this based on where the sediments are, right? Why'd you put those there? Well, they're on the bottom of the jar. Okay, let's ignore that and take a look now at the rate at which they fall out. So if I shake it which one's the first one that comes out? Okay now apply that. The water's coming in here. The first one falls out you'll put it where? Here.” And we did it that way. And then I said, “The third one--let's consider this: As the water moves what's happening to the speed of the water as it goes out to the ocean?” And they, they pretty much came to it will slow down. All right. “Did we do something like that in-- with this? Did we start shaking it really hard and then slowing it down? And when you do that, where do the sediments end up?” They’re like, "Oh it would be the same place as the previous one."

Figure 4-5. Transcript excerpt: 7th Grade Studio Day, Lunch

Summary: More generative talk—Affording learning opportunities

Despite the missed opportunities to learn that resulted from not using artifacts of student work, overall the Studio Day conversations afforded opportunities to learn in multiple, interrelated ways. Jill’s drawing (representational tool) drew the group’s attention to the differences in their thinking, making their imagined practices more transparent. The Studio Day context of planning and revising a live, shared lesson supported transparent practices because it required everyone understand each other’s imagined practices. The context also supported agency by positioning everyone in the group as collectively responsible for the lesson. Because the context included the teachers and Sam in the conversation, the group was able to draw on multiple types of expertise (resources), which in turn supported their ability to connect theory and
practice. The iterative nature of the Studio Day context also relieved the pressure to get the lesson “right,” thereby supporting individuals’ willingness to remain open, speaking in tentative terms (improving stance). That openness steered the conversational routine toward collective sense-making, rather than toward any type of advising. Engaging in the conversational routine of collective sense-making meant that every participant was positioned as a potential contributor (agency), and required participants to provide a rationale to support their ideas, as part of the negotiation process. These complex interactions are captured in Figure 4-6. (In Figure 4-6, the white boxes represent the mediating features, the green boxes represent aspects of more generative talk, and the connecting lines represent the relationships between them).

Looking back at Figure 4-2, it is clear that the varieties of all five mediating features in this conversation (Studio Day context, narratives and drawing as tools, improving stance, multiple types of expertise and collective sense-making) appear on the “Affording Features” (left) side of the figure. It is no surprise then, that the conversation constructed all four aspects of more generative talk (transparent practice, attention to rationales, theory-practice connections, and distributed agency). These relationships are also captured in Figure 4-6.

Unfortunately, in this data set, all five “affording” features appeared all together only in the Studio Day conversations. On the far opposite end of the spectrum, in a few conversations, none of the five “affording” features appeared in the conversation. In the next section, I analyze one of those conversations: the February monthly meeting.
Less generative talk: February monthly meeting

In this data set, the overall conversation that occurred during the February monthly meeting best demonstrates how context, tools, stance, resources and conversational routines interacted to construct less generative talk. That is, this the talk in this episode left teachers’ practices very opaque, paid little attention to rationales for practice, made essentially no theory-practice connections, and positioned some individuals with considerably more agency than others. The overall conversation was by no means without merit. But overall, in comparison to the other conversations in which the group attempted to engage with one another’s practices, this meeting was the least generative in terms of affordances for learning.

Beginning in January, Sam’s teaching schedule at the university conflicted with the group’s regular monthly meeting time. Although Sam was still able to work with the group in other contexts (March half-day inservice, May Studio Days), he was not able to attend the

Figure 4-6. Constructing More Generative Talk: 7th grade Studio Day.
monthly meetings. As the district curriculum coordinator, Tim assumed responsibility for facilitating these monthly meetings, as he had done for the past two years in this position. The February meeting was held at West, in Cheri’s room (although Cheri was not in attendance). After sharing approximately fifteen minutes of district-related “business items,” Tim opened the conversation to the group by posing the question, “What do we got going on in different classes at this point in time here?” The conversation that took up this question essentially consisted of nine “episodes,” most of which were not related to one another, over the course of approximately forty minutes. Because the episodes were extremely similar, to avoid excessive repetition, I analyze just one episode below. In the next section (“Josh’s struggle”), I begin with transcript excerpts and narrative to connect them, then I shift to the analysis through the lens of the four aspects of generative talk: transparency of practice, agency, attention to rationale, theory-practice connections.

**Josh’s struggle**

When Josh took up Tim’s question, he described his current classroom biology practices around the driving question: “How does an acorn turn into a giant oak tree?” This question was used in all of the 7th grade classrooms (at East and West) as an anchor for their biology instruction. As part of this description, Josh articulated his current struggle: helping students make connections between day-to-day classroom activities and the overall explanation of the phenomenon. During this narration, Josh referred to some posters (lines 34 and 38 below) that the 7th grade teachers from West designed and used in their classroom, containing the “acorn to oak” driving question. The West teachers had recently ordered a set of these posters from the district print shop for the 7th grade teachers at East.
Josh: I'm having a hard time keeping that question in mind. So I'm excited to have those [Acorn to Oak posters], because now that we went to, “How do things grow? Well, cells divide. The cells don't get bigger.” And we do the labs and things like that, but they keep forgetting the big question. Like, I said, “Why would we be doing this?” I think that's going to help. We can always just be like, “This!” [points to imaginary poster]. And we got through like, “Things are made up of cells. Well, how do we know that?” We look at, we do samples, we look at things using microscopes. The next one was “how do they grow? Cells multiply.” But getting them to connect the things is still pretty hard. I haven't looked through their initial models in a while, but I think I want to get that back out and add as we get through different labs. Do it more like, “Here's more evidence.” So going back and, “I don't want to have you do a completely new initial model, but just adding stuff in as you go.” I have them do that in Move-note for the initial videos, and then there's an add-on that I use for concept mapping, Lucid chart. So as a group, we picked out the five [important concepts], so photosynthesis came into play. We talked about cells first, and off of that, we did photosynthesis and respiration, things like that. Having then from one week to the next connect those topics is still really hard for them. They [the students] think they [the topics] are islands.

Keith took up Josh’s struggle by referring to a bulletin board that he used in his classroom to generate a class concept map.

<table>
<thead>
<tr>
<th>52</th>
<th>Keith</th>
<th>Yeah, I kind of stole an idea from Matt. I kind of mesh it [with another idea].</th>
</tr>
</thead>
<tbody>
<tr>
<td>53</td>
<td></td>
<td>I'll start by saying, I hate bulletin boards, but I've actually found a use for one that I think is worthwhile.</td>
</tr>
<tr>
<td>54</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Josh interrupted, pointing to a bulletin board on Cheri’s wall:

<table>
<thead>
<tr>
<th>55</th>
<th>Josh</th>
<th>Is it that one?</th>
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Over the next minute and a half, Keith spoke uninterruptedly, describing how he uses a bulletin board to create a class concept map. During his turn, Keith pointed to an imaginary 3-column bulletin board in front of him to supplement his verbal description.
Keith: No, that one’s different. I stole the idea from Matt and I kind of tweaked it. In beginning, we said, “All right. You're going to have to answer this big question. What do you need to know to answer that?” They listed things they thought might be important, and we put them all over there [points to left “column” of imaginary bulletin board in front of him]. These are those questions you want to answer. Then, I sectioned it, and the middle section [points to middle “column” of imaginary bulletin board] is, what do we start with? “In progress” was what we called that, so that's currently what we're working on and we put that there. What they found is, “Well, we can't really do that [motions to top of middle “column”] by itself. This [points to bottom of middle “column”] is going to have to happen at the same time, so there might be two or three things bouncing around in there.” Then, they would move it over into “Resolved” [points to right “column” of imaginary bulletin board]. We have some kind of resolution. Not saying we have the answer, but we have some kind of final thought. Then those, they didn't just put it over there. They had to connect it to the other stuff that they had resolved. So we basically built a concept map, as we went. It did go back to that big question and say, “This has to fit somewhere in the big scheme of things.” Some kids buy into it and get those connections a lot more than others, absolutely, but they were all part of that process. When I was like, “Well, what the hell do I do next?” That's where I went every single time. It's like, “Alright, we've got these; the list. Which ones can we move? Which ones do we need to bring to the forefront now?”

Following Keith’s narrative, Tim posed a procedural question:

Tim: Do you do that with each classroom?
Keith: Yeah. Now I will put it up there, and then I take it down [after each class].
Tim: Okay, that's what I was wondering, the logistics of it.
Keith: It's like..
Brent: [Functional
Keith: “[“Wow! This is a bulletin board that actually works.” Because most of the time, it's like…
Brent: Decoration
Keith …I've got to find something to stick up there—if someone walks in the room, you don't want it to look boring. Yeah, and the concept mapping is something I think is great, just get the kids to try to visualize how all this stuff fits together.

Other than this one question, no one in the group took up Keith’s pedagogical approach of using this bulletin board to help students make connections between day-to-day activities and the explanation of the phenomenon. Instead, Matt changed the topic to a different pedagogical approach for supporting students’ connections, which Keith linked back to his bulletin board.
Matt: Do you still do the journals?
Keith: Yeah.
Matt: So I think that's another part too.
Brent: In the journal you can ask the question, “How does this relate to this?”
Keith: So we generally do the journaling, and that gives them time to process through it on their own, and then we'll do the group discussion of like, “Okay, let's take a look at the board, what do we need to change on the board?”

Following Keith’s turn (lines 94-96), the group then shifted to a related, but different topic: grading the journals. This shift (and the fact that no one returned to the topic later) indicated that this episode had ended.

Transparency of practices. In this conversation, the reliance on narrative as the sole tool for representing, and the lack of resources (facilitation expertise) left everyone’s practices very opaque. Both Josh (lines 33-51) and Keith (lines 56-78) spoke in rather general terms, summarizing days or weeks of practice in just one or two minutes. Although Keith referred to concrete artifacts of practice—his concept-mapping bulletin board and a similar bulletin board of Matt’s—he only used hand motions to make these bulletin boards more “visible” to the group. In terms of resources, the lack of facilitation expertise also contributed to opaque practices. That is, anyone in the group could have drawn on facilitation expertise in that moment, by suggesting that the group walk over to Matt’s and Keith’s classrooms (just steps away) to get a better sense of what these boards looked like. But instead, the representation relied on Keith’s narrative alone, leaving his practice very opaque.

Agency. The interaction of stance, context and resources constrained the group’s opportunity to engage in collective sense-making. Instead, the group engaged in “quick advising,” which essentially positioned Keith as the sole sense-maker in regard to Josh’s practice. Josh represented his practice with an improving stance, indicating a struggle (lines 33, 41-42, 50-51). His stance implicitly invited the group to take up his practice in conversation, which could have afforded a powerful learning opportunity for Josh and for the group. But Keith responded
with rather certain advice (proving stance), evaluating this method of concept mapping to support student connections as “worthwhile” (line 54), one that “actually works” (line 84), and “great.” (line 89). Brent affirmed Keith’s evaluation, calling it “functional” (line 83). The only questions the group posed were clarifying, procedural questions (lines 55, 79, and 82). No one asked Keith for any evidence of this method’s effectiveness, which allowed Keith’s authority (experience with EDI) to serve as the sole support for his claim about the effectiveness of his concept mapping technique. As a result, the conversation was deemed “complete” by the group, constraining Josh’s agency for making sense of his own problem, or the group’s agency for considering alternatives to Keith’s advice. To be clear, neither Josh, Keith nor any other member of the group was individually responsible for this imbalanced agency. While Keith’s certain language may have discouraged others from asking about his rationale, his tone was one of genuine care and helpfulness. It is more likely then, that the routine of “quick advice” resulted at least in part from the group’s respect for Keith’s contextual expertise and not from an avoidance of anyone’s potential defensiveness.

The context of “checking in” also constrained the distribution of agency across the group. That is, while participants were certainly permitted to take up one another’s practices, the context of checking in did not explicitly invite this take up. Instead, Tim’s question of “What do we got going on in different classes at this point in time here?” implied that each of the eight teachers would have a chance to narrate what was “going on” in their individual classrooms. Considering that only forty-five minutes remained in the meeting when he posed that question, the group may have felt a need to quickly narrate, advise if invited, and then move on to the next teacher, rather than spending too much time on any one person’s practice. This urgency is unfortunate, considering that helping students connect day-to-day activities to an overall explanation of a phenomenon is a very common and important struggle for teachers who are shifting their teaching toward EDI. Josh’s struggle could have served as an opportunity for the group to thoughtfully
evaluate various methods to support students’ explanation building, positioning the group as a whole with agency. Instead, the conversation positioned Keith’s advice as the only “public” option, limiting individual and group agency.

Furthermore, the group accessed only a single type of expertise (contextual) in this conversation. Other than Tim’s (line 79) and Matt’s (line 90) clarifying questions, no one attempted to facilitate the conversation. They simply listened to and affirmed Keith’s advice. While the practices that Keith advised had been successful for him, others would likely need more concrete examples, rationales and opportunities to evaluate alternatives in order to decide how to proceed in their own classrooms (agency). Without an explicit attempt to facilitate those opportunities, agency remained imbalanced within the group.

**Attention to rationales.** This conversation not only left the participants’ practices quite opaque, it also placed very little emphasis on teachers’ rationales for those practices. As described above, the context of checking-in, stance, and resources interacted to produce a conversational routine of “quick advising.” This conversational routine did not require participants to emphasize their rationales. Instead, Keith’s authority (based on the group’s perception of his contextual expertise) served as rationale alone.

**Theory-practice connections.** Josh’s representation afforded an opportunity for the group to make theory-practice connections. That is, the struggle he described subsumed an important principle for teaching EDI (students need to connect their day-to-day activities to an overall explanation for a scientific phenomenon, and are likely to need support for making those connections), which he grounded in his own teaching context. In essence, Josh’s turn alone made a theory-practice connection. But as described above, the tools and resources drawn upon in the resulting conversation interacted to leave Josh and Keith’s practices quite opaque. Thus, although a theory-practice connection was made, the vagueness of the teaching context constrained the potential power of the connection in terms of supporting the group’s learning opportunities.
Summary: Less generative talk—Constraining learning opportunities

Overall the conversation that took place during the February monthly meeting constrained the group’s learning opportunities in multiple, inter-related ways. The group’s reliance on narratives as the sole representational tool left images of Keith’s bulletin board (and of the way he used it as a tool to support explanation building) very unclear. The certainty of Keith’s advice (proving stance), combined with his position in the group as “more expert” left little space for probing or pushing back against Keith’s advice, setting the group up for a conversational routine of “quick advising.” This quick advising routine was also supported by the context of “Checking in,” which encouraged teachers to quickly take a turn sharing, but did not explicitly invite take up of each other’s practices. The lack of facilitation expertise (resources) also allowed the group to fall back on the familiar routine of quick advising. That lack of facilitation expertise also contributed to opaque practices, as no one thought to head over to Keith’s room to look at his bulletin board, or to press Keith to make his practice more transparent by providing additional verbal details. Because Keith’s practices remained opaque, the teachers may have had a difficult time connecting them to the underlying theory of EDI. The conversational routine of quick advising resulted in little attention to rationale, since Keith’s positioning allowed the group’s respect for his expertise to substitute for a rationale. The routine resulted in very imbalanced agency, positioning Keith as the sole sense maker of Josh’s problem. These complex interactions are represented in Figure 4-7. (In Figure 4-7, the white boxes represent the mediating features, the red boxes represent the four aspects of less generative talk, and the lines connecting them represent the relationships between them.)

Looking back at Figure 4-2, it is clear that all five mediating features in this conversation (Checking in, narratives only, proving stance, single type of expertise, and quick advising) appear on the “constraints to learning” side of the figure. It is no surprise then, that the conversation
const rained all four aspects of the group’s opportunity to learn (opaque practice, limited attention to rationales, weak theory-practice connections, and imbalanced agency). Fortunately, all five “constraining” features appeared all together in only a few meetings in this data set (October monthly meeting, November inservice, February monthly meeting).

Figure 4-7. Constructing Less Generative Talk: February meeting

While the May Studio Days and the February monthly meeting serve as relatively straightforward examples of how context, tools, stance, resources and conversational routines interacted to afford or constrain the group’s opportunity to learn, most conversations in the data set were much more mixed. That is, in the other conversations, mediating features from both the left and right sides of Figure 4-2 interacted to create conversations that contained some affordances for learning, and also some constraints to learning. Two episodes from the September monthly meeting serve as very different examples of the complex ways that the mediating features interacted to afford and constrain learning opportunities in this group’s conversations around practice. In the next section, I analyze two episodes from the very complex conversation
that occurred during the September monthly meeting, in which mediating features from both the left and right side of Figure 4-2 interacted in different ways to afford some opportunities to learn, while constraining others.

“Mixed” talk: September monthly meeting

The conversation that occurred during the group’s first meeting (September 24, 2014), exemplifies the different and complex ways that tools, stance, resources and conversational routines interacted to both afford and constrain the different aspects of the group’s opportunity to learn. The group gathered for the first “official” meeting in Keith’s classroom at West. Sam intentionally left the agenda open to the teachers, to allow them the power to decide how they spent their time together. At the very beginning of the meeting, Sam offered the group several choices.

<table>
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<th>Sam</th>
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<td>1</td>
<td>Okay, so generally speaking I don't have a specific agenda. I have lots of advice that I can give you about things. People have already started doing stuff here [at West]. So it's more a question of how we can productively take advantage of the fact that we have about forty-five minutes together as a group, and that we'll have that not very frequently [monthly]. And that we also have a half-day [in-service] in October to try and do something collectively. So I’m happy to start wherever you guys want. If you want to ask questions. If you want me to tell you more background about the broader scale of this project. I’m happy to have you guys talk about what you are already up to. I’m happy to do whatever you think is productive.</td>
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In response to this invitation, the group engaged in two closely related conversations (“episodes”) centered around: 1) a problem of practice articulated by Matt, and 2) the West 8 teachers’ shared chemistry “phenomenon.” These two episodes demonstrate—in different ways—how context, tools, stance, resources and conversational routines interacted to afford the group’s opportunity to learn in some respects, but constrain it in others. This context can be characterized as “reflecting on unshared practices.” By “unshared,” I mean that not everyone in the conversation used the
particular practices that were discussed. In the conversation about the chemistry phenomenon, those particular practices were shared by three of the teachers (Matt, Cheri and Brent). But overall, the group as a whole did not share these practices (as they did during the Studio Days). Although this context is somewhat similar to “Checking in,” (February meeting), the September context differed in two important ways. First, there were no expectations that every person would talk about their individual practices. Second, Sam explicitly set the expectation that the group would take up teaching practices through advising and asking questions. These two important differences characterize the September context as “reflecting on unshared practices” rather than “checking in.” In the next section (“Matt’s Problem of Practice,”) I begin with transcript excerpts and narrative to connect them, then I shift to the analysis through the lens of the four aspects of the group’s OTL: transparency of practice, agency, attention to rationale, theory-practice connections.

**Matt’s Problem of Practice**

Matt took up Sam’s invitation (lines 1-10 above) by describing a problem he’d been struggling with in his classroom.

| 129 | Matt: I got a question. There's something I'm kind of struggling with a little bit which is, what do you do with the information that you've acquired by going through the storyline and by going through the claims-evidence-reasoning process? And maybe I don't need to do anything with it, but in a traditional sense, kids have records of things because they've taken notes on it, they have some sort of record of what they're doing. But I guess I just haven't... I'm not sure exactly how to … to do this. You know what I mean? |
| 130 |  |
| 131 |  |
| 132 |  |
| 133 |  |
| 134 |  |
| 135 |  |

Sam then pressed Matt to make his practice more transparent.
Sam: I think I know what you mean, but I want you want to make it more concrete. Can you be more specific about something you [do in your classroom]?

Matt: I mean for example, we're running across vocabulary. They all know the vocabulary pretty well, but something in me feels like there needs to be a list of vocabulary words that we do. And there needs to be some way of documenting what happened when we did a particular experiment. You know, it just doesn't feel like the way I used to do things. The way I'm doing things now aren't jiving all that well. I'm kind of feeling like I'm not really sure, you know, how we do this. They know about properties of matter. They know about crystal shape. They know about solubility. They know about what it means to dissolve. They know all these things, what the hell do I do with it?

Sam’s next response (lines 147-164) indicated that Matt had made his practice transparent enough for Sam to understand. But instead of taking up Matt’s question with a definitive answer, he instead reframed the question, addressing the overall challenges of shifting from traditional teaching to EDI.

Sam: So one thing that complicates this is, part of the shift that thinking about teaching this way makes you start to think about is the difference between teaching topics or science content, right? Like, solubility or combustion or particulate models of matter or whatever. You [used to] get out the glossary out of a textbook and look at those things. And instead, [now you are] thinking about teaching phenomena, right? Like, “How does an acorn become a tree?” “How does a tanker get crushed after it's cleaned out with a steam cleaner?” Those are fundamentally very different approaches [from your old way of teaching], and if you're thinking the experience you're having—which I think everybody has had who tries this—is... it's sort of of like an estuary, right? You're getting a mix of salt and freshwater, and in some sense that's bad for everything that lives in fresh water or salt water, so you're sort of in this middle space where you're not...you haven't completely transitioned across to this new way that you're trying to teach. But as a result you haven't abandoned some of the ways that you think about teaching, and so that's causing you cognitive dissonance, for lack of a better word. Right? So you're struggling with the fact that [you] want kids to know that when you say “solubility,” that has a definition.

In addition to reframing Matt’s question, Sam’s response also pushed back on Matt’s practice. That is, in the previous turns, Matt described his practice as having shifted from traditional to EDI. But in this turn, Sam suggested that Matt’s teaching included a mix of both traditional practices and EDI, using an analogy of an estuary (lines 156-161).
Matt then pushed back against Sam’s interpretation of his practice.

| 165 | Matt:          | But… just to clarify that, I mean, maybe I'm wrong but I feel like that's what   |
|     |                | we are doing. But I'm not having them memorize a definition. We're               |
| 166 |                | constructing a definition as we go through this process. So we got a            |
| 167 |                | phenomenon and essentially what they need to do in order to explain the         |
| 168 |                | phenomenon is they need to understand that there's different ways of            |
| 169 |                | identifying materials physically and chemically.                               |
| 170 |                |                                                                             |

Here, Matt made the claim that his practice did represent EDI, rather than a mix of EDI and traditional methods. Specifically, he claimed that he chose a phenomenon (lines 167-168), and that he asked his students to construct an explanation of that phenomenon (lines 168-169).

Over the next five minutes, Matt described how his class co-constructs classroom definitions. To make this practice more transparent, he used the example of defining “dissolving,” which took place during a “Mystery Powders” unit that was co-designed by the 8th grade teachers at West (Matt, Cheri, Brent). Because Sam had reframed Matt’s original question, Matt’s representation included two foci: 1) supporting his claim that his practice aligned with EDI, and 2) making his practice transparent enough for others to respond to his original question: “What do you do with the information that you've acquired by going through the storyline and by going through the claims-evidence-reasoning process?”

Sam took up both foci of Matt’s representation, beginning with Matt’s original, procedural question.
Sam: So I think it is extremely reasonable for you to have an internal science glossary that's built into [something like] Google Docs where you have, "Here's our definition of dissolve" ... and I think this is critically important, "Here are the investigations that led us to this and the evidence and the claims that we made out of those investigations that led us to that definition of dissolve." So not just a bunch of words that say, “dissolve means that the particles are” – whatever their definition is—“the particles are small enough to stay suspended in, for an extended, blah blah blah.” I don't know what their definition that you developed was or whether became that formalized or not. It may not have. But I think you have to link it, for your class, to specific investigations and things that they did so that it's concrete for them. Because that was how you developed the definition. They should have that.

Sam then turned to the question about whether Matt’s practice aligned with EDI, in terms of asking students to construct explanations of everyday scientific phenomena.

Now the bigger question for me is—always—what is the phenomenon that understanding and developing a definition of dissolve is in the service of? Because dissolving is not... exactly a phenomenon. Right? What I’m saying is, ultimately the place where that stuff appears is in the explanation of the phenomenon. And in the explanation of the phenomenon they better be able to explain ‘dissolve’ at least in the context of the phenomenon they’re trying to explain. And if they can do that then usually, yeah, you should be pretty happy with that, if you're happy with the explanation.

Transparency of practice. Throughout this conversation, the reliance on narratives as the sole tool for representing practice, and the context of “reflecting on unshared practices” left teaching practices somewhat opaque. In terms of tools, Matt verbally described (narrated) several weeks of instruction in just a few minutes, and did not provide any examples of his class’s evolving definition of “dissolving,” nor any examples of classroom work that his students used to construct that explanation. As a result, Matt’s practice remained somewhat opaque to the group.

That being said, Sam’s procedural question, “Can you be more specific about something you [do in your classroom]?” (line 137) served to make Matt’s practice more transparent. It is interesting to note that Sam did not pose any other procedural questions here. Specifically, he did not ask Matt to specify the phenomenon that his students used the concept of “dissolving” to explain.

This question could have served to make Matt’s practice even more transparent. [Note: Tim later
posed this question to Matt. The resulting conversation is analyzed in the next section, “West 8’s Chemistry Phenomena”

In terms of context, Sam’s invitation to “do whatever you think is productive” (line 10), may have constrained the group’s opportunity to make their practices more transparent to one another. This constraint was due not to the invitation itself, but rather to its timing. That is, the spontaneous nature of the question (at the beginning of the meeting rather than prior to the meeting) meant that the teachers did not bring artifacts of practice with them to the meeting. Had the teachers had more advanced notice of this opportunity, they may have been able to use artifacts of practice to make their practice more transparent to the group. Without such artifacts, Matt’s verbal representation left many specifics of his practice unclear.

**Theory/practice connections.** In this episode, the interaction of stance and resources afforded the group’s opportunity to learn, in terms of connecting generalized principles of EDI and the group’s contextualized practices. In terms of stance, Matt maintained an improving stance all throughout this episode. In his first two turns (lines 129-135, 138-146), Matt indicated that he was encountering a problem for which he did not yet have a solution, saying, “There's something I’m kind of struggling with a little bit,” (line 129), and “The way I'm doing things now aren’t jiving all that well. I'm kind of feeling like I'm not really sure, you know, how we do this,” (lines 142-144). Although he did not explicitly ask his colleagues to weigh in during these turns, he framed his problem as a question that he posed to the group (lines 129, 130-132, 146). This framing implicitly invited his colleagues to take up his problem of practice.

Having listened to Matt’s representation of his problem, Sam drew on his theoretical expertise as a resource to connect theory and practice. Specifically, he recognized that the practices Matt described in lines 138-146 did not necessarily align with the tenets of EDI, which he then explained to the group (lines 147-164). In this turn, Sam reframed Matt’s “procedural” struggle as a conceptual struggle that is part of the overall challenge of shifting from teaching
around ‘topics,’ to teaching using EDI. He specifically drew on the contexts of the group’s classrooms, contrasting between teaching about solubility as a topic (line 149, 163) versus using driving questions such as “How does an acorn become a tree?” and “How does a tanker get crushed after it’s cleaned out with a steam cleaner?” (lines 152-153) to explain phenomena. Had Matt spoken in more certain terms about his practice (proving stance), Sam may have been more hesitant to reframe Matt’s practice, and instead simply responded by attending to the procedural question that Matt posed (“What do I do with that?”).

After Sam reframed Matt’s problem as teaching in an “estuary,” Matt defended his practice as aligning with EDI, while still maintaining an improving stance. For example, two minutes into his extended (five minute) representation, Matt acknowledged Sam’s claim about mixing EDI and traditional teaching, saying “And the question I have, is that me getting my old and new mixed up still?” He also maintained his improving stance by restating his “what do I do with it?” question four times throughout the representation, and explicitly invited his colleagues weigh in, saying, “I'm just going to shut up and listen to what you have to say now.” This improving stance invited Sam to further explore the connection between Matt’s contextualized problem (organizing students’ co-constructed definitions), and the underlying theories of EDI (using those definitions in the service of an explanation) in lines 300-307.

**Attention to rationales.** In this episode, the interaction of stance and resources also afforded the group’s opportunity to learn in terms of drawing explicit attention to rationales for teaching practices. As described above, Matt’s improving stance invited the group to take up his “procedural” problem of managing students’ co-constructed definitions of science concepts. In terms of this procedural problem, Matt’s improving stance invited Sam to again draw on his theoretical expertise around EDI—in this case, shifting the group’s attention away from Matt’s focus on procedures (“What do I do with that?”) to an additional focus on rationales. That is, Sam could have closed the conversation with his brief response to Matt’s question (“So I think it is
extremely reasonable for you to have an internal science glossary that's built into [something like] Google Docs where you have, ‘Here's our definition of dissolve’” lines 288-290), focusing on the procedure. But instead, Sam followed up that procedural advice with an extended rationale for developing such classroom definitions (lines 290-299), calling attention to the critical nature of having such a rationale for this practice (“because that was how you developed the definition,” line 298-299). Matt’s improving stance invited Sam to attend to the rationale for why classroom “definitions” need to connect to the class’s day-to-day activities.

**Agency.** The conversational routine that best characterizes this episode is “extended advising.” That is, a participant (Matt) sought advice, which was then provided by another participant (Sam). Although Sam’s detailed advice afforded opportunities to learn in terms of theory/practice connections and attention to rationale (making the conversation “extended advising” rather than “quick advising”), all the agency for sense-making and problem solving was afforded to a single person: Sam. Although Matt did a great deal of talking during this episode, in all of his turns he essentially narrated his practice. In lines 165-170, he did push back on Sam’s interpretation of his practice, but the final interpretation and problem solving occurred during Sam’s turns (lines 147-164, 288-307). This imbalanced agency resulted from a complex interaction of tools, stance, resources and context.

As described above, the context of “reflecting on unshared practices” and the reliance on narratives without artifacts left Matt’s practice somewhat opaque to the rest of the group. This opacity constrained the group’s opportunity to visualize what happened in Matt’s class, which constrained their opportunity to engage in collective problem solving. Had the group had access to artifacts of Matt’s practice, the other teachers may have been in a better position contribute to a solution to Matt’s problem, rather than relying on Sam. Moreover, anyone in the group could have used such artifacts to draw Matt’s attention to particular aspects of his own practice, thereby scaffolding his thinking and problem solving. But because Matt’s practice remained somewhat
opaque, the other teachers left the problem solving up to Sam.

In terms of resources, Sam did not draw on facilitation expertise in the same way that he did in the May Studio Days. That is, in the May Studio Days, Sam’s turns served to draw out and push back on the teachers’ ideas, but he left the overall ‘final’ decisions up to the entire group. In this episode, Sam’s turns did draw out and push back against teachers’ ideas, but the ‘final word’ was his. Once Sam contributed his interpretation (lines 288-307), the teachers proposed no alternative interpretations, nor asked Sam to clarify any of his ideas. As in the February meeting, no one person (or feature) was individually responsible for this imbalanced conversational routine. Matt essentially positioned Sam as the person most capable of solving his problem, and the other teachers took up this positioning, as did Sam. Any participant in the group could have changed that positioning with a scaffolding question or an alternative interpretation, but no one did. Sam may have intended his interpretation in lines 147-164 to serve as a scaffold, but the group did not take it up in this way. Had he (or anyone else) drawn on facilitation expertise, or had the context included some sort of structured conversation protocol (e.g. the Critical Friends Group® Consultancy Protocol for framing and taking up dilemmas), it is possible that the other teachers (and/or Matt) may have felt positioned to make a greater contribution to the problem solving process.

Summary: “Mixed” talk—Affording and constraining learning opportunities (September meeting, Part 1)

Overall, the mediating features in the conversation around Matt’s struggle interacted to construct aspects of both more generative and less generative talk. In terms of affording features, Matt’s improving stance invited Sam to use his theoretical expertise (resources) to draw attention to the reasoning behind Matt’s class “definitions” (rationales) and to reframe Matt’s practical
question in terms of the underlying theory of EDI (theory-practice connections). In terms of constraining features, the spontaneous nature of the reflection (context) meant that teachers did not bring artifacts of practice to the meeting. Relying solely on narratives then (tools), left many details of Matt’s practice somewhat opaque (transparency). Without clear images of Matt’s practice, the teachers’ opportunities to contribute to a conversational routine of collective sense making were constrained. The context did not include any explicit structures for taking up Matt’s practice, and other than Sam’s one request for clarification, no one drew on any facilitation expertise (resource) to engage the group in collective sense making. As a result, the conversation fell into a routine of extended advising. While that advising included attention to rationales and theory-practices connections, Sam was positioned as the person responsible for doing that sense-making, leaving Matt and the rest of the group with very little agency. These interactions are represented in Figure 4-8. (In Figure 4-8, the white boxes contain the mediating features, printed in red (affording) and green (constraining), the green boxes represent aspects of more generative talk, the red boxes represent the aspects of less generative talk, and the lines connecting them represent the relationships between them.)

While this episode is certainly more “messy” than the conversations that took place during the Studio Day or the February meeting, the paths from the mediating features to the various aspects of more- and less generative talk were still somewhat straightforward. That is, in this episode of talk, the affording features interacted to construct aspects of more generative talk, while the constraining features interacted to construct aspects of less generative talk.
Figure 4-8. Constructing “mixed” talk: September meeting, Part 1.

The next episode however, was nowhere near this straightforward. Although the tools and context remained the same, people exhibited different stances from one another, and those stances shifted from time to time. And although the group drew on facilitation expertise more frequently than in the previous episode, that expertise did not necessarily lead to more affordances for learning. Overall, it is one of the “messiest” episodes of talk from the entire data set, exemplifying the complexity of how the group’s conversations mediated their learning opportunities.

West 8’s Chemistry Phenomena

Immediately following Sam’s advice to Matt (lines 300-307 above), the conversation shifted to a new episode that focused more specifically on the particular phenomenon that the
West 8 teachers used in their chemistry unit (which Matt had used in the previous episode to contextualize his question about constructing a class definition). In this episode, tools, stance, context, resources and conversational routines interacted to mediate the group’s opportunities to learn in very different ways than in the previous episode. In this section, I begin with transcript excerpts and narrative to connect them, then I move into the analysis through the lens of the four aspects of generative talk: transparency of practice, attention to rationales, theory-practice connections, and agency.

Tim’s asked Matt a question that began the new episode.

317  Tim:  So what was the phenomenon you were looking at?

Matt and Cheri began to co-construct their shared practice (lines 318-324), which Sam interrupted with an empathizing comment (line 325-329).

| 318  | Matt:   | All right, so I kind of feel like we got ourselves into a little bit… I wouldn't  |
| 319  |        | call it a mess…  |
| 320  | Cheri:  | Tad bit.  |
| 321  | Matt:   | Just a little bit, but it's a mess. How do we end up with a dual phenomenon?  |
| 322  |        | Which is…  |
| 323  | Cheri:  | We couldn't see it coming.  |
| 324  | Matt:   | So, so here in my mind this is what it is…  |
| 325  | Sam:    | Wait, before you say that. I just want to be clear. It's always a mess. Right?  |
| 326  |        | This is always a mess. Part of the reason people like the traditional way of  |
| 327  |        | teaching is it's not a mess. And so, one of the major problems with thinking  |
| 328  |        | about teaching this way is that it is always a mess, at least for the first three  |
| 329  |        | to five years. Sew your seatbelt on for that.  |

Over the next two and a half minutes, Matt provided a more detailed overview of the day-to-day activities in the West 8th grade teachers’ Mystery Powders unit, including the overall explanation that the teachers expected the students to construct—distinguishing between eight different substances in a mixture. After a five-second pause at the end of Matt’s turn, Sam evaluated the West 8 teachers’ practice, in terms of their alignment with the tenets of EDI.

| 357  | Sam:   | So again, I'm so…  |
| 358  | Matt:  | Go ahead, just let it fly. That's what we do usually.  |
| 359  | Cheri: | We started with something else. And that's what…  |
| 360  | Matt:  | Yeah, we did but…  |
Cheri then nominated her West 8 colleague Brent to represent (narrate) another of the West 8 teachers’ shared “phenomena.” This decision was briefly negotiated by the West 8 teachers.

Instead of waiting for Brent to take up Cheri’s nomination, Matt began to represent their shared practice.
appearances are alike, and basically the question is “What do we have here? Do we have something—coconut oil’s together just with some other stuff and this is now them mixed up?” Some think that it’s something different.

Cheri: I have a video [that I showed the kids].

Brent: And we have to be able to develop the skills to quantify what's different about them. We kind of use the “Fat versus Soap” from elementary that they did. But this is expanding it to actually trying to be able to describe the differences between them in a more quantitative chemical level. And then we can use that to talk about later on what changes [inaudible].

Sam: Okay now stop, I got that.

Brent: But the framing for it I haven’t been able to—'cause it's not also the kind of thing that you just come across somebody mixing.

Sam: Yeah, especially those two particular things.

Matt: Yeah.

Sam: Right.

Cheri: So we were trying to create, like, “Here's an experience that we're all having together” because we just didn't…

Brent: If you call it soap making…

During this representation, a quiet side conversation began between East teachers Jill, Kathy, and Brandon (line 424). Sam then (line 433) interrupted the West 8 teachers’ representation to bring the East teachers into the conversation.

Sam: Wait. I want to know what these guys [Jill, Brandon and Kathy] are asking.

Jill: Well, I was just saying that if you're covering in eighth grade chemistry: atoms, periodic table, reactions, acids and bases… that’s your chemistry unit?

Brent: Good question.

Jill: So find a common everyday chemical reaction that does that. You were using the soap thing, right?

Matt: Yeah.

Jill: But you know, why does this happen? How does it happen?

Matt: Yeah, I mean that crossed our mind, but just in our defense, one of the things we were worried about…

Sam: You don’t have to defend yourself.

Matt: Well, I know.

Matt then provided some rationale for why he and his West 8 colleagues chose “soap making” as their phenomenon, during which he referred to his 7th grade colleagues’ practice of asking students to explain—throughout a whole semester—how an acorn grows into a huge oak tree.

Matt: One of the things we were worried about was that we didn't want to have something that was too big, that went on forever.

Sam: Right, agreed.
Matt:

And so we kind of decided this year that was our problem last year—and so let's not do that this year. Let's make the phenomenon – that we thought was a phenomenon—basically long enough that we can keep coming back to it, without it dragging on and everyone just getting bored of the whole idea. So that was why we didn’t want to make it the “Acorn to the Oak Tree.”

Sam:

That's what I want to see the Acorn to the Oak Tree.

Cheri:

We don’t—yeah, that's just it. We don't have the Acorn to the [Oak Tree.] We want it. But we just haven’t…

Sam:

But I don’t know that you do. I want to see the Acorn to the Oak Tree because that can lead to the same kind of problems you're talking about where the kids want to gouge their eyes out because they’re like, “Again with the acorn to the oak tree?”

Matt:

I don't think it does. I've seen it. I mean, I don't do it. I've seen Keith do it and it doesn't seem to have that problem because it seems to be compartmentalized within itself so that you're not constantly… I feel like that's more of the story line. It's not…

Sam:

Okay, so part of the problem that we're going to have here is that—it's like having conversation in Italian with a bunch of people at the table who don't speak Italian. So let me think about this, because as much as I think, for me and maybe for you [West teachers], this idea of “What is a phenomenon?” and “What is the correct grain size phenomenon to select for this sort of task?” I think that's an interesting conversation. I think it's not—if we're going to talk as a whole group, I don't think that's a productive question. So I'm going to recommend a couple of possibilities. So the University of Washington just put out a video that is like a summary of how they think about science teaching. If you watch it you'll get some idea of—with some examples from actual classrooms—of what this stuff looks like and what the sort of purposes are, and what the goals look like. The other thing we can do, I think, is start with something smaller, so that you don't feel like there's this huge thing that you have to do. Because the huge thing is all well and good if you're interested in trying the huge thing. But it is a mess and it can be disconcerting to feel like you…or your class is out of control. That's a bad feeling. You don’t want to feel like, “My kids don’t understand what's going on. I don't understand what's going on. We've gone off the rails into this territory where I don't know how to get us back.” And that is not a place that I think anybody wants to be in.

Matt:

It's all right. It happens to me once a week.

Sam:

Yeah, and if you want to do that I’m all for you trying to throw yourself into the deep end of the pool with some cement shoes on. But what I am saying is, not everybody wants to do that, and I think there are productive ways that we can think across the group that will help you guys who have tried more radical stuff and more intense and large scale stuff, but will also help the
people who just want to try something that's like “this big” to see if this is even something that they care about.

**Transparency of practice.** As in the previous episodes in this meeting, in this episode the reliance on narratives as the sole tool for representing practice and the context of “reflecting on unshared practices” left teaching practices somewhat opaque. But in addition, stance and resources played important roles in terms of mediating the transparency of practice. In lines 318-324, both Matt and Cheri represented their practice with an improving stance. Matt acknowledged the limitations of their practice, referring to the shared West 8 teachers’ chemistry unit as “a mess” (line 321), which Cheri affirmed (“tad bit,” line 320). Cheri also pointed out the uncertain nature of trying out something new, saying, “We couldn’t see it coming,” (line 323). Sam used facilitation expertise (resource) by empathizing with the teachers’ struggles, saying, “it is always a mess, at least for the first three to five years,” (lines 328-329). Matt and Cheri’s improving stance, combined with the resource of facilitation expertise, set the tone for the group to take up the West 8 teachers’ practices in whatever ways would make them most transparent.

But following Matt’s representation, the conversation’s trajectory shifted. When Sam began to push back on the West 8 teachers’ practices (line 357), Matt and Cheri responded with different stances. Matt maintained an improving stance by inviting Sam’s critique, saying “Go ahead, just let it fly” (line 358). In contrast, Cheri shifted the focus of her attention to a different practice, saying, “We started with something else” (line 359), and “but that’s why, Matt,” (line 361). Cheri’s turns take a proving stance, because they explicitly turned away from the Mystery Powders, implicitly closing down the opportunity to take up (and learn from) that practice. Sam then responded to Matt’s invitation to “let it fly” with a proving stance, assessing the West 8 teachers’ practices in rather certain terms, arguing, “what you have chosen is not a phenomenon” (lines 363-364). Matt and Cheri again had very different responses. Matt acknowledged the limitations of his practice, exclaiming “I knew it!” (line 365, improving stance), whereas Cheri
again shifted her attention to a different practice (“But we…” line 366—proving stance). In Sam’s next turn, he posed a question that probed the rationale for choosing Mystery Powders as a phenomenon, asking “Where in your life do you encounter eight white powders that you have to mix into something and decide what they [are]?” (lines 370, 372-373). Cheri’s response (“back alleys,” line 374) provided some brief comic relief.

At this point, the conversation could have taken up the Mystery Powders as a phenomenon, providing an opportunity for the West 8 teachers to make their practice more transparent for others (and for the group to attend to rationale, make theory-practice connections, and distribute agency across the group). But instead, the topic shifted slightly, to a different “phenomenon” shared by the West 8 teachers (line 391), essentially closing the opportunity to learn from the West 8 teachers’ representation of “Mystery Powders.”

This shift (and resulting opacity) can be understood as the interaction of context, stance, and resources. In terms of context, while “reflecting on unshared practices” allowed space for the group to take up one another’s practices, it did not include any structures to mediate that take up. Thus, any member of the group could change the topic at any time. In terms of stance, although Matt and Cheri’s original improving stances invited the group to take up the Mystery Powders in conversation, the shift in Cheri’s stance to proving—perhaps in response to the proving stance of Sam’s assessment of their practices—turned away from the Mystery Powders, taking advantage of the “freeform” nature of the context. In terms of resources, in this moment no member of the group used facilitation expertise to return the group to the original topic (Mystery Powders). Thus, when Cheri shifted to the West 8 teachers’ practices around “soap making” in line 391, the rest of the group followed along. As a result of these interactions (context, stance, resources), the conversational routine around “Mystery Powders” ended abruptly (quick advising). That very brief routine constrained the group’s opportunity to make the West 8 teachers’ practices more transparent. It is important to reiterate that it was the interaction of multiple features (context,
resources, stance) – rather than any one feature or person— that constrained the transparency of the West 8th grade teachers’ practices.

**Attention to rationales.** As described above, the interaction between context, resources and stance resulted in the very brief conversational routine of quick advising. This routine closed an opportunity for the group to attend to Sam’s rationale, or to anyone else’s alternative interpretations of the “Mystery Powders” practice. Following the quick shift to the new topic (West 8’s phenomenon of soap making, lines 391-407), the mediating features in the conversation interacted in even more complex ways to constrain the group’s opportunity to attend to rationales.

About one minute into the West 8 teachers’ co-construction of their soap making phenomenon, the “freeform” context again constrained the group’s opportunity to dive deeply into to rationales. Just as Brent began to address the West 8 teachers’ “framing” (i.e. rationale, lines 425-426), a quiet, parallel conversation began among some East teachers (Jill, Brandon, Kathy). As a result of this parallel talk, some members did not attend to the developing focus on the West 8 teachers’ rationales. This time however, Sam used facilitation expertise to draw the group back together, saying, “Wait. I want to know what these guys are asking” (line 433). Although this move had potential for calling attention to others’ interpretations of the “Soap Making” practice (rationales), instead it introduced another (yet related) topic—Jill’s advice to the West 8 teachers to “find a common everyday chemical reaction” (lines 437-438) and explain “why does this happen? How does it happen?” (line 440). Here, the freeform nature of the context overpowered Sam’s attempts to use facilitation expertise, constraining the group’s opportunity to reason about whether “soap making” represented a phenomenon in the terms of EDI.

Eventually (line 466), Sam used facilitation expertise to draw the conversation about the West 8 teachers’ practices to a close, by: 1) pointing out the varying levels of attention to rationales across the group (lines 468-471), 2) emphasizing the need for the talk to be productive for everyone in the group (lines 471-472), and 3) suggesting two possible choices for future
conversations (lines 473-477 and 477-485). Although this move temporarily closed the opportunity to attend to rationales around the “Soap Making” practice, it opened future possibilities for this opportunity to learn in a more intentionally designed future context.

**Theory-practice connections.** Overall, this episode had the potential to support important connections between theory practice. Although it was never explicitly named as the goal of the conversation, the conversation supported the group’s understanding of the nature of a “phenomenon” in terms of EDI, by grounding it in examples from classroom practice. This unspoken goal was crucial. That is, the core reason for the teachers’ difficulty in identifying a ‘good phenomenon’ was the fact that they didn’t yet quite understand EDI’s underlying theory of teaching and learning. Or, they understood the theory in the abstract but had not yet learned how to contextualize it in practice. But instead of using practice to make sense of the general underlying theory, the group maintained most of their focus on practice, constraining their opportunity to learn. These connections were also constrained by the group’s frequent shifts between topics (caused by the interaction of stance, tools, context, and resources, described above), resulting in a shallow discussion characterized by a conversational routine of quick advising.

**Agency.** In terms of agency, this episode is quite different from the previous episode in this meeting. It demonstrates the complex and fluid nature of positioning within the group’s talk, the resulting shifts in their conversational routines, and the shifts of power for engaging in sense-making (agency). These fluid and frequent shifts are further afforded by the “freeform” nature of the context.

At the beginning of the episode, Tim posed the original question that sparked the conversation (“So what was the phenomenon you were looking at?” line 317). Considering that the question came from someone other than Sam, potentially the group may have felt welcome to interpret Matt’s practice more collectively, rather than relying on Sam’s advice. However, when
Matt began his extended representation of the day-to-day activities in the Mystery Powders unit, he seemed to be talking specifically to Sam, rather than to Tim or to the whole group. (There is no video for this meeting, so eye gaze and body positioning cannot be used to support this inference, but considering Sam’s position as sole sense-maker in the previous episode, this interpretation is plausible.) Regardless of Matt’s intent, when it came to interpreting the “Mystery Powders” unit (lines 357-375), Sam took up the position of sole sense-maker (rather than also positioning others as potential contributors). This kind of positioning, characteristic of “advising,” limited the group’s opportunity for distributed agency.

When the topic shifted (line 391) to discussing the West 8 teachers’ use of “soap making” as a phenomenon, Cheri and Matt clearly positioned Sam as the evaluator of their practices. Cheri nominated Brent to “tell him” [Sam] about their practices five times: twice in lines 391-392, and three times in lines 401-402. Matt affirmed Cheri’s nomination in line 403, and specifically named Sam as the evaluator in line 405. This positioning set up the conversational routine of quick- or extended-advising, potentially constraining the distribution of agency across the group.

In contrast to Cheri and Matt, Brent did not position Sam as the sole evaluator of the West 8 teachers’ practices around “soap making.” For example, Brent pushed back against Cheri’s interpretation of their practice as being phenomenon-based (“I'm not sure if the other one is a phenomenon,” line 396), and began to provide a rationale (“So I don't still think it is, because of the way we framed it,” line 407). These turns positioned Brent as a capable interpreter of his own practice, pushing the conversation toward collective sense-making. But instead of engaging with Brent’s rationale, in the next turn (line 408) Matt began to narrate the West 8 teachers’ practices to Sam, positioning Sam once again as the “most expert” sense-maker. Cheri and Brent then followed Matt’s lead, co-constructing a narration of their shared practices (lines 408-422). But in lines 425-426 and 432, Brent again positioned himself as a capable contributor to the sense-making process (not just a narrator), returning to the “framing” of the classroom activities.
Overall, Brent’s turns nudged the conversation toward collective sense-making and distributed agency.

Like Brent, Jill also did not position Sam as the sole sense-maker of the West 8 teachers’ practices. While she did not specifically evaluate whether the “soap making” activities constituted a phenomenon, she considered the range of the 8th grade chemistry standards (lines 434-435) and suggested a (somewhat general) alternative to “soap making” as a phenomenon (437-438, 440.) In this way, Jill positioned herself as a potential contributor, (albeit around a slightly different imagined practice), instead of relying on Sam as the sole sense-maker, again opening up the possibility for distributed agency.

At different points in the conversation, Sam accepted and rejected the position of sole sense-maker. As described above, in the talk around the Mystery Powders (lines 357-375), Sam served as the sole interpreter. But in the talk around “soap making” (lines 391-465) his positioning was more fluid. For example, in line 423, he said, “Okay now stop, I got that.” On the one hand, this move could be considered a purely facilitation (rather than sense-making) move, intended to expedite the West 8 teachers’ representation. On the other hand, this move served to facilitate Sam’s own (rather than the group’s) sense-making, as he did not check in with others in the group to assess whether they also “got that.” Instead, he encouraged the West 8 teachers to jump ahead, once he had heard enough about their procedures to understand the gist of what they did in their classrooms, thereby positioning himself as the person responsible for interpreting their practices. These turns constructed a routine of advising. But later, Sam explicitly positioned others as contributors to the sense-making process. For example, when Sam interrupted the West 8 teachers’ representation, saying, “Wait. I want to know what these guys are asking,” (line 433), he was likely trying to draw out the East teachers’ interpretation of the West 8 teacher’s practices. Furthermore, after Jill responded, Sam remained quiet, allowing Matt to take up Jill’s advice (line 441-442), essentially rejecting the position as sole sense-maker, and opening the door for
collective sense-making and more distributed agency.

Although Matt’s response (“that crossed our mind,” line 441) acknowledged Jill’s advice, Matt did not take up her contribution any further, essentially closing the door on any sort of “collective” discussion of her advice. Instead, Matt returned to ‘defending’ (line 441) the West 8 teachers’ rationale for choosing soap making as a phenomenon (i.e. wanting to avoid a phenomenon that was “too big,” that “went on forever,” lines 445-446, 448-453). Although Sam did affirm Matt’s rationale (“Right, agreed,” line 447), it is not clear that Matt intended to position Sam as the evaluator of that rationale. Instead, Matt seemed to position himself as a contributor to the group’s understanding of the West 8 teachers’ rationale, in the same way that Brent did by attending to the group’s “framing” of the soap-making activities (lines 407, 425-426, 432). In this way, Matt opened the door to more collective sense-making.

In the end, Sam did hold the final power over the sense-making process, as he decided to temporarily suspend the conversation (lines 466-472). But over the span of the next (October) meeting, this decision actually served to afford the teachers with more agency, as it allowed Sam time to design a different context that might generate “productive ways that we can think across the group” (line 489-490). Overall, this episode exemplifies the extremely complex and messy ways that the group’s opportunity for distributed agency was mediated by positioning, context, resources and conversational routines.

**Summary: “Mixed” talk—September monthly meeting, Part 2**

Overall, this episode can be characterized as two rounds of “quick advising” around two West 8 chemistry “phenomena” (mystery powders and soap making). In the talk around both topics, the group’s trajectory toward productive talk was interrupted by different mediating features, shifting the talk toward the much less productive routine of “quick advising.” Those
shifts occurred in different ways.

In the talk around mystery powders, although Matt and Cheri relied on narratives, their improving stance combined with Sam’s facilitation expertise (empathy) set the conversation on a potential trajectory toward some aspects of generative talk. That trajectory was interrupted when Sam pushed back against the West 8 teachers’ practices as “not a phenomenon.” At that point, a combination of features—the “freeform” nature of the context and one participant’s shift to a proving stance—allowed the topic of the conversation to shift abruptly (to soap making). When no one drew on facilitation expertise to draw the group’s focus back to the mystery powders, that part of the conversation ended, constraining any potential opportunities to learn from examining that practice.

In the talk around soap making, Brent’s improving stance and his attention to rationale again set the group on a potential path toward more generative talk. But this time, that trajectory was interrupted by the “freeform” nature of the context, when the East teachers began a parallel conversation. This time, Sam drew on facilitation expertise to draw the East teachers into the conversation, which potentially could have helped the group to engage in collective sense-making around whether and why “soap making” constituted a “phenomenon” in the terms of EDI. But unfortunately that facilitation move had the opposite effect. It instead introduced yet another (though closely related) topic into the mix (Jill’s advice to find a common everyday chemical reaction). The freeform context allowed the topic to shift again, when Matt turned away from Jill’s advice and instead turned toward the topic of an appropriate “grain size” for phenomena. Sensing a trajectory toward imbalanced agency, Sam drew on facilitation expertise to close the conversation and propose a different context for the group’s next meeting. Although that move constrained the group’s immediate opportunity to learn, it opened possibilities for opportunities to learn in a different future context. These complex interactions are represented in Figure 4-9. (The dotted arrows represent potential trajectories that were not realized in the conversation.)
Like the previous episode (Matt’s Problem of Practice), this episode contained both affording features (improving stance, contextual, theoretical and facilitation expertise) and constraining features (narratives only, lack of facilitation expertise, proving stance). But unlike the previous episode (which constructed aspects of both more- and less generative talk in relatively straightforward ways), in this episode, the interaction of the mediating features moved the initial trajectory of the group’s talk away from more generative talk, toward a conversation that constrained the group’s learning opportunities overall. This episode then, demonstrates the importance of focusing not just on the direct connections between individual mediating features (represented in the white boxes in Figure 4-9) and aspects of talk (green and red boxes), but on the interactions between the features.
Chapter Conclusion

In this chapter, I presented my findings in regard to the central research question of this study: How do conversations around practice mediate a teacher learning group’s opportunity to learn about teaching? First I identified and described five features that consistently mediated the generative nature of the group’s talk (context, tools, stance, resources and conversational routines) and the varieties of each feature that occurred in the group (See Figure 4-1). Next, I described the varieties of each feature that were most associated with more- and less generative talk. (see Figure 4-2). Last, I demonstrated the complex ways in which the five conversational features interacted to mediate the group’s opportunity to learn in four different conversations (See Figures 4-6, 4-7, 4-8, and 4-9.) In the next Chapter, I summarize and discuss these findings in terms of their implications for teacher education.
Chapter 5

Conclusion

This Chapter concludes the dissertation. The chapter begins with a brief overview of the study and a summary of the findings. Next, I discuss some nuances of the findings, along with their implications in terms of supporting teacher learning through conversations around practice, and in terms of future research around this kind of teacher learning. I also propose some underdeveloped wonderings and conjectures regarding these data that I plan to pursue in future analyses. Then I summarize the contributions of this study to the teacher education literature, and articulate the limitations of the study. Finally, I propose future research that I plan to do, and that is needed in general, to further develop our understanding of how conversations around practice mediate teacher learning.

Overview of the Study

This study addresses a contemporary challenge in teacher education, namely supporting inservice teacher learning in small, job-embedded learning groups in which teachers engage in conversations around practice. While these groups have become a more regular form of professional development over the last few decades, facilitators frequently report a common challenge: the persistence of “traditional” discourse practices that are shaped by prevalent school cultures of privacy, non-interference, and individualism, and by the outdated expectation that professional development experiences provide opportunities for more expert individuals to advise less expert individuals of “best practices.” Drawing on sociocultural perspectives of learning, researchers conjecture that teacher groups’ discourse practices mediate what, the degree to which
and the ways in which teachers learn through talking about practice. But few studies have investigated this conjecture, or attempted to explain how teacher talk mediates teacher learning. This study addresses that gap in the literature.

Specifically, I posed the following research questions in this study:

How do conversations around practice mediate a teacher learning group’s opportunity to learn about teaching?

a) Which designed and spontaneous features of the group’s conversations around practice accounted for differences in the generative nature of those conversations?

b) How did those features mediate the generative nature of the group’s talk?

Drawing on the teacher education literature, in this study I defined four aspects of “generative” talk that are thought to serve as affordances for learning about teaching. These aspects include: public, transparent practices; emphasized attention to rationales; theory-practice connections; distributed agency. Conversely, I defined four corresponding aspects of group talk that are thought to constrain learning, including: opaque practices; limited attention to rationales; a focus on theory or practice; limited or imbalanced agency.

This investigation can be characterized as a microethnographic case study, in which I drew on methods of ethnography and discourse analysis to make sense of a group of educators’ talk around ambitious science teaching practices as a form of professional development. I observed and video/audio recorded the group’s conversations as they met approximately monthly over the course of one school year. I also regularly interviewed participants using clips from the video/audio recordings of meetings to elicit their interpretations of the group’s discourse. Based on my analysis of these data sources, I generated two central claims that address the research questions. These claims are summarized in the next section.
Summary of Findings

The findings of this study support two claims about how conversations around practice mediate educators’ opportunity to learn about teaching.

Claim 1: Five conversational features mediated the group’s opportunity to learn.

Five features of this group’s conversations around practice consistently mediated their opportunity to learn about teaching. Those features were:

- the context of the conversation, in terms of its goals, focus, and structure
- the tools that group members used to represent their teaching practices
- the stance that individuals took when representing practice, in terms of proving versus improving the effectiveness of that practice
- the resources that the group drew upon, in terms of expertise
- the conversational routine of the talk, characterized by the degree to which the group engaged in negotiation (versus narrating or advising) and the ways that participants were positioned to make sense of practice.

Across the group’s ten meetings, each of these five features could either afford or constrain learning, depending on how that feature was expressed in the conversation and how it interacted with other features. In terms of context, conversations that included planning and reflecting on shared practices or reflecting on unshared practices constructed the most generative talk. Conversely, conversations that focused on imagining future practices or checking in constructed the least generative talk. In terms of tools, using visual artifacts to support verbal representations of practice generated affordances for learning. Verbal representations alone did sometimes construct generative talk, but only when supported by extensive questioning for
elaboration. Maintaining an improving stance in conversations generally afforded learning opportunities, whereas proving stances constrained those opportunities. Conversations that drew on resources of contextual, theoretical and facilitation expertise constructed a number of aspects of generative talk, whereas learning was constrained in conversations that drew on only one or two of these kinds of expertise. Conversations characterized by the routine of collective sense-making or extended advising were most generative of learning opportunities, whereas routines of quick advising, affirming and elaborating, and minimal take up most constrained the group’s opportunity to learn. These findings are summarized in Figure 4-2.

**Claim 2: The five conversational features interacted with one another to mediate the generative nature of the group’s talk in complex, patterned ways.**

While there were some direct associations between specific conversational features and specific aspects of more- or less generative talk, an important finding of this study is that these features often interacted with one another to mediate learning opportunities in complex ways. In this section, I summarize the complex ways that the five conversational features interacted to construct specific aspects of more- and less generative talk.

**Transparency of practices**

The degree to which the group’s practices were made transparent was closely related to the tools that they used to represent their practices in conversation. In general, this group relied heavily on narratives (without using visual artifacts such as student work to supplement those narratives) as the standard tool for representing practice. As a result, the group’s opportunity to learn was regularly constrained because these narrations told somewhat vague stories, without attention to specific aspects of teaching and learning. However, context, resources, and stance
often interacted with tools to mediate transparency. Specifically, the context determined whether
the teachers brought artifacts with them to the meeting, and in the case of the Studio Days, the
context replaced artifacts with live observations. Participants’ use of facilitation expertise
(resource) determined whether they actually used any available artifacts in the conversation. In
the absence of artifacts, participants sometimes mitigated opacity by drawing on facilitation
expertise, posing questions to one another to provide more details of the practice. Stance was
related to this questioning, and thus to transparency, in the sense that an improving stance invited
questions from the group, whereas a proving stance often discouraged them. The nature of each
conversational routine also mediated transparency, in the sense that some routines (collective
sense-making, extended advising) required the group to generate a public, shared vision of
practice, while others (quick advising, affirming and elaborating, no/minimal take up) did not.

Attention to rationales

How much attention the group paid to rationales for practice (as opposed to just the
procedures of practice) depended heavily on the conversational routine in which the group
engaged. In general, the conversational routines of collective sense-making and extended
advising were most productive in terms of attending to rationales for teaching, whereas quick
advising, affirming and elaborating, and minimal take up were the least productive routines. But
the nature of each conversational routine was shaped by a combination of stance, resources, and
context. Specifically, the speaker’s stance could either open up or close down invitations for
others to probe the speaker’s rationale. Facilitation expertise (or lack thereof) shaped the nature of
the questions posed to the speaker, and the context shaped the group’s expectations for taking up
one another’s thinking. Each of these features influenced the kind of routine in which the group
engaged, and in turn, the degree to which the group attended to rationales for teaching practices.
**Theory-practice connections**

The degree to which the group made connections between theory and practice was largely related to the design of the context, which determined the resources available to group in terms of expertise. In general, in contexts where the teachers and Sam were present, contextual and theoretical expertise were available to the group. The mere presence of theoretical and contextual expertise did not suffice to support theory-practice connections however. Rather, the group had to draw on facilitation expertise in order to meaningfully contextualize the theories underlying EDI. In contexts where Sam was not present, his theoretical (and facilitation) expertise was not available to the group, limiting the group’s potential for theory-practice connections. In all contexts, the ways in which the group drew on the available resources was mediated by stance. That is, in conversations where participants represented their practices with an improving stance, others frequently attempted to probe potential connections (or lack thereof) between those practices and the underlying theories of EDI. Conversely, when participants represented their practices with a proving stance, others rarely sought out theory-practice connections (or pointed out the lack of connections).

**Agency**

By definition, the conversational routine in which the group engaged was closely related to the ways that the talk distributed agency for problem solving and sense making among the participants. For example, a conversation was only characterized as “collective sense making” if it positioned the participants with substantial agency, in relatively equal proportions, whereas a similar conversation (in terms of transparency, attention to rationales, theory-practice connections) that positioned some people with substantially more agency than others would be
characterized as extended advising. As described above, the nature of each conversational routine was shaped by a combination of stance, resources, and context (see “Attention to rationales”). In addition, the group’s use of tools for representing practice also mediated how agency was distributed among the group. As described above, the group’s heavy reliance on narratives frequently left the group’s practices somewhat opaque (see “Transparency of practices”). When participants did not share a clear vision of each other’s practices, their potential for engaging in collective sense-making was constrained. Also described above, that opacity was sometimes mitigated when participants drew on facilitation expertise (posing questions to one another to provide more details of the practice) and represented their practices with an improving stance (inviting questions from the group, see “Transparency of practices”). The relationships described in this section are summarized in Figure 5-1. Note that in Figure 5-1, stance is not directly related to any aspects of more- or less generative talk, but as described above, stance indirectly mediated all aspects of talk by interacting with the other features.

Figure 5-1. Relationships between mediating factors and aspects of more- and less generative talk.
Discussion and Implications of Findings

In this section, I discuss some nuances of the findings, along with their implications for practice and future research, and their connections to the existing literature. In this discussion, I attend to the relative importance of the mediating features, and issues around stance, contexts, facilitation, and the inherent tension between expertise and positioning.

The relative importance of the five mediating features

Reflecting on the group’s ten meetings across the school year, it is hard not to wonder whether some of the five mediating features are more powerful than others, in terms of their potential for mediating a group’s opportunity to learn. As I have argued throughout the findings, no one feature mediated the group’s learning opportunities independently. Rather, the five features interacted with one another in various ways. That being said, the conversational routine seems to stand out as an important feature. That is, whenever the group engaged in the conversational routines of minimal take up, affirming and extending, or quick advising, the talk generated few substantive learning opportunities overall. Conversely, when the group engaged in collective sense-making and even extended advising, learning opportunities were afforded overall (although to differing degrees). But considering the complex ways that the features interacted, it would be unwise to generalize that the conversational routine is more important than the other features. For example, a group could engage in collective sense-making, while simultaneously drawing only on facilitation and contextual expertise. That conversation would not be as likely to generate learning opportunities as one in which the group also drew on theoretical expertise. This comparison holds true for the teachers-only Studio Day planning conversations (drawing mainly on facilitation and contextual expertise) versus the Studio Day reflecting/revising conversations.
in which teachers and Sam were present (drawing on facilitation, contextual, and theoretical expertise). (To be fair, the teachers did draw on theoretical expertise during their planning meeting, but not to the same degree that Sam did during the Studio Day.) Although both conversations took on a routine of collective sense making, the inclusion of facilitation, contextual, and theoretical expertise during the Studio Day reflecting/revising conversations generated greater affordances for learning, especially in terms of theory-practice connections.

Thus, instead of privileging conversational routine as the most “important” mediating feature, it is best to view the other features as prerequisites to the conversational routine. The other features also serve to mediate the relative “power” of the routine, in terms of generating learning opportunities. As prerequisites, stance, tools, context and the resource of facilitation expertise interact to construct a particular routine (minimal take up, extended advising, etc.). During a conversational routine, stance, tools, context and resources furthermore interact to mediate the power of the routine, in terms of which and how many aspects of generative talk are achieved (theory-practice connections, transparent practices, etc.) and the degree to which each of those aspects are generated (e.g. the degree to which practice is made transparent).

**Stance**

As discussed in the findings (Chapter 4), stance played an important role in mediating the generative nature of the group’s talk. In general, stance-taking characterized as “improving” constructed more generative talk by inviting the group to take up representations of practice. In these instances, the group took up representations by pressing for elaboration, posing questions about rationales, and reframing problems, which resulted in more transparent practices, emphasized attention to rationales, and theory-practice connections. Stance-taking characterized as “proving” constructed less generative talk by discouraging the group from taking up
representations in these ways. These findings support those of Nelson, Slavit and Deuel (2012). While this relationship between stance and learning opportunities is somewhat straightforward, the construct of stance is quite complex, in terms of how it is enacted, and how it can be analyzed. In this section, I address issues of analyzing the intent versus the function of stance taking, the fluid nature of stance, and the multiple dimensions of stance.

**Intent versus function of stance taking**

This study contributes to the existing literature around stance-taking in teacher learning groups by providing some nuance regarding the ways in which stance is analyzed. Specifically, this study highlights the necessity of focusing on the function of (rather than on the intent behind) participants’ stance taking when analyzing how teachers’ conversations mediate their learning opportunities. Analyzing participants’ intentions requires a high level of inference. Of course, researchers can always interview participants about their intentions, and while interview data can certainly contribute to a researcher’s analysis, it can also complicate that analysis, as the risks of self-report data are well known (Paulhus, 2002). But regardless of the speaker’s intent, analyzing the function of speakers’ stance taking requires a lower level of inference, and more importantly, it is more useful for analyzing how teachers’ conversations mediate their learning opportunities.

Take, for example, the instance in the September conversation around West 8’s “Mystery Powders” phenomenon when Cheri’s turn shifted attention to a different practice (“soap making”). Based on my coding framework, I coded this move as taking a proving stance, because it explicitly shifted away from talking about Mystery Powders, and instead focused on a practice that Cheri argued was better. But Cheri may have changed the topic for any number of reasons, some of which may have nothing to do with “proving” the effectiveness of her practice. In terms of understanding how the conversation mediated the group’s learning opportunities, inferring why
Cheri turned away from talking about the Mystery Powders is less useful than analyzing how the group took up Cheri’s turn. In this particular instance, Cheri’s West 8 colleagues followed her lead, abandoning the Mystery Powders and focusing on a different practice. Furthermore, no one in the group (including Sam) attempted to return to talking about the Mystery Powders. Essentially, the group implicitly agreed to close the conversation around Mystery Powders, which also removed any opportunities for the group to learn by talking about that particular practice. (It should be noted that while the shift from Mystery Powders to Soap Making eliminated opportunities to learn through talking about Mystery Powders, it opened potential opportunities to learn through talking about Soap Making).

The same argument about the value of focusing on the function (rather than the intent) of stance taking holds true for analyzing how participants take up each other’s practices as well. For example, in the February meeting, I coded Keith’s advice to Josh about using a bulletin board to support students’ explanations as taking a proving stance, based on the “certain” (rather than tentative) nature of his language. However, Keith may not have intended for his advice to be “absolute,” going unquestioned. He may have very well welcomed questions and critiques of his advice, and taken up such moves as a way to improve his own practice of supporting students’ explanations. Nonetheless, the group took up Keith’s advice as the “final word,” posing no questions to him about the bulletin board, and quickly switching to a new topic. Regardless of Keith’s intentions, his advice functioned as proving, by providing unexplored advice. Throughout the data set, when making sense of how stance interacted with other features to mediate the group’s opportunity to learn, it was most useful—and required a lower level of inference—to focus on the function (rather than intent) of participants’ stance taking. Other researchers may benefit from taking this approach to analyzing stance as well.

As I coded the data in this study, I became increasingly uncomfortable with the terms “proving” and “improving,” for characterizing my participants’ stance taking, considering the
potentially pejorative connotation of the term “proving,” and the assumptions that the term may imply about individuals’ intentions (described above). After all, these teachers formed this group voluntarily, for the expressed purposes of learning and improving their teaching. Their mere presence in the group then, suggests a stance of wanting to improve their practice.

In the findings, I characterized individuals’ stances as “proving” when they used certain (rather than tentative) language (implying the effectiveness of the practices they represented), when they did not explicitly invite colleagues to take up their representations, when they explicitly turned away from talking about their practice, or when they “defended” their practice in the face of critique. But in the context of publicly representing and making sense of one’s practices in a group of colleagues, there may be times that any of these moves are perfectly appropriate and potentially productive (and therefore not worthy of a pejorative term). For example, during the September conversation around the West 8th grade teachers’ chemistry phenomena, Matt responded to Jill’s suggestion to use a “common, everyday reaction” instead of Mystery Powders or soap making saying, “Just in our defense…” In this turn, I characterized Matt’s stance as “proving.” But Matt’s “defense” of his practice was potentially productive for the group’s learning opportunities, because he included a rationale behind his team’s decision to use these phenomena (limiting the size of a phenomenon to prevent student “burnout”). Perhaps then, a potentially pejorative term like “proving” is not the most appropriate umbrella term for these moves in this kind of professional development context.

These terms for characterizing stance were coined by Nelson, Slavit & Deuel (2012), who characterized an overall teacher group’s stance in terms of how they made sense of and used student-learning data. In that context, the words “proving” and “improving” are generally used in a “functional” way (as discussed above), to describe how the group handled the data. Used in this way, the term “proving” feels less pejorative. But for characterizing individual’s stances, or in professional development contexts other than analyzing student learning data, “proving” may
not be the best word to characterize stance. (To be clear, the construct that term represents is very important to analyze, but the particular word itself—“proving”—may impose inappropriately negative connotations, when used to characterize individual’s stances, in this kind of PD context.)

**Fluid nature of stance**

This study extends previous findings that stance is a fluid (rather than fixed) trait of teachers’ representations. For example, Braaten’s (2011) study of stance taking over the course of a year demonstrated how stance may shift over long periods of time (months), and in multiple directions. My study points out that stance can also shift in much shorter periods of time, even from one conversational turn to the next. Paying attention to these short term shifts (not just long terms shifts) may prove useful to understanding how conversations mediate teachers’ opportunity to learn. For example, in the September conversation around the West 8th grade teachers’ chemistry phenomena, both Matt and Cheri’s stances shifted between proving and improving multiple times. As described in the Chapter 4, these shifts interacted with other conversational features (context and resources) to constrain the group’s opportunity to learn. These shifts are especially noteworthy in comparison to the stability of Matt and Cheri’s stance taking during most of the study. That is, both Matt and Cheri maintained an improving stance during the vast majority of turns (and conversations). For analysts then, paying attention to short term (not just long term) shifts in stance taking—especially when those shifts differ from participants’ long term patterns of stance taking—may be particularly important for understanding how a group’s conversations mediates its learning opportunities.
Dimensions of stance

This study also extends the literature around stance taking in teacher learning by highlighting the complex and multi-dimensional nature of stance. As I made sense of these data, I drew on the literature in professional development to define my analytic codes for characterizing teachers’ stances. In particular, I drew heavily on Nelson, Slavit and Deuel’s (2012) two dimensions of an inquiry stance toward student learning data in professional learning communities: an epistemological stance toward student-learning data, and the group stance toward dialogic interactions. At the time, I did not appreciate the need to separate stance into multiple dimensions, and instead defined a single analytic construct of stance as existing along a proving-improving continuum (See “Stance” in Chapters 2 and 4). While using a single improving/proving code was analytically useful to me while making sense of my data, as I reflect on the findings, I realize that the single dimension of improving/proving did not always effectively characterize the different contexts in which participants took stances in conversations.

Take for example two instances in the findings (Chapter 4): Brandon’s brief narration of having “no issues” in regard to his project-based learning (see “No/minimal take up”), and Keith’s representation of using a bulletin board to support students’ explanations (see “Josh’s struggle”). While I coded both of these turns as taking proving stances, the different contexts highlight two different dimensions of stance taking—stance taking when focused on one’s own practices, and stance taking when taking up others’ practices. For example, Keith represented his practice in response to Josh’s expressed struggle. While Keith used somewhat “certain” (rather than tentative) language to describe the effectiveness of his practice (a defining characteristic of “proving”), what’s missing from this characterization is its focus: attending to Josh’s expressed problem of practice. Upon listening to Josh’s struggle (supporting kids’ connections between day-today activities and an explanation of a scientific phenomenon), participants could take up Josh’s
practice in (at least) two ways—by sharing practices that had proven useful to them in mitigating a similar struggle (“advising”), or by posing questions or multiple alternatives to Josh to help him solve his own problem (“scaffolding”). These moves reflect two different stances toward responding to colleagues’ representations. “Advising,” serves to provide a solution to a struggling teacher (as Keith did in this example), whereas “scaffolding” serves to help the teacher construct their own solution (as Sam did during the Studio Days). As described above (in “Intentions versus function of stance taking”), it is important to note that Keith may have intended for his advice to Josh to serve as just one example that could be compared with other practices (i.e. scaffolding). But in combination with the context and resources of the conversation, Keith’s advising functioned as a quick, certain solution to Josh’s struggle.

While the single construct of “improving-proving” was sufficient for analyzing this data, in future research, it may be useful to separate stance into two dimensions: stance toward representing one’s own practices (proving-improving), and stance toward taking up others’ practices (advising-scaffolding). Comparing these two proposed dimensions back to Nelson and colleagues’ (2012) framework, there is some overlap between our dimensions, but they are not exactly the same. The same can be said when comparing my two proposed dimensions of stance to the four dimensions of Braaten’s (2011) framework for stances taken by teachers in a science teacher Video Club – there is overlap, but the dimensions characterize slightly different aspects of stance. These differences highlight the complex nature of stance taking, and point to the likelihood that additional dimensions of stance exist. Which dimensions to pay attention to likely depend on the context of the group’s conversation and the research questions that are being investigated. Identifying the various dimensions of stance may prove useful to researchers who attempt to make sense of teachers’ complex conversations around practice. As such, more research is needed to investigate the various dimensions of stance and the relationship between stance and learning opportunities.
Contexts

In the findings I addressed six different specific aspects of contextual design that consistently mediated the group’s opportunity to learn through conversations around practice. These contextual aspects include: the presence or absence of built-in structures for making practice transparent; the “grain size” of the practices; the amount of time dedicated to talking about the practices; the degree of consensus required; the expectations around taking up others’ representations in the conversation; the resources available (in terms of expertise). The ways in which each of these contextual aspects mediated opportunity to learn is addressed in the findings (Chapter 4). In this section, I further discuss issues around designing contexts that support opportunities to learn, including attention to participation structures, use of artifacts, reflecting versus planning, and grain size of practices.

Participation structures

This study supports the existing literature around teacher talk and teacher learning, by highlighting the important ways that the structures (or lack thereof) for taking up practice in professional development conversations can mediate opportunities to learn. In this group, conversations were essentially “free form,” meaning that there were no explicit structures of rules for how to participate. As a result, opportunities to learn were sometimes constrained when participants shifted the focus of the conversation away from the practice under consideration (see “West 8’s Chemistry phenomena” in Chapter 4), or when the group simply did not take up each other’s practices in any great depth (see “Constraining opportunities to learn: February monthly meeting” in Chapter 4). This group (and other groups who are new to working together in a particular way) may benefit from contexts that provide more structure for focusing and taking up
practice, such as using a conversation protocol.

Conversation protocols provide procedural steps and guidelines for talking about practice, including “defining relevant artifacts for scrutiny, establishing guiding questions for considering those artifacts, and structuring both participant roles and the use of time” (Little & Curry, 2009, p. 30). McDonald, Mohr, Dichter, and McDonald (2013) argue that protocols increase the focus on and transparency of practice in comparison to “just talking” (p. 7). For example, conversation protocols could have potentially focused the conversation about West 8’s chemistry phenomena on a single practice (rather than shifting between multiple practices), helped the group to explore and evaluate Keith’s advice to Josh about using a bulletin board to connect day to day activities to overall explanations, and supported the use of artifacts for learning from practice during the May Studio Day conversations. It is important to note that simply following the rules of a protocol does not guarantee that a group will learn from talking about practice. As Little and Curry (2009) noted, teacher groups sometimes privilege the form of a protocol (keeping time, following the prompts) over the substance (problematizing practice). These findings highlight the important issue of expertise in facilitation that is needed to use protocols productively (discussed below in “Facilitation expertise”).

**Use of artifacts**

This study supports the existing teacher education literature around the importance of using artifacts of practice in professional development contexts to support teacher learning opportunities (Ball & Cohen, 1999; Little, 2002; Kazemi & Franke, 2004; Lewis, Friedkin, Baker, & Perry, 2011). As discussed above (in “Transparency of practice”), artifacts such as student work or videos of teaching make practice transparent in a way that talk alone does not. In several of this group’s conversations, teachers did not focus on artifacts of practice because they
were not specifically asked ahead of time to bring artifacts with them. Including this requirement when designing professional development contexts could greatly improve the transparency of practice in conversations.

Of course, having artifacts of practice available does not mean that groups will necessarily use them. Take for example the May Studio Days where the group had samples of every student group’s work throughout the day, but never actually looked at them during their conversations. Furthermore, existing research highlights the fact that even when groups do look at artifacts in conversation, teachers often find it difficult to use artifacts productively, instead making comments that are general, evaluative, superficial and/or procedural (van Es, 2012; Pfeiffer & Featherstone, 1997; Nelson et al, 2012; Coles, 2012; Earl, 2009; Timperley, 2009). These findings reiterate the important role the facilitation expertise plays in making productive use of artifacts in a designed context.

Reflecting versus planning

Job-embedded professional development requires teachers to both teach and learn from their teaching at the same time. This duality can create a tension between using professional development time to learn from practice or to help teachers plan curricula that will achieve the goals of the PD and also “cover” all of the required state standards in the course of the school year. This tension is especially prominent when teachers are developing new curricula or in schools that have low standardized test scores (Tranianou, 2012; Anagastopolous & Rutledge, 2006). As a result of this tension, teachers sometimes feel pressure to spend their time together focused on future teaching, rather than reflecting on past teaching. Cheri eloquently referred to this feeling as “go time,” in explaining why the West 8 teachers switched from “soap making” to Mystery Powders as a focus of instruction, without knowing for sure whether either one
constituted a phenomenon within the tenets of EDI. The West 8 teachers may have missed an opportunity to learn about EDI through reflecting on students’ explanations of soap making, due to the pressure they felt to move forward and “cover” properties of matter through Mystery Powders. While imagining future practices as the focus of professional development is certainly not without merit, the hypothetical nature of conversations around potential future practices does not provide teachers with opportunities to learn from analyzing real evidence of their own students’ learning that reflective conversations around artifacts of practice can provide. In this sense, conversations that reflect on practice may better afford learning opportunities than those that aim to construct future practices.

That being said, the hypothetical nature of future-thinking conversations eliminates the need to be defensive about aspects of an actual, past lesson that did not go well, and may reduce the likelihood of defensive, guarded or rationalized discussions. That is, hypothetical conversations may support the use of an improving stance, and in turn construct more generative talk. Considering the important role that stance plays in mediating a group’s opportunity to learn, combined with the fact that an improving stance can take time to develop within a group, future-thinking conversations may prove to be useful in the early stages of a group’s development.

Furthermore, conversations about future practices can take a number of forms, some of which may better support teachers’ learning opportunities than others. For example, future-thinking conversations may differ in the degree to which they are contextualized in teachers’ actual curriculum and/or with their actual students—ranging from “imagining,” (discussing generalized practices for an imagined but unspecified group of learners to be implemented at some future but unspecified time), to “planning” (negotiating concrete practices for a real group of students to be implemented at a specific time). Without a context, imagining future practices runs the risk of teachers imagining a “bodiless” group of students, which can translate into visualizing a room full of themselves as learners (as sometimes occurs in preservice teacher education courses that are
not connected to a field placement). Furthermore, without any expectation of actually implementing the imagined practices, teachers may feel less invested in the outcome and therefore less likely to engage in actively negotiating the practices into a concrete form. Without the active negotiation of concrete practices, these conversations may constrain a group’s opportunity to make practice transparent, to emphasize rationales for teaching, to connect theory and practice, and/or to have a sense of agency for taking action. While planning for a concrete context certainly does not guarantee these kinds of learning opportunities, it may support them.

Considering that participants in Professional Development groups are likely to have goals for both learning from practice and improving future practice, perhaps the best approach is to try to strike a balance between reflection and action. A group’s early conversations could focus on future practice, explicitly modeling and attending to stance. As the group develops a consistently improving stance, conversations could include more reflective aspects, including analyzing artifacts of practice in order to inform decisions about actual, near future practices. Initially, these artifacts could come from teachers outside the group, in order to de-personalize the practice and provide opportunities to engage in critique in that feels “safer.” Over time, the group could shift to reflecting on the practices of the teachers within the group (e.g. Pfeiffer and Featherstone, 1997). More research is needed to explore these conjectures.

**Grain size of practices**

In the findings chapter, I made the argument that the “grain size” of the practices being discussed was one aspect of the designed context that mediated the group’s learning opportunities. In general, conversations around small grains of practice (e.g., a single lesson in the Studio Days) were more productive than conversations around larger grains of practice (e.g. weeks of instruction during the February “check-in”). While I stand by that assertion, it is
important to note an important caveat. Any professional development context that focuses on a small grain size of practices (such as Studio Days and Lesson Study) runs the risk that participants may focus on the surface features of that context, such as developing quality lesson plans. While developing a quality lesson plan is certainly one outcome of a productive Studio Day, that single outcome does not justify the resources required to support a Studio Day (or Lesson Study). In regard to Lesson Study, Lewis, Perry, Hurd, and O'Connell, M. P. (2006) emphasized, “Lesson Study is about teacher learning, not just about lessons” (p. 274). Elaborating on this claim, Lewis, Perry, and Murata (2006) conjectured that “lesson study strengthens three pathways to instructional improvement: teachers' knowledge, teachers' commitment and community, and learning resources” (p. 5). While Studio Days are not exactly the same as Lesson Study, they are similar enough that Studio Days may also strengthen these three pathways. However, attention to these pathways must be made explicit and revisited frequently, to avoid the temptation to focus solely on “polishing” a single lesson. This caveat reiterates the important role that facilitation expertise plays in making a designed context productive in practice.

**Facilitation**

This study supports previous findings in the literature that facilitation expertise is crucial to supporting opportunities to learn through conversations around practice (Lasky et al., 2009; Timperely, 2009; Elliot & Kazemi, 2009; Little, 2012; Earl & Timperley, 2009). Furthermore, it supports Zhang, Lundenberg and Eberhart’s (2011) finding that the effectiveness of facilitation moves is highly contextual. That is, facilitation moves that are “effective” in one context may not necessarily function the same way in a different context (see the discussion of Sam’s attempt to reunite a fractured group conversation below). This fact makes the notion of “facilitation expertise” extremely difficult to define.
Analysts have the luxury of hindsight to characterize a particular move as “expert,” depending on how the move supported the conversation that followed. But facilitators do not have that luxury. They constantly have to make facilitation decisions on the fly. For example, during conversations around practice, facilitators need to decide when and how it would be helpful to “break the rules” of a conversation protocol, how to support teachers’ analyses (not just evaluations) of artifacts, how to draw teachers’ attention to the greater teacher learning purposes of the conversation (especially when focused on small grains of practice, as during Studio Days), when and how to push back on teachers’ practices and/or press them to elaborate, how to draw attention to particular conversational discourse moves (such as pushing back) through meta-commenting, and when it would be more appropriate to advise a struggling teacher about how to solve a problem versus scaffolding that teacher’s own solution. Without the luxury of hindsight, facilitators have to make these decisions based on their prediction of how those moves will function in the particular group. But at any time, a facilitation move may have the opposite effect than the facilitator intended. For example, during the September whole-group conversation that was focused on the West 8th grade teachers’ chemistry phenomena, Sam noticed a separate conversation occurring among the East teachers. In order to reunite the group so that they could all contribute to (and/or learn from) making sense of West’s “soap making” phenomenon, Sam interrupted the West 8th grade teachers, saying, “Wait. I want to know what these guys [Jill, Brandon and Kathy] are asking.” While this move did reunite the group, it also introduced a shift in topic away from the soap making phenomenon, when Jill made a suggestion of a different phenomenon that the West 8th grade teachers might use instead of soap making. In general, effective facilitation is extremely complicated and requires the facilitator to consider teachers’ stances, levels of expertise, and their relationships with others in the group, just to name a few.

In terms of deciding when it is more appropriate to use “advising” versus “scaffolding” moves to support a struggling teacher, facilitators of learning groups might consider drawing on
the literature in developmental teacher supervision. In that literature, Glickman, Gordon and Ross-Gordon (2014) defined a continuum of supervisory behaviors, ranging from practices that are more directive (meaning that the supervisor exerts maximum control over decision making), to collaborative (in which the teacher and the supervisor make shared decisions), to non-directive (in which the teacher takes maximum responsibility for making decisions). They argued that, “the ultimate aim of the supervisor should be reflective, autonomous teachers facilitated by non-directive supervision” (Glickman et al., 2014, p. 111). However, they also point out that teachers vary in their abilities or readiness for making decisions about their instruction, and argued that all three supervisory approaches are valid, as long as they aim to increase teacher self-control. In order to determine the most appropriate approach to use then, supervisors must first diagnose teachers’ abilities to interpret evidence of teaching and learning, as well as their abilities to use those interpretations to make informed decisions about future practice. Supervisors then have to match their behaviors to the teacher’s developmental level, in response to teachers’ immediate concerns. But over time, supervisors must also strategically shift their behaviors toward the non-directive end of the continuum, in order to support teachers’ development as reflective, autonomous practitioners (Glickman & Gordon, 1987). Thus, it is wiser to assess the effectiveness of facilitation moves over time as opposed to at any one point.

It is important to note that teacher learning groups are comprised of multiple teachers, each of whom may have different degrees of expertise in teaching, in interpreting teaching, and in making informed decisions about future teaching. Thus, the kind of facilitation move (e.g. scaffolding versus advising) that is most appropriate for a single person in the group may not be most appropriate for everyone in the group. Clearly, facilitating a group effectively is an incredibly complex endeavor.

It is also important to note that facilitation expertise should not be conceived as belonging to (or the responsibility of) a single person in the group. That is, regardless of who is the
designated “facilitator,” any person in the group can draw on facilitation expertise at any time. For example, during the 7th grade Studio Day, no one asked Jill (or anyone else in the group) to produce an example of what the students would be asked to draw during the lesson on depositional environments. But wanting to make her thinking more transparent to others, Jill walked to the board and drew what she was imagining while others continued to talk about what they were imagining. This move quickly shifted the group from narrating their individual images to negotiating a shared image, concentrating on evaluating multiple rationales for practice, affording an opportunity to learn. While Jill was not the designated facilitator, she was able to draw on facilitation expertise. Considering the fact that in teacher learning groups, university- and district-based group members (e.g. Sam and Tim in this study) are frequently positioned as the group’s “facilitator,” groups would be wise to articulate the philosophy that any person in the group can draw on facilitation expertise at any time.

Expertise

Combining multiple types of expertise

This study contributes to the literature by introducing a new way of thinking about combining the potential power of the traditional and contemporary views of Professional Development. As discussed in Chapter 1, Cochran-Smith and Lytle (1999) defined three different relationships of knowledge and practice: knowledge-for-practice, knowledge-in-practice, and knowledge-of-practice. In this study, knowledge-for-practice most closely resembles what I have called “theoretical expertise,” whereas knowledge-in-practice corresponds to what I called “contextual expertise.” Knowledge-of-practice cannot be classified as either theoretical or contextual. Instead, it is the knowledge generated “when teachers treat their own classrooms and
schools as sites for intentional investigation at the same time that they treat the knowledge and theory produced by others as generative material for interrogation and interpretation” (Cochran-Smith & Lytle, 1999, p. 250).

In the traditional view of professional development, external experts (such as educational researchers) provide knowledge-for-practice to teachers, who are then responsible for connecting it to their own practice. But because knowledge-for-practice is generated outside teachers’ classrooms, they may perceive it as being disconnected from practice, existing in some idealized context, rather than in actual classrooms. Historically, teachers’ rejection of outsiders’ expertise has been a perennial problem in “traditional” professional development. As described in Chapter 1, a contemporary view of professional development repositions teachers as constructors—rather than receivers—of knowledge. While external experts are certainly not prohibited from participating with teachers in these contemporary forms professional development, in practice many learning groups for teachers (often called “professional learning communities”) consist solely of teachers and other school-based participants.

In Cochran-Smith and Lytle’s (1999) terms, Sam’s theoretical expertise would generally be characterized as knowledge-for-practice. But in this group’s context, Sam’s expertise was introduced only as it pertained directly to the teachers’ practices. Sam did not approach the group immediately providing theoretical expertise and asking the teachers to find practical applications. Instead, the teachers identified real problems of practice within their own classrooms, and in the conversations around those practices, Sam’s contributions connected problems to applicable theoretical concepts. As a result, Sam’s contributions lost the “disconnected” nature of knowledge-for-practice, and instead took on the characteristics of knowledge-of-practice, in the sense that theoretical concepts were introduced in direct relation to practice, and could be immediately “tested,” either in thought or in practice.
In this sense, the context of a learning group that consists of *both* teachers (“insider/contextual experts”) and educational researchers (“external/theoretical experts”) may serve as a vehicle for introducing knowledge-*for*-practice in a way that makes it more connected to knowledge-*in*-practice, and more closely resembling knowledge-*of*-practice. By combining the external expert (the mainstay of the traditional view of professional development) with the teacher learning group (typically consisting only of teachers in contemporary practice), the two views are combined, allowing theory to be directly connected to practice and vice versa.

**Expertise and positioning**

This study echoes findings in the existing teacher education literature about the inherent tension between expertise and positioning in terms of mediating a group’s learning opportunities (Elliott et al., 2009; Adamson & Walker, 2011; Glazier, 2009). No matter who is in the group, participants are likely to have different degrees and types of expertise. Furthermore, participants are likely to have perceptions about others’ expertise in comparison to their own. On the one hand, expertise can serve as a resource, potentially supporting a group’s opportunity to learn. For example, in the September conversation about the West 8th grade teachers’ chemistry phenomena, Sam’s theoretical expertise regarding EDI shifted a potentially surface-level conversation about “managing” students’ definitions to a deeper conversation about the nature of a “phenomenon.” In other words, had Sam’s expertise not been available, the conversation may have generated fewer learning opportunities. These findings echo Horn and Kane’s (2015) findings that groups comprised of teachers with higher levels of expertise generated more opportunities to learn when talking about practice than did groups of teachers with lower levels of expertise.

On the other hand, perceptions of expertise can potentially constrain learning, when those perceptions cause participants to position themselves and each another in static ways. Turning
again to the September conversation about the West 8th grade teachers’ chemistry phenomena, the teachers generally positioned Sam as the most expert person in the room. They represented their practices to him, and invited him to provide advice about, evaluate or otherwise interpret their practice. While the teachers in the group were not prohibited from taking up each other’s representations, few did. Sam could have accepted or challenged his “most expert” positioning, depending on how he responded to the teachers. He could have challenged that position by turning Matt’s question about managing student-generated definitions back to the whole group, or by posing scaffolding questions to the West 8 teachers to help them decide whether Mystery Powders constitute a phenomenon, engaging them in a conversational routine of collective sense-making. In this particular conversation, he accepted the position of “most expert” by advising Matt about managing students’ definitions and by interpreting the Mystery Powders as “not a phenomenon,” engaging in a conversational routine of extended advising. Sam’s choice to advise the teachers (accepting the position of expert) may very well have been the most developmentally appropriate choice for that particular conversation (see “Facilitation” above). That is, there is nothing inherently wrong with individual instances of more-expert members of a group providing advice to less-expert members. However, when positioning becomes static (by consistently positioning individuals in particular ways over time), unproductive behaviors can develop within a group, including learned helplessness (Kazemi & Franke, 2009), exclusion (Adamson & Walker, 2011) and pretending that everyone agrees (Glazier, 2009; Grossman, Wineburg & Woolworth, 2001).

In heterogeneous groups of teachers and teacher educators, the group’s talk traditionally positions teachers with more years of experience as more expert than teachers with fewer years of experience, and positions university-based faculty, participants with advanced degrees, or non-school based facilitators as “most expert.” When participating in learning groups, members who are positioned as more- or most-expert would be wise to carefully consider both the
developmental level of the group/individual and the ways in which their contributions position others—as receivers of knowledge or as co-constructors of knowledge—keeping in mind the ways that static positioning can constrain individual and group learning over time.

**Wonderings and conjectures: Positioning, participation and identity**

Although this dissertation includes positioning as an embedded construct in some of the conversational features defined in this study (e.g., conversational routine), I did not specifically privilege positioning as a central phenomenon under investigation. That being said, as I generated and analyzed the data, I was surprised by the number of instances of positioning that occurred in every meeting. I wondered about potential relationships between positioning and individuals’ participation (in terms of stance and frequency of speaking). Here, I present some initial wonderings and conjectures about the relationships between positioning, identity, participation and learning opportunities, some of which I will explore in greater depth in a future paper. I present these wonderings here because I believe them to be relevant to the findings presented in this dissertation.

Wortham (2009) described how members of communities develop durable, context-specific identities. Specifically, when a member of a group is positioned in static ways over time, his or her identity within the group becomes objectified. This identity then shapes the ways in which he or she participates in the community. For example, if a participant in this study was consistently positioned as having more expertise than others, over time he or she may come to identify as a “more expert” practitioner. This expert identity could then shape the way he or she participates in the group. Specifically, he or she may be more likely to speak with certainty about teaching, or to identify more as a contributor to others’ learning, rather than one who learns with or from others in the group.
As described in the Conceptual Framework (Chapter 2), individual and group learning within a community requires that the group experience both continuity and displacement of their existing practices (Lave and Wenger, 1991). That is, newcomers to the group learn through enculturation, adopting the community’s existing practices (continuity). But the entire group learns when the community’s practices evolve (displacement). Wenger (1998) argued that the transformation of practices is often fueled by “generational encounters,” meaning the inherent conflicts between the viewpoints of “old-timers” and “newcomers.” In order for generational encounters to afford transformation, newcomers’ contributions to negotiations must be granted sufficient legitimacy. Without this legitimacy, generational encounters are unlikely to be productive, and in turn, the group may simply reproduce its existing practices. In order for a group to learn through both continuity and displacement then, every member needs to be able to identify both as learner (“newcomer”) and as a contributor to others’ learning (“old-timer”). This dual-identity would require flexible positioning over time.

From the very first meeting, and across the school year, I noticed frequent positioning, in terms of overall approaches to teaching science (e.g. “traditional” versus EDI), perceived expertise with EDI, and group or subgroup affiliation (or lack thereof). With the exception of the Studio Day conversations, that positioning was generally static over time. As I reflected on this positioning, I wondered about how people identified in terms of seeing themselves and each other as teachers who competently use EDI in their classrooms. I also wondered about how participants saw their role (and others’ roles) in the group. Did they identify more as a learner of EDI, as a contributor to others’ learning about EDI, or both? Who in the group did they identify as someone they could learn from? And how did these identities shape the way individuals participated in the group?

I wonder about whether and how people’s positions and identities may have constrained the group’s learning opportunities, especially in terms of transforming practices. For example, in
some instances, the contributions of participants who were positioned as less expert (based on the number of EDI workshops they had attended) were not always taken up by the group as legitimately as the contributions of “more expert” participants. (These instances are not presented in this dissertation, but will be explored in a separate study of this data.)

I also wonder about whether and how people’s positions and identities mediated the group’s learning opportunities, in instances when the group’s talk positioned a person differently than the way that the person positioned him or herself. I conjecture that these kinds of “challenges” to people’s positions/identities may be related to shifts in stance. While this wondering will also be explored in a separate study of this data, some of the findings presented in this dissertation provide some preliminary evidence to support this conjecture.

Take for example two instances of shifts in stance-taking in the September conversation around the West 8th grade teachers’ use of Mystery Powders as a phenomenon. First, Cheri took an improving stance at the beginning of the conversation, referring to the West 8 team’s practices around various chemistry phenomena as a “tad bit [of a mess].” In that turn, she clearly acknowledged the limitations of the practices. But later, Cheri took a proving stance in several turns. She shifted the topic away from Mystery Powders after Sam evaluated it as “not a phenomenon,” while arguing that their original phenomenon (soap making) was “better,” and she twice nominated her West 8 colleague Brent to “tell him” [Sam] about the soap making, to support her claim. Granted, in the rest of the episode, Cheri’s language was less certain (“we thought,” line 394; “I’m not sure either” line 397; “it’s better…I think,” line 406), but several of her turns in this episode can be characterized as proving. Second, Matt also shifted his stance from improving to proving in one turn in this conversation. He maintained an improving stance during most of the conversation, but shifted to a proving stance, saying “Yeah, I mean, that crossed our mind, but just in our defense…” after Jill suggested that the West 8 teachers use “a common everyday chemical reaction” as their phenomenon (instead of soap-making or Mystery...
As I analyzed the data across the year, this conversation stood out to me as particularly interesting, because it represented one of the only conversations in which either Cheri or Matt took a proving stance all year. As I wondered what had caused these unexpected shifts in stance taking, I thought about the ways in which Cheri and Matt were positioned in this group, and how that positioning was challenged during the conversation. Cheri and Matt were some of the group’s earliest adopters of EDI (along with Brent and Keith, also from West). Prior to the school year of this study, Cheri and Matt had each attended Sam’s EDI summer workshop twice, and had been considering (and experimenting with) EDI practices for two years prior to those workshops, vicariously learning about EDI through their West 8 colleague Brent, who had attended the workshop in the two years before Matt and Cheri first attended. Based on these experiences, it is likely (and understandable) that Cheri and Matt positioned themselves as more expert than others in the group who had attended the workshop only once (just two months before the September meeting) or not at all.

I noticed that both Cheri’s and Matt’s shifts in stance-taking (from improving to proving) in that September conversation occurred immediately following a turn in which another participant “pushed back” in some way on their practices. Cheri’s shift immediately followed Sam’s assessment of the Mystery Powders as “not a phenomenon.” Cheri may have felt that Sam’s pushback positioned her as having developed little EDI expertise, which may have conflicted with her identity as a teacher who uses EDI competently. It is interesting to note that Matt’s stance did not shift at that same time. That is, Matt maintained an improving stance following Sam’s pushback. But Matt had just explicitly positioned Sam as the expert assessor of West 8’s practices, inviting Sam to “go ahead, just let it fly.” He may have perceived Sam’s pushback not as a repositioning of Matt (to a position of someone with little expertise with EDI), but rather as an appropriate response of someone with more expertise.
But Matt’s stance did shift from improving to proving immediately following Jill’s advice to use “a common everyday chemical reaction” instead of Mystery Powders or soap making as a chemistry phenomenon for their students to explain. Considering that Jill had only attended the workshop one time, just months before this conversation, Matt may have (unconsciously) positioned her as less expert than himself, and felt that her advice to him challenged his identity as a teacher who uses EDI competently.

It is particularly interesting to me that these shifts in stance occurred in the very first meeting of the group in this new context. It is important to remember that although this group was “new” in the sense that this combination of people—Sam, Tim and all of the 7th and 8th grade science teachers from the district, including those who had never taken Sam’s workshops—had not worked together in this particular context (learning about EDI), Tim and all of the teachers had met monthly as a group for at least one school year prior to the study, as part of their district contractual obligations. Considering that some of the teachers had attended the workshops more frequently (and had been using EDI longer) than others, it is likely that some positioning according to EDI expertise had already taken place in the previous year’s conversations, shaping the ways that each member positioned him or herself, as well as each other, even before the first conversation in this data set occurred. (While it is not presented in this dissertation, substantial evidence from the year’s meetings and interviews supports this conjecture.)

I cannot help but wonder how this group’s conversations may have been different if the participants had been positioned more fluidly over time, or if the group explicitly discussed positioning and shared a goal of identifying one’s self and every member of the group as both a learner and a contributor to others’ learning, regardless of their perceived degree of expertise with EDI. I wonder, with fluid positions and dual identities (as learners and contributors) would the “less expert” teachers’ contributions have been taken up in the same ways as more expert teachers’ contributions? Would pushback against one’s practices feel less like a challenge to
one’s identity, and more like an opportunity for everyone in the group to learn? And would participants have represented their practices in less certain (improving) terms? As I move forward, I will continue to consider these questions. That is, how might learning groups leverage the expertise that exists within a group, while resisting the urge to let people’s expertise (or lack thereof) position them in static ways? How can every member of the group identify simultaneously as a learner and as a contributor to others’ learning? And how does this fluid identity shape the group’s learning opportunities?

**Contributions to the literature**

This study contributes to the professional development literature in several ways. In addition to those contributions discussed in the previous section (“Discussion and Implications of Findings”), this study makes two additional contributions. First, it contributes a novel set of conversational features, the interaction of which are important to consider when designing and analyzing teachers’ conversations around practice (see Figure 4-2). Second, it supports the use of discourse analysis as a powerful methodological tool for studying the relationship between teacher talk and teacher learning.

**Limitations of the Study**

While the rigorous methods used in this study support the trustworthiness of the findings, the findings are limited in two important ways. First, as in all case studies, the findings of this study are inherently context-dependent. Therefore, these findings may not easily transfer to teacher learning groups that have significantly different contexts. Second, while Generative Talk provided a useful framework for understanding how teachers’ conversations around practice
potentially generated learning opportunities, it did not allow me to make claims about what teachers actually learned, or how that learning may have translated into changes in practice. Therefore, while these findings are useful for designing and analyzing conversations around practice, they cannot be used to predict teacher learning.

**Future Directions**

As is common in research, I conclude this dissertation having more questions than answers, and far more (and different) questions than I began with. I intend to pursue these questions in numerous ways. First, I intend to return to this data to explore my wonderings and conjectures around the relationships between positioning, identity and participation in this group, with the goal of developing a framework for understanding how participants’ identities as learners vs. contributors (or as learner-contributors) mediated the group’s and individuals’ opportunity to learn. Such a framework may be useful to those who design, participate in, facilitate and/or study professional development conversations around practice.

While the participants in this dissertation were clearly focused on learning about science teaching practices, this dissertation focused more broadly on teacher learning in general. But looking at the data across the year, there are ample opportunities to study the development of this group’s shared repertoire of practices around explanation-driven instruction (EDI). I plan to return to this data, to identify the shared practices the group constructed, and the ways in which the group constructed those practices. Such a study may contribute to science educators’ understandings of how teachers learn about explanation-driven instruction. This research is particularly timely, given the increased attention to engaging students in the scientific practice of constructing explanations called for in the *Next Generation Science Standards* (NGSS Lead States, 2013).
As I move forward working with new teacher learning groups, I intend to apply the lessons I’ve learned from this study to the way I design, participate in, and facilitate conversations around practice. Studying these new cases, especially in cross-case analyses with the group in this dissertation, may shed new light on the conversational features that “matter,” as well as the ways in which those features interact to mediate teacher learning. Other teacher educators may engage in similar research, contributing additional case studies of conversations around practice. Amassing a body of these case studies could allow the field to identify the important contextual features that determine the potential of transferability of findings from one case to another.

Lastly, when working with future teacher learning groups, I intend to study the ways in which teachers’ classroom practices relate to their conversations around practice. In other words, I want to better understand what and how teachers actually learn about teaching by talking about practice, how that learning translates into teaching practices, and how teachers’ classroom experiences influence their professional conversations around practice. There are far too few studies that attempt to “connect the dots” between teacher talk, teacher learning, and teaching practices, especially in multidirectional ways (Opfer & Pedder, 2011). Considering the burgeoning popularity of engaging in “professional learning communities” as a form of professional development, this kind of research is crucial to understanding how the talk in those communities might be able to improve practice, and vice versa.

**Concluding Thoughts**

As I think about the particular group that allowed me to study them for this dissertation, I hope that the findings of this study “first, do no harm” to the dynamics of the community or to their individual identities as competent science teachers and as colleagues with other teachers.
These teachers were in fact the most reflective, most collegial and simply the best science teachers I’ve ever met. I was regularly amazed by the kinds of risks they took in their own classrooms, in order to better support their students’ learning, and by the time they spent individually and with each other, reflecting on their teaching. While they were certainly not a perfect group (nor does a perfect group exist), studying them has made me a better teacher educator and a better researcher. I hope that the contributions that this dissertation makes to the field of teacher education warrants the risks that these teachers took by participating in my study. I am forever indebted to them.
References


Educational Researcher, 33(8), 3-15.


Educational Researcher, 18(1), 32-42.


NGSS Lead States. (2013). *Next generation science standards: For states, by states*. Washington,


203.


### Appendix A

**Video Log**

<table>
<thead>
<tr>
<th>Date</th>
<th>Meeting Type</th>
<th>Location</th>
<th>Participants</th>
<th>Notes</th>
<th>Facilitator</th>
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<tbody>
<tr>
<td>Sept 24</td>
<td>Monthly meeting</td>
<td>East MS</td>
<td>Whole group</td>
<td>What is a phenomenon?</td>
<td>Sam</td>
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<tr>
<td>Oct 28</td>
<td>Monthly Meeting</td>
<td>West MS</td>
<td>Whole group</td>
<td>Choosing “problem” for focus of 10/31 inservice</td>
<td>Sam</td>
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<tr>
<td>Oct 31</td>
<td>½ day inservice</td>
<td>Valley HS</td>
<td>Whole group</td>
<td>D1,2,3; assessments; prompts/rubrics; grouping students;</td>
<td>Sam</td>
</tr>
<tr>
<td>Nov 26</td>
<td>½ day inservice</td>
<td>East MS</td>
<td>Tim, Jill, Josh, Cheri, Brent, Sean, Keith + Tech Ed</td>
<td>MS Schedule, tech ed stuff</td>
<td>Tim</td>
</tr>
<tr>
<td>Feb 24</td>
<td>Monthly meeting</td>
<td>West MS</td>
<td>Tim, Josh, Sean, Brent, Matt, Keith, Jill, Brandon, Sam, Jessica</td>
<td>Sharing about current activities; 3 column bulletin board; journals; grading journals</td>
<td>Tim</td>
</tr>
<tr>
<td>Mar 11</td>
<td>½ day inservice</td>
<td>Valley HS</td>
<td>Cheri, Kathy, Matt, Jessica, Sam, Jill, Josh, Sam, Sam</td>
<td>Logistics of studio days; What are “good” phenom for physics? Monkey gun;</td>
<td>Sam</td>
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<tr>
<td>April 28</td>
<td>Monthly meeting</td>
<td>East MS</td>
<td>Tim, Kathy, Jill, Brent</td>
<td>Studio Days (inviting East 8);</td>
<td>Tim</td>
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<td>May 5</td>
<td>West 8 plan per.</td>
<td>West MS</td>
<td>Matt, Brent, Cheri</td>
<td>Planning the Li/Na lesson</td>
<td>West 8 teachers</td>
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<td>May 6</td>
<td>Studio Day 8th</td>
<td>West MS</td>
<td>Cheri, Matt, Brent, Sam, Kathy (2nd half)</td>
<td>Executing/Reflecting on/Revising Li/Na lesson</td>
<td>Sam</td>
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<td>May 6</td>
<td>SD7 Planning</td>
<td>Grocery store cafeteria</td>
<td>Brent, Jill, Sean, Keith, Josh</td>
<td>Planning the Geo lesson; Keith vs Brent</td>
<td>7th grade teachers</td>
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<tr>
<td>May 14</td>
<td>Studio Day – 7th</td>
<td>West MS</td>
<td>Sean, Keith, Brent, Josh, Jill, Sam</td>
<td>Executing/Reflecting on/Revising Geo lesson</td>
<td>Sam</td>
</tr>
</tbody>
</table>
Appendix B

Interview Transcript Excerpt

Amy: In terms of pushing back, I noticed that in the meeting, there would be, like, a half an hour between the time that somebody said something and when you pushed back on that, and other times it was like, immediate. For example, let’s look at this instance, starting here [points to line in transcript.] So Matt was talking about his “Mystery Powders” unit, and Tim asked him, “What was the phenomenon you were looking at?” Then Matt launches into a description of his unit, finishing with, “So that’s kind of the idea.” After a brief pause, you said, “Okay, here would be my argument. That’s not… what you have chosen is not a phenomenon.” And then Matt says, “I knew it!” and everyone started laughing.

Sam: Yeah, that was awesome. Matt did know it, and so he deserves an immediate response, like Tim doesn’t get it, Josh doesn’t know me, so I leave those.

Amy: So are you saying that your relationship with the person determines how quickly you come back to – to push back on their idea?

Sam: That’s part of it but I’d have to look at the transcript to see what was the flow of conversation, because one of the things that I knew – I mean, that was early, only 15 minutes in—I knew because we had already sort of surfaced this phenomenon/topic thing, I think – but I knew that was going to be a huge ass can of worms. I knew that Brent and Matt in particular had really been grappling with that, “What is a phenomenon? We’ve got this thermometer – that seems like that’s really a phenomenon, then we’ve got these powders, and is that really a phenomenon?” And Matt knew damn well that… so I think part of it was, I was still trying to get a sense of what people thought, or were interested in, or were grappling with, and I knew that as soon as we started down that road, it was going to be a conversation about that, because it’s profound in its implication, so I knew it was going to be a kettle of fish, and I also knew that embedded in that was the social construction piece – the reason that photosynthesis is photosynthesis is because we call it photosynthesis, not because it is photosynthesis. And that’s the sort of thing that academics like me get accused, “oh that’s all fancy language, but ultimately photosynthesis is photosynthesis.” I can debate it on that level, but for me, it’s not that, it’s that that tells you something about how to teach. Like, yeah, photosynthesis is a socially constructed thing, but the thing it tells me is if you want to understand science, you’ve got to explain stuff. And then put the labels on it. ‘Cause that’s the way that science works. Science is not learning the labels. Science is learning to explain things, and then putting the labels on it once you’ve got the explanation. And that’s what the story of the social construction of any of these things really tells you, is it tells you a story about teaching. But everybody hears it as “oooh.” Especially teachers are like, “I’m done with you now.” If you get into that conversation first, it’s the same with this topic/phenomenon, it sounds to them like you’re having a semantic conversation, like, combustion is a thing, you just want to argue about this because you’re an academician in an ivory tower and you get to sit around thinking profound dumb thoughts all day. And we have to work here in the real world and for us, there’s no difference between a concept and a phenomenon. And that’s where the whole fundamental shift
happens – where you understand that there is a difference and it profoundly changes the way you teach when you understand that. But there’s so much stuff embedded in that, that they don't want to admit that it means that they’ve taught stuff wrong, that it means that their whole education was wrong. That’s hard as a person that then pursues that life. I’ve turned that lens on myself, I look back on the way I taught physics and I’m appalled at my memories of what I thought was awesomeness – and in fairness, that kids and other teachers thought was good science teaching. Not to brag, but people thought I was pretty good at it. And I look back and say, “not very good at it.” But that’s easy for me because I don't teach any more. So I don't have to own that in the way that these guys do. They have to say, not only am I turning that lens on myself and recognizing that I’m not teaching the way that I want to or the way that I should, but that I’m going to have to keep teaching that way before I can teach the way I want. That’s a hard pill to swallow.
## Appendix C

### Interview Log

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<th>Date</th>
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<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/08/14</td>
<td>Sam</td>
<td>background/goals of group; reflecting on 9/27 transcript</td>
</tr>
<tr>
<td>11/04/14</td>
<td>Jill</td>
<td>Background info; reflecting on video from 10/31</td>
</tr>
<tr>
<td>11/04/14</td>
<td>Brent</td>
<td>Background info; reflecting on video from 10/31</td>
</tr>
<tr>
<td>11/04/14</td>
<td>Brandon</td>
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</tr>
<tr>
<td>11/06/14</td>
<td>Matt</td>
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<td>Sean</td>
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<tr>
<td>11/06/14</td>
<td>Tim</td>
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</tr>
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<td>11/07/14</td>
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<td>11/10/14</td>
<td>Josh</td>
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<tr>
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<td>Cheri</td>
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<tr>
<td>11/11/14</td>
<td>Heath</td>
<td>Background info; reflecting on video from 10/31</td>
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<td>11/17/14</td>
<td>Sam</td>
<td>“Community”; member check re: findings from 10/8 interview</td>
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<td>01/15/15</td>
<td>Sam</td>
<td>Choice in PD; reflecting on video from 10/31</td>
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<td>02/25/15</td>
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<td>Conversation development (organic vs. structured)</td>
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<td>Re: 3/11 inservice: Positioning re: Monkey gun conversation</td>
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<td>exit interview</td>
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<tr>
<td>06/12/15</td>
<td>Kathy</td>
<td>Reflecting on 05/15 8th grade Studio Day, exit interview</td>
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Appendix D

Sample Field Notes

September 24, 2014 meeting

“Raw” field notes

- Brent: West meets every day, rotating between within grade, as a whole department
- East meets 1+/week within grade, rarely as whole dept
- East – We took what we normally do and put it in the content storyline.
- Jill – created a grid of types of questions do kids ask, used Keith CER journal as a shared google docs
- Sam: Are you sharing with everybody? ← community building
- Speaking in very certain terms
- CDW vs CER – other 7th grade teachers (not science) are using CER… Brent’s students are already taking it up ← proving stance?
- Cheri: Still figuring this out, doing a crappy job, but still better than anything I’ve ever done, engagement is high, teachers are giving feedback to her that kids are talking about her class ← improving stance?
- Matt: I have a question: root of the problem – what do you do with the info that you’ve acquired by going through the storyline and CER, maybe nothing? ← improving stance
- Sam: complicated: difference between topics and instead teaching phenomenon… cognitive dissonance ← empathy
- Sam is really letting them talk, he never interrupts, he doesn’t really answer their questions, others interrupt him before he gets a chance to answer (are they asking him or each other?) ← organic conversation development
- Sam challenges them to reframe their thinking about topics as being in the context of the phenomenon? ← facilitation move
- Someone asks, “What is the phenomenon?”
- Sam: It’s always a mess – the traditional way is not a mess ← putting them at ease? Or maybe preparing for the journey?
- Matt: the phenomenon is “how many different things are in here?”
- Sam begins to push back, hesitates ← empathy
- Matt invites feedback “just let it fly” ← improving stance
- Sam pushes back on Matt’s example of a “phenomenon,” somewhat bluntly
- Cheri – we have another idea ← proving stance?
- Teachers are very unsure about their understanding of a phenomenon, they want Sam to “tell us, then!”
- Sam – where to start. If we wanted to do that, we would have to do a lot more work. ← empathy
- “How big does a phenomenon have to be?” GREAT question
- “I don’t want to get yelled at for not having a phenomenon” ← yikes!
- Sam notices a side conversation, turns conversation to them, “I want to know what these two are asking” ← community building
- Matt says “in our defense” ← proving stance
- Sam “you don’t need to defend yourself” ← empathy
- Sam is worried that there are very different levels of understanding – trying to find something that is productive for everyone – trying to figure out various phenomenon for each grade is not going to be productive for the whole group
- Sam is worried that teachers will feel like they and their classrooms are “out of control,” there are things we can do as a group that would be productive,
- Some teachers seem like they want to “save face” (is it because of Sam or each other? Both?)
- I need to go back to “what is a phenomenon?” ← who asked that? (Tod?)
- “I don’t see the difference, I really don’t.”
- Sam comes back strong against the idea that photosynthesis isn’t a “fact” ← his point is important but it’s kind of “blunt.”
- Some teachers left early (after 42 minutes)
- People packed up early
- WHAT WERE THE QUESTIONS AT THE END ABOUT HOW THIS IS RESEARCH? I NEED TO KNOW THAT. AND DID THEY SIGN THE CONSENT FORMS?

“Cooked” field notes:

- Some people spoke with certainty about the great things they’re doing (proving/improving) – sharing ideas to prove their effectiveness rather than to offer them up for scrutiny
- Some people asking Sam (and the group) questions when they didn’t understand something (What’s a phenomenon?) ← positioning selves as learners, Sam as expert
- People pushing back (against Sam) when they disagreed with him (topic = phenomenon)
- Sam not interrupting teachers, he let them interrupt him, and waited to respond to questions until after the teachers had responded. (facilitation choices)
- Sam speaking authoritatively
- Sam explaining his thinking and offering evidence to support his claims
- Sam expressing empathy
- Teachers expressing fear of “being wrong”
- Some connected talk, some disconnected talk
Appendix E

Analyzing Interview Data

OPEN (INITIAL) CODING

(Transcript excerpt)

<table>
<thead>
<tr>
<th>Raw Data</th>
<th>Initial Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amy: And then Matt says, “I knew it!” and everyone started laughing.</td>
<td>• Assessing a teacher’s understanding</td>
</tr>
<tr>
<td>Sam: Yeah, that was awesome. But Matt did know it, and so he deserves an immediate response, like</td>
<td>• Choosing to push back because teacher does understand concept</td>
</tr>
<tr>
<td>Tim doesn’t get it,</td>
<td>• Assessing teacher’s understanding</td>
</tr>
<tr>
<td>Josh doesn’t know me,</td>
<td>• Assessing relationship with teacher</td>
</tr>
<tr>
<td>so I leave those.</td>
<td>• Choosing to not push back because teacher doesn’t understand concept</td>
</tr>
<tr>
<td>• Choosing to not push back because the teacher doesn’t know him yet</td>
<td></td>
</tr>
</tbody>
</table>
Pushing Back: Teacher’s level of understanding - The teacher’s level of understanding matters. If the teacher does not understand a concept, it may not be appropriate to push back on his idea.

- Assessing teacher’s understanding
- Choosing to push back because teacher does understand concept
- Assessing teacher’s understanding
- Choosing to not push back because teacher doesn't understand concept
- Assessing that a teacher knew the concept well

Pushing back: Relationship with teacher – the relationship with the teacher matters. If the teacher does not know him well, it may not be appropriate to push back on his idea.

- Assessing relationship with teacher
- Choosing to not push back because the teacher doesn’t know him yet

Pushing back: Timing during meeting – the timing during the meeting matters. Pushing back too early in the meeting may not be appropriate.

- Assessing flow of conversation
- Assessing timing within meeting

Pushing back: Degree of teacher grappling – the degree to which teachers have been grappling with an idea matters. If they have been grappling with an idea for a while, it may be appropriate to push back.

- Assessing that teachers had been grappling with the issue
- Assessing what people were grappling with

Pushing back: Complexity – the complexity of the discussion that ensues matters. If the ensuing conversation is very complex, it may not be appropriate to push back.

- Determining that pushing back would lead to a very complex discussion
- Determining that the conversation would be very complex
- Determining that the conversation would be very complex

Pushing Back: Teachers’ interests -- People’s interests matter. If people are not interested in pursuing the idea, it may not be appropriate to push back.

- Assessing people’s interests

Pushing Back: Positioning – the The resulting positioning matters. If pushing back results in him being positioned as an “academic,” it may not be productive to push back.

- Determining that the conversation would position Sam as an “academic”
- Determining that teachers position him as an “academic”

Complex concepts: The concept of science as a social construction is very complex. The concept of a topic being different than a phenomenon is very complex
THEORETICAL CODING: CATEGORIES (samples)

1. Factors Sam considers when deciding whether, when and after how long to “push back” on a teacher’s idea/statement:
   a. Teacher’s level of understanding of a concept
   b. His relationship with the teacher
   c. The timing during the meeting
   d. The degree to which teachers are interested/engaged/experienced with the idea
   e. The complexity of the concept and the resulting conversation
   f. The positioning of him as “other” that results
   g. The teachers’ perceived value of the idea
   h. The degree of pain that results

2. Implications of the nature of science for science teaching:
   a. Science is an endeavor of explaining natural phenomenon
   b. Most school science does not reflect the true nature of science, it instead reflects behavioristic notions of teaching and learning – structured around “topics”
   c. Teaching science around topics is less effective for true science learning than teaching science as explanation building.

3. Issues of positioning
   a. Teachers see a difference between their work and that of “academics”
      i. An academic’s job is to think and to exist in a world that is not “real” but a teacher’s work exists in the real world.
   b. Teachers value the work of academics and teachers differently
      i. An academic’s work is not valuable to K-12 teaching
   c. Teachers do not enjoy engaging in the work/world of an academic because they do not see it as real or valuable to them.
   d. Raising issues that teachers perceive as “academic” work may result in positioning the speaker as “other,” making the teacher unreceptive to the issue or the speaker.

4. Shifting paradigms
   a. Understanding the difference between teaching science as explanation building and teaching science around topics is a complete shift in a teacher’s understanding about what it means to teach science.
   b. This shift can be challenging to make because the distinction is very subtle.
   c. The subtlety of this distinction can seem trivial if the teacher does not understand it.
INTERPRETING CATEGORIES (samples)

Pushing Back
Sam takes into account several factors when he is deciding whether and when to “push back” on a teacher’s idea during the PD group meetings. It is important to note that this decision making process is spontaneous, organic and likely to be largely subconscious. These factors include:

- his perception of how well the teacher understands a concept
- how well the teacher knows him
- the timing during the meeting
- the degree to which the teachers are interested/engaged, experienced with the idea
- how complex the concept (or the resulting conversation) is
- the likelihood that his pushing back will position him as “other” (“academic” – see below)
- the teachers’ perceived value of the idea
- the degree of pain that the resulting conversation causes (see “pain” below).

Implications of the nature of science for teaching science
Sam believes that science is a social construction – a human endeavor to construct explanations of natural phenomenon. He believes that most school science does not reflect this true nature of science, but instead reflects behavioristic notions of teaching and learning, structured around “topics” that experts (scientists or teachers) believe are logically sequenced. He believes that this kind of teaching is less effective for truly understanding science, compared to teaching science around constructing explanations for natural phenomenon.

Positioning
Sam believes that teachers see a difference between their work and that of “academics.” He believes that teachers think an academic’s job is to think and to exist in a world that is not “real,” whereas they think their work involves “doing” (rather than just “thinking”) and exists in the “real” world. He believes that teachers do not necessarily see the work of “academics” as being valuable (or relevant) to their work. As a result, he believes that teachers may not enjoy engaging in the work of “academics.” Sam believes that raising certain issues that teachers may perceive as “academic” (e.g. science is a social construction), may result in them positioning him as “other,” making them less receptive to the idea or to him.

Shifting paradigms
Sam believes that understanding the difference between teaching science as explanation building and teaching science around topics is a significant shift in a teacher’s understanding about what it means to teach science. This shift can be challenging to make because the distinction is very subtle. The subtlety of this distinction can seem trivial if the teacher does not truly understand it.
A few things stand out to me in this audio recording. Positioning is the most prominent. I also notice a move that Sam makes several times, which could be considered reframing a technical question as a probing question, or it could be considered pushing back – “that’s not a phenomenon”

Some of the teachers position themselves as experts (or at least advisees/teachers) by sharing stories as exemplars, without inviting any kind of discussion about their stories. Essentially all of the teachers position Sam as an expert by asking questions directed to him (rather than to the group). In his responses to their questions, he positions himself as an expert (or at least an advisor) and the teachers as consumers/learners/novices, as his responses do not offer the teachers much agency to solve their own problems, but instead offers them advice. His “opposing” and “advising” positions the West teachers (and Tim) differently (as novices) than their “advising” talk positions themselves (as experts).

It is extremely important for me to find a way to talk about these positions without attaching meaning of judgment. Of course Sam is more knowing in some ways, but the teachers are more knowing in other ways. In the same vein, the East teachers also have valuable knowledge and expertise. They could also be positioned as contributors, but in most cases are positioned as consumers. (There is one exception however, when Jill offers advice to the 8th grade teachers about finding a common chemical reaction (such as something rusting) as a phenomenon to be explained using the content of the 8th grade standards.)

Sam offers the teachers choices so that they feel a sense of control over how they spend their time (including letting the conversation develop organically, rather than controlling it-
only a few exceptions). But the choices are never negotiated publicly by the teachers, (no clear, shared sense of purpose/goals) leaving the floor open to individuals attempting to get their personal needs met – individual attempts at control.
Appendix G
Reflexive Journal Excerpt

September 17, 2015

I am firmly committed to trying to understand each participant’s perspective, and to portraying their words and actions with empathy and compassion. Usually that’s pretty easy for me, but right now I am really struggling with how to write about a few things that Sam says in the August 24 meeting.

On the one hand, during the meeting Sam consistently expresses empathy for the challenges of learning to understand and enact EDI. He also expresses empathy for teachers (e.g. Kathy, Brandon) feeling “behind” other people in the group in terms of understanding EDI.

Example: 515-516 “What I really don't want to have happen is for you [Brandon] to freak out that this is like what A) you should be doing or B) that you have to do it next week when you start chemistry or any of that.” Sam frequently suggests ways that everyone in the group, regardless of the degree of their EDI expertise, can participate in the group’s practices, and in the talk about those practices. Example (677-697) Sam: “I'm going to recommend a couple of possibilities. One is a video that I just sent to Tim. If you watch it you'll get some idea of with some examples from actual classrooms of what this stuff looks like and what the sort of purposes are and what the goals look like. The other thing we can do I think is start with something smaller. So that you don't feel like you feel like there's this huge thing that you have to do.” In these ways, he positions himself as a benevolent, empathetic leader.

Sam also positions himself as a facilitator who is aware of, and tries to reduce, the potentially harmful effects of positioning based on expertise within the group. That is, he is aware that there is a range among the teachers’ understanding of EDI, and he knows that those with
more expertise could potentially intimidate those with less expertise, by talking “over the heads”
of the less expert teachers. For example, after Matt represents the West 8 practice of “Mystery
Powders,” and Brandon expresses frustration of not knowing where to begin, Sam says, “this is
why it makes me nervous to let you [Matt] talk.” Here, his meta-talk reveals his observation that
Matt’s “expert” talk may be contributing to Brandon’s feelings of frustration which could limit
his learning.

Sam occasionally attempts to reduce that unproductive positioning by explicitly
“silencing” members who he senses may be heading into language that is not helpful to the
group’s learning. Specifically, the group norm of “Shut up, Brent” is referenced several times
throughout this conversation. That is, having a long history and relationship with Brent, he has
(privately) asked Brent to not talk at particular times. Although the phrase “Shut up, Brent!” may
sound harsh to the observer unfamiliar with this group, Sam and Brent have a long standing
mutual respect for one another, and Brent fully understands why Sam asks him to “shut up.” This
exchange demonstrates this understanding:

Matt  Okay. Don’t’ say anything! [to Brent].
Brent  I’m not going to!
Matt  Okay.
Sam  He's gotten so good at this, so…
Brent  I've been told to shut up so many times that…
Sam  You've actually taken it to heart [to Brent]

[Note: In the November interview with Brent, he explains his understanding and acceptance of
Sam’s silencing. He doesn’t take it personally. To be clear, Sam does not intend to prevent Brent
from speaking in this group. Instead, he wants to be sure that Brent does not take up the majority
of the “air time” in a conversation in order to enable others to participate or talk “over the heads”
of the rest of the group. This does not imply that Brent is “showing off” in any way. Rather, like
any other group member, Brent attempts to make sense of teaching and learning through public, verbal sense making, in which he talks “in” the practices at his current level of development. Sam wants Brent to consider the effect that his contributions may have on others in the group. Brent does still participate in this group’s talk, but—when Sam is facilitating and the East teachers are present—he tends to listen carefully, interject only occasionally, when he feels is helpful or necessary to his own understanding, and he speaks in terms that are accessible to all group members.

Okay, all of that being said…

On the other hand, there are times when Sam says things in rather “blunt” ways. Although Sam is overall positioned as a benevolent, empathetic leader, there are also times in this conversation that he is positioned by Cheri and by himself, as a (somewhat) harsh leader. The most notable evidence of this positioning occurs in several things that Cheri says after Sam pushes back (rather bluntly) on West 8’s teaching practices (e.g. “What you have chosen is not a phenomenon”). Examples: “[Sam is] calling us losers” (470), “I don’t want to get yelled at for not having a phenomenon” (536); “We get it all the time” (761); “We already know we suck” (769). These phrases characterize Sam as a somewhat harsh, unempathetic facilitator. Although Cheri says these phrases with sarcasm and laughter—indicating that she doesn’t mean them literally—Cheri’s responses may reflect her discomfort with this way that she (or her West 8 colleagues) has been positioned (as “novice”). A few times in the conversation, Sam positions himself not as “cruel,” but as “a pain in the ass.” Examples: 765, Sam: “These guys are used to me being a pain in the ass.” 1119: “I know I can be a pain in the ass.” I don’t believe that Cheri or Sam actually see Sam as harsh or cruel, but I point this out because of something that Sean said in the Studio Day 7 Planning. (Something about the nature of Sam’s pushback being too “harsh.”)
## Appendix H

### Characteristics of Conversational Contexts

<table>
<thead>
<tr>
<th>Context Types</th>
<th>Planning shared practices</th>
<th>Imagining future practices</th>
<th>Reflecting on/revising shared practices</th>
<th>Reflecting on unshared practices</th>
<th>Checking in</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Examples</strong></td>
<td>Studio Day Planning (7,8)</td>
<td>March Inservice (Physics unit)</td>
<td>Studio Days (7,8)</td>
<td>All except Feb &amp; April meetings</td>
<td>February meeting</td>
</tr>
<tr>
<td><strong>Timing</strong></td>
<td>Future</td>
<td>Future</td>
<td>Past &amp; Future</td>
<td>Past</td>
<td>Past/ Future</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Shared content area</td>
<td>Shared content area</td>
<td>Shared content area</td>
<td>Not all shared content area</td>
<td>Not all shared content area</td>
</tr>
<tr>
<td><strong>Consensus</strong></td>
<td>Consensus required</td>
<td>Consensus not required</td>
<td>Consensus required</td>
<td>Consensus not required</td>
<td>Consensus not required</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>No expectation of shared imp</td>
<td>No expectation of shared imp</td>
<td>No expectation of shared imp</td>
<td>No expectation of shared imp</td>
<td>No expectation of shared imp</td>
</tr>
<tr>
<td><strong>Focus</strong></td>
<td>Narrow focus (single lesson)</td>
<td>Broad focus (days/weeks)</td>
<td>Narrow focus (single lesson)</td>
<td>Varying ranges of focus</td>
<td>Varying ranges of focus</td>
</tr>
<tr>
<td><strong>Practices</strong></td>
<td>Everyone’s practice (shared)</td>
<td>Individuals’/groups’ practices (unshared)</td>
<td>Everyone’s practice (shared)</td>
<td>Individuals’/groups’ practices (unshared)</td>
<td>Individuals’/groups’ practices (unshared)</td>
</tr>
<tr>
<td><strong>Representing</strong></td>
<td>Each person expected to represent</td>
<td>NOT every person expected to represent</td>
<td>Each person expected to represent</td>
<td>NOT every person expected to represent</td>
<td>Each person expected to represent</td>
</tr>
<tr>
<td><strong>Take-up</strong></td>
<td>Expectation of group take-up</td>
<td>Expectation of group take-up</td>
<td>Expectation of group take-up</td>
<td>Expectation of group take-up</td>
<td>No expectation of group take-up</td>
</tr>
</tbody>
</table>
VITA

Amy René Ricketts

EDUCATION

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