The Nature of Teacher Learning in Collaborative Data Teams

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Abstract

As data teams have grown in popularity in recent years, they have been increasingly looked to by educational researchers because of the tantalizing prospect of combining teachers' on the job professional development with increased and effective data use to drive instruction. Data teams have been increasingly implemented within schools by educational leaders attempting to take advantage of what teachers learn from each other in the context of a data team. Many conceptual models of data team function have been proposed, but few empirical studies have examined how teachers learn from collaborating with each other in a data team. This paper explores the nature of teachers' learning in data teams, uncovering key factors that impact the learning opportunities created by collaborating around student data.

Keywords

Collaboration, Data Team, Teacher, Learning, Social Constructivism, Proximity, Transience, Community of Practice

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As data teams have grown in popularity in recent years, they have been increasingly looked to by educational researchers because of the tantalizing prospect of combining teachers' on the job professional development with increased and effective data use to drive instruction. Data teams have been increasingly implemented within schools by educational leaders attempting to take advantage of what teachers learn from each other in the context of a data team. Many conceptual models of data team function have been proposed, but few empirical studies have examined how teachers learn from collaborating with each other in a data team. This paper explores the nature of teachers' learning in data teams, uncovering key factors that impact the learning opportunities created by collaborating around student data. Keywords: Collaboration, Data Team, Teacher, Learning, Social Constructivism, Proximity, Transience, Community of Practice

As teaching evolves to become a more collaborative endeavor, it is increasingly important for educators reflect on how and why they work together in ways that provide them with learning opportunities (Lave & Wenger, 1991; Schön, 1987). The trend towards reframing teachers' collaboration as professional development is based in the rationale that critical reflections on teacher practice in collaborative settings have the potential to change teaching practice (Horn, 2005; Little, 1990; Tyack & Cuban, 1997). Concurrent with this movement has been an increased focus on the use of student data. The combination of these two simultaneous trends emphasizes an effort to capitalize on the hypothesized power of data-centric collaboration. This article explores the possibilities of this type of work through an empirical study of a data team, a team of teachers collaborating with student data as a focus. Using a social constructivist framework, this paper explores how teachers engaged on a data team learned from the experience, and what contextual factors, such as proximity and transience, influenced their learning opportunities as part of a data team (Michaud, 2015). As data teams advance as a new mode of collaborative practice in education throughout the world, policy-makers, educational leaders, and classroom teachers should be aware of their direct benefits, and the factors that influence the nature of teachers' learning from each other in collaborative data teams.

The existing research literature on data teams focuses mostly on teachers' capacity for data use (Little, 2012). This comes at the expense of studying their true value, which is that teachers can change their pedagogy based on what they learn from data and each other (Katz & Dack, 2014). The social situation that surrounds such a partnership lends itself to various factors impacting the nature of the teachers' learning. It has been shown that the proximity and transience of collaborating teachers on a data team heavily influences the collaborative process.

Literature Review

Time available for collaboration has been identified as a significant variable in teacher collaboration (McGrath, 1991; Vadala, 2014). O'Leary et al. (2014) indicated that personal qualities, the creation of a shared meaning and identity led to perceived proximity, the

closeness of which determined the relative effectiveness of the collaborative work. While much of the existing research on data teams focuses on how they are structured, there is an existing gap concerning how teachers learn from participating as data team members (Schildkamp & Poortman, 2015). Other studies have noted the nature of teacher learning in other types of collaborative teams, including the work of Little (1990), McGrath (1991), and Vadala (2014), which indicates that proximity increased the frequency and quality of collaboration among teachers. Considering the importance of joint enterprise to the working of a community of practice (Lave & Wenger, 1991) and joint work to teachers' collaboration (Little, 1990), a data team's perception of their work as a team effort is critical to their function. By focusing on the nature of their collaborative work in a data team from a social constructivist perspective, this research study was able to address existing gaps in the research literature by further exploring how teachers learn from their participation in a data team. The qualitative methods, theoretical framework, and research questions of the study all coalesce around the need for further exploration of the way that teachers learn in collaborative teams when student data is the focus of their activity together. This paper discusses the findings of Michaud's (2015) study that indicate that proximity and transience of data team members influenced the politicization of meetings and the ability to forge a collaborative orientation towards joint enterprise.

Theoretical Framework

Collaborating on a team is inherently social. Social constructivism interprets learning as a function of social interaction. Within this perspective are two specific theories used to understand different aspects of learning: situated and social learning. Social learning emphasizes learning by observing the behavior of others (Bandura, 2006). Situated learning focuses on learning as it is socially constructed within particular physical and cultural contexts. All learning is situated, because all learning is activity that occurs within wider contexts that include cultural and physical elements that act on and with the learner (Lave & Wenger, 1991). Building on the work of Dewey, Vygotsky and Goffman, situated learning emphasizes learning that occurs through active participation (and changes in the participation of individuals) in a community of practice (Horn, 2005; Lave & Wenger, 1991). When knowledge is collaboratively constructed, a community of practice is capable of crafting a shared identity around mutual engagement, joint enterprise and shared repertoire of its members (Horn, 2005; Moolenaar et al., 2012).

Methodology

This exploratory qualitative study examined the collaborative work of a data team consisting of five teachers and one reading specialist over the course of six weeks in the spring of 2015 (Michaud, 2015). All team members (N=6) participated in the study. Using the work of Horn (2005) as an exemplar, the methodology of this study sought to reveal significant factors in the collaborative process, and impact of those factors on teachers' learning. Horn's (2005) work was also a case study that used interviews, meeting observations, and artifact collection as a way to learn more about the collaboration of a team of teachers. The amount of data collected in this study parallels the standard set in this prior work.

Five observations of data team meetings were audio recorded and transcribed. Data included five 45-minute data team observations, six 15-minute interviews with each teacher, and one 15-minute interview with the reading specialist. During the observations, additional data were collected in the form of document artifacts, field notes, and reflective memos. The

role of the researcher in this study was to observe the participants as they collaborated, interview them about their work together, and to later subject that data to further analysis. As this study was not an ethnography, the goal was for the researcher to limit the effects the researcher's presence might have on the participants and the collected data. The data were analyzed using a social constructivist framework to draw conclusions about how teachers learned from their collaborative engagement through the community of practice they established in the data team.

Research Site and Participants

This study was conducted at Dorne Elementary School (pseudonym), a suburban public elementary school in Massachusetts. This school was chosen based upon its reputation for effective data teams. Its' location in Massachusetts also meant that it was subject to Massachusetts' policies regarding data teams, such as the use of district-determined measures (DDMs), which are common assessments that collaborating teachers are supposed to create and administer together as way to stimulate collaborative inquiry using student data. The sample data team was chosen because of the continuity of its' team members and its' demonstrated past success. Many of the existing literature on data teams focuses on how to establish them, which is why so little is known about high functioning teams. The participants were a second grade data team that met twice per week. The team studied was using a series of DDMs, and their data team meeting time was allotted for them to collaborate on their phonics instruction and assessment practices.
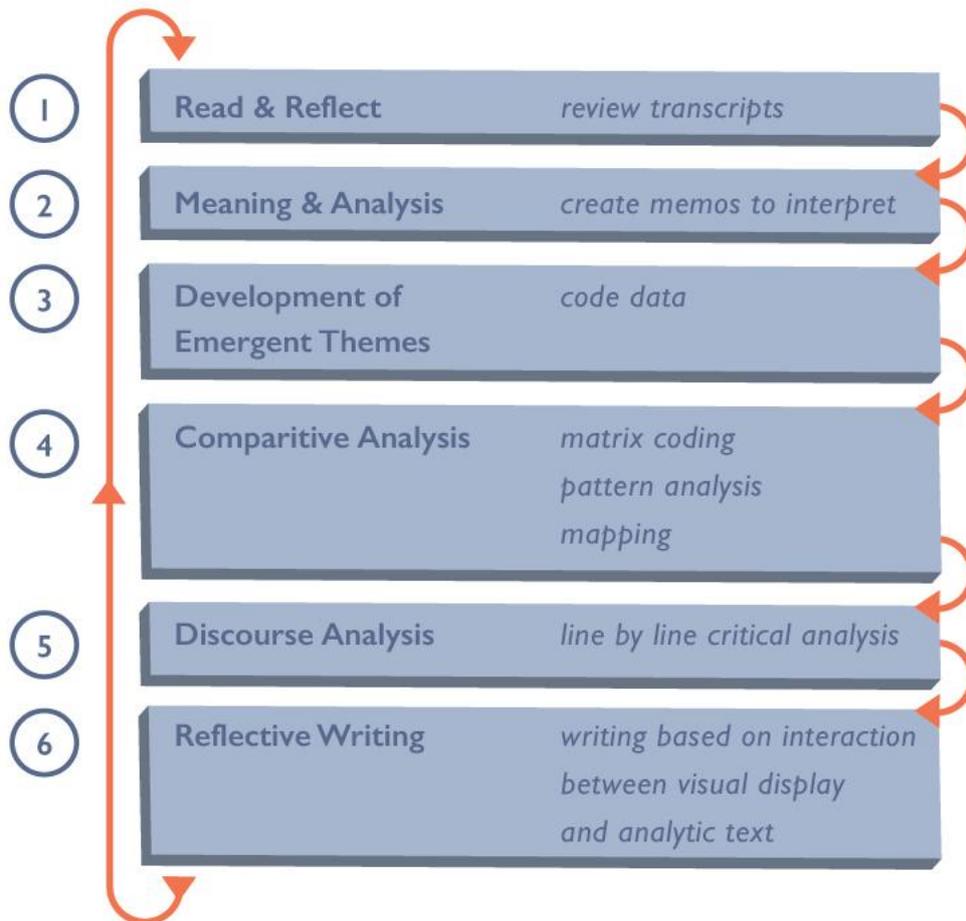
Data Analysis

The data collected from observations and interviews, as well as artifacts from data team meetings were analyzed and coded in the qualitative data analysis software NVivo 10. From the social constructivist perspective, community members have agency to shape their situation through their interactions. Therefore, an analysis of participants' interactions included line-by-line analysis of their discourse. Their speech was connected to antecedent and successive discourses to reveal more about the nature of the data team's social context. Context plays a critical role in the analysis of how people learn when utilizing situated learning as a framework for guiding research and interpreting findings (Choi & Hannafin, 1995). Therefore, memos were used to generate reflective situational analyses, including creating and ruling out different interpretations of the data (Table 1).

Table 1. Data collection, analysis, and connections to theoretical framework

Collected data	Data analysis	Connections to Situated learning variables
Observation transcripts	Discourse analysis, constant comparison, reflective memos, matrix coding	Community of practice, Joint enterprise, Mutual engagement, Shared repertoire
Interview transcripts	Discourse analysis, constant comparison, reflective memos, matrix coding	Community of practice, Joint enterprise, Mutual engagement, Shared repertoire
Field notes	Discourse analysis, constant comparison, reflective memos, matrix coding	Community of practice, Joint enterprise, Mutual engagement, Shared repertoire
Documents and artifacts	Document analysis, reflective memos	Community of practice, Joint enterprise, Mutual engagement, Shared repertoire

The data were cross tabulated with one set of codes measured and compared to another code or set of codes to identify meaningful relationships, and to uncover contextual patterns and emerging themes (figure 5). The "matrix coding" function of NVivo 10 aided in the cross-comparison of coded data with other coded data, and extended those comparisons to include cross-references with the original transcripts. By comparing cross-sections of data according to the word count or coding frequency helped to identify overlapping "hot spots" that indicated significant relationships between codes and data sources.

The physical context of the data team was mapped out and compared to outcomes of discourse analysis to make connections between the data team's context and trends within the data (Bazeley, 2013). Matrix coding enabled comparative contextual analyses.


Figure 1. Data analysis process.

Emerging patterns in the data were compared to transcriptions with supporting quotes that affirmed, denied, or clarified identified relationships. Reflective memos on the interactions between the visual displays and the analyzed text explored possible connections between codes as well as developing entirely new emergent codes that were then used to further categorize the data before subjecting it to further cross-comparisons (Miles & Huberman, 1994). The social constructivist framework guided the analysis to emphasize the context of the discourse and embraced possible overlapping connections between what was said, how it was said, and the discourse's physical context. Re-assembling the participants' discourse enabled a clearer understanding of how their context influenced their socially constructed learning.

Findings

Proximity as a Major Factor of Socially Constructed Learning

Physical context actively shaped the frequency and nature of the data team's collaboration.
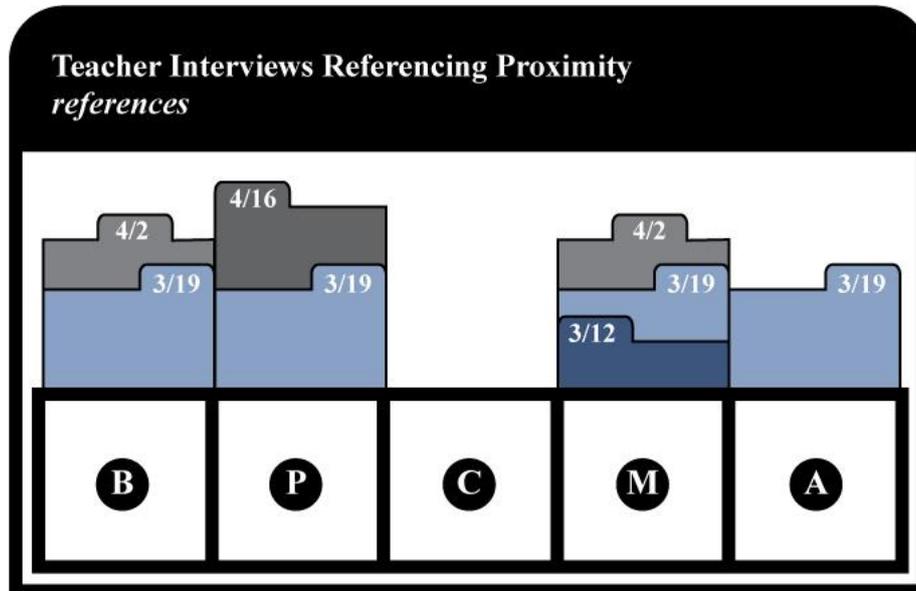
Figure 3. Diagram of teachers' room locations with an overlay of the interview transcripts in which proximity was referenced as a factor of collaboration by the teacher.

All of the participants, except for Carol, indicated the importance of proximity for the team's work together. Carol's proximity relative to the other team members was central and neutral, making it unlikely that her geographic position positively or negatively impacted her ability to collaborate with any of her colleagues (figure 3). The other teachers cited a variety of instances where their proximity, or lack thereof, shaped the team's collaboration. Mary indicated Anne's location within a different part of the building in the previous school year had negatively impacted their collaborative work:

> …there's a lot of informal meeting that happens just because you're close together. So with [Anne] downstairs…we'd be halfway through a conversation and [say], Anne should really be a part of this.
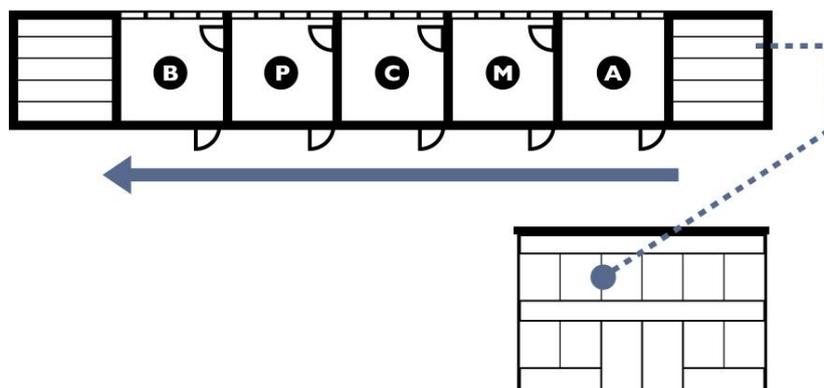
Figure 2. Diagram of the second grade hallway at Dorne Elementary.

Geographic positioning influenced the data team's opportunities for informal collaboration. The teachers' collaborative interactions were derivative of the team's proximity. The data team was able to increase the time they spent collaborating through "popping in" on each other, and through other informal conversations they were able to have with one another due to their proximity. According to Carol:

> …we spend a lot of time together outside of the meetings that we conduct. We have our two meetings. The one that we use as a planning meeting during one of our special times and then before school meeting is dedicated just to our goals…And if anyone has anything particular they want us to cover other than what we're focused on, we bring it up and we try to have time. But that's not usually an issue because we see each other so much and interact constantly.

Carol attributed the team's frequent interactions with each other as a function of the team's proximity. She indicated that other teams have to "come together from other areas," which was a logistical problem. However, for this team proximity allowed the convenience of additional time to participate actively in the team's work. She also positioned their "constant interaction" as a proximal outcome. Without having to travel to "cover everything they need to" they were able to "pop-in" or convene informally. Their close proximity fostered the team's ability to craft a shared identity.

The teachers on the data team were in adjacent rooms, all connected through interior doors (figure 2). At the end of the hallway to the left of the diagram is a staircase that is rarely used. On the far right of the diagram, was the frequently used central staircase of the building. They were all much more apt to walk by Anne's room than they were to pass Barbara's. The teachers adjacent to one another extended their collaboration beyond the scope and limits of their data team meeting time. It also influenced which teachers interacted with each other. Mary explained that

> [They] run in and out of each other's rooms … even during teaching sometimes. We'll be like, *Hey, I can't find this paper* or whatever…Carol is next door and Anne's next door, so I'd say they're probably the two that I plan with the most … our classrooms all touch, but since I can just open my doors and get to Anne and Carol, they tend to be the ones. And then Peggy's right next to Carol and then Barbara's on the end. So we're all pretty close together, which his good for Anne (see Figure 2).

Mary openly attributed her more frequent collaboration with Anne and Carol to her geographic location within the team's hallway. She extended and clarified proximity's effect on their situated learning through the team's practice of "popping in" to each other's rooms.

> [We] pop into each other's classrooms a lot, especially during planning times, even if it's not a common planning time. So I think we talk every day and we probably touch upon phonics…We probably talk about it once a day. So I think it does sort of lead its way into – we always come to Thursday's meeting knowing exactly what we wanted to talk about because we've been poking our heads in and saying like, *All right, we need to put that on the agenda for the next meeting* Because we keep asking the same question; we need to get on the same page.

That connectedness influenced their collaboration beyond simply extending the amount of time hey engaged in conversation together. Many of those interactions shaped the official meetings before they were held. Barbara explained how proximity helped her organize her thoughts *before* the data team meetings, which then drove the discussion at the following meeting.

> … a lot of times I'll just poke my head into Peggy's room and say, "Peggy, will you remind me that this is what I want to talk about at the meeting?" Or sometimes we'll have smaller conversations that then will lead us to some of the questions that we bring up, and that was like what happened with that whole do we want to take that week off of phonics? Do we want to spend two weeks? Because I poked my head into Peggy's and kind of quickly shared my data that I had and then we looked a little bit at hers and said, oh, we're going to run into that short week, you know, what do you think, and then let's bring that to the whole meeting...

While proximity stimulated collaboration, it also limited the learning of some group members simply by virtue of their location granting them limited access to some of the team members. Barbara explained that her position often literally shut her out of learning opportunities by virtue of her location on the geographic fringe:

> …I mean I'm probably more out of the loop more than everybody else. I'm not as familiar with…how the others teach and stuff because they have the tendency to be able to open their doors a little bit more. But being on the end, you know, I don't feel that I have that opportunity to open up my doors on both sides and really kind of observe someone's teaching, where I think sometimes they have a little bit more of an ability to do that. … I feel like I'm sometimes distant…

The team members' location influenced the frequency of their collaboration, who they worked with and who they did not, and shaped the nature of those interactions. It was clear that teachers felt the tacit impact that their proximity to each other had in governing the situation that surrounded their collaboration. Their geographic positioning corresponded with team members' orientations towards the data team's mutual engagement and joint enterprise.

Proximity's Impact on the Team's Joint Enterprise

Proximity had a significant impact on the team's perceptions and subsequent social co-construction of the team's activity as a joint enterprise.

This graph (Figure 4) indicates the number of words coded at the code for joint enterprise for each participant's interviews. The word counts correlate directly to the geographic location of each participant's classroom. While coding for numbers of words cannot be considered a representation of quantitative data, it illustrates a significant trend within the interview data.

Corresponding to the geographic location of their classrooms, the closer each teacher's classroom was to the center of the building (to the right, Figure 4) the more frequently the teacher spoke of her efforts as part of a larger joint enterprise. Figure 4 above shows the number of words coded at joint enterprise, a code based on the definition of a community of practice, for each participant during each of their interviews (Horn, 2005). The trend was that the teachers on the right side of the hallway spoke more often about the joint

nature of the team's enterprise, than teachers on the left side of the hallway. This trend was also found in the meeting transcripts, and was even found in the participants' syntax and diction.
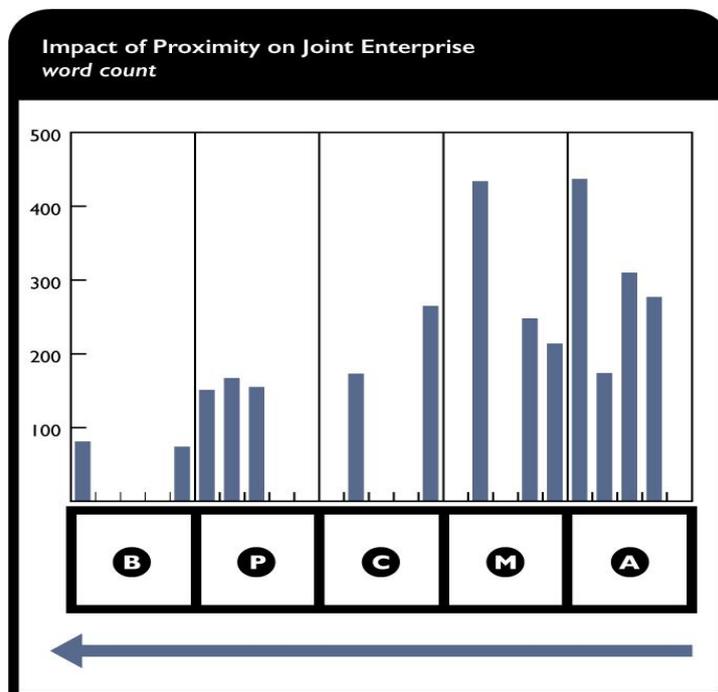

Figure 4

In the following excerpts one of the team's meetings, quotes from Anne and Barbara (from opposing locales) are juxtaposed as different perceptions of the team's joint enterprise as they discussed the team's decision to change their phonics program.

> Barbara: So that's why I mean you have to kind of judge the kids that are in front of you and sometimes, like with the groups that I have, I do get into more of the explanations. When I have my whole group, I try to really simplify it.

Barbara talks about the team's work using the words *I* and *you*, while Anne uses *we* and *us*.

> Anne: But then are we – I shouldn't worry about it. …we're told to use the curriculum. Now we found something that's working better for us, so are we departing from it?

Later in the same meeting, Anne and Barbara had a direct exchange illustrating the different ways that they talked about the nature of the team's joint enterprise. Barbara discusses a "requirement," meaning an expected level of student achievement on a phonics assessment to qualify to be moved into a more advanced instructional group, which she taught. She labels it objectively as "the requirement." Anne conceived of it differently, as something that Barbara had created for her class, labeling it "your [meaning her] requirement."

> Anne: So I actually, I'm not sure what to do with her because I know that she meets your—
> Barbara: The requirement?
> Anne: Your requirement.

The nature of the team's discourse regarding the joint nature of their work, indicated that proximity affected not just the frequency of the teachers' collaboration in the data team, but the degree to which they had crafted an identity based upon the team's perception of their work as a joint enterprise.
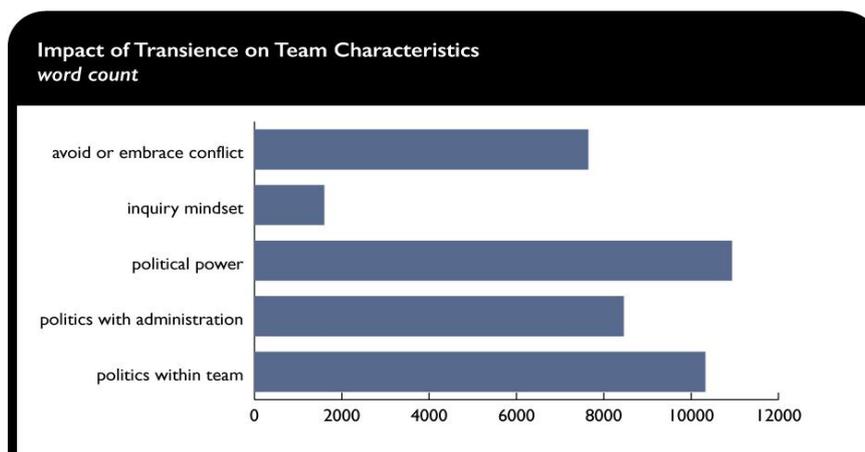
Transience

One of the most important contextual factors that shaped teachers' situated learning in this data team was the variance in the attendance of the team members at the data team meetings. Within a community of practice, the learning of the community is dependent upon the participation of the group members (Lave & Wenger, 1991). The instances of transience over the course of this study were an ever-changing factor that shaped the team's conversations (Figure 5).
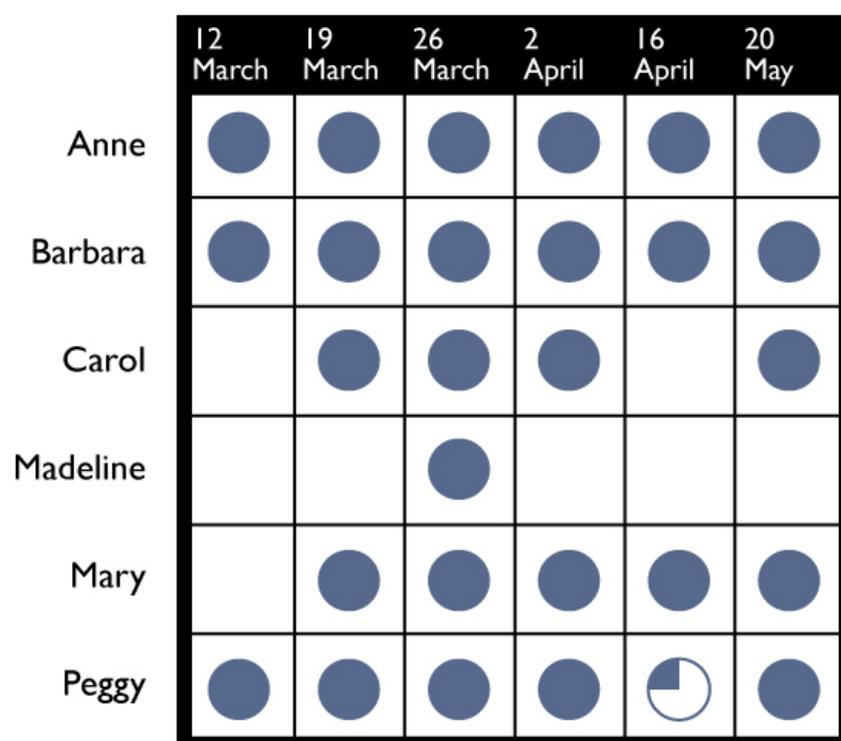
Figure 5. Attendance of team members at data team meetings during the study.

The addition or subtraction of group members placed added pressures on the group that were evidenced by intensified political during meetings with transient membership. Figure 6 illustrates the impact that transience had on the culture of the team meeting to meeting, particularly in the areas that were outcomes of negotiations, like teachers' attitudes towards conflict, and inter-team politics.

Figure 6. Impact of transience on team characteristics.

The figure displays the number of words coded at each code, and is shown only to illustrate trends in the data team meeting transcripts.

Transience and Political Discourse

Analyzing the text of the groups' discourse from the perspective of its' wider socio-political context, the team's lexical style, which so often featured the use of rhetoric as part of their politicized negotiations, corresponded with the added stress on the political relationships within the group during times of transience. It was in those meetings that team members engaged in the heavy use of rhetoric. It is possible that the use of rhetoric was a discursive method of re-creating social identities and positioning within the new context created in a meeting with transient membership. As the team experienced instances of group transience, those members who were present at the data team meetings blurred the lines demarking political roles and norms. This happened when team members moved to the center of the team's participation, while others moved more to its' periphery.

The team's March 12 meeting illustrated how transience was connected with direct political activity. In this thread, the topic of the number of students in Mary's class (Mary was absent from the meeting) was raised. Mary's position as the data team's leader, as well as the fact that she had the least number of students in her phonics class, meant that her absence from the meeting changed the nature of how this discussion progressed.

> Anne: And she has few enough kids that you'd think that there would be [movability] . . .
> Barbara: To break that group into two groups?
> Anne: Maybe. I wonder if—I don't know.
> Peggy: To break Mary's group?
> Anne: Well, not into two teachers but you'd think—she has a small enough group that I think she'd be able to tweak it a little bit. I don't know. I shouldn't speak for her but . . .

Mary's position as the team's leader was present in the conversation despite her absence as an individual. Without Mary present to contribute to the discourse, the group constructed a different reality around teacher caseload and differentiated instruction than what might have happened if not for Mary's absence. Her absence gave the team the opportunity to reposition her on its' periphery, changing the discourse around her political positioning within the team.

The politicization of the data team's discourse during a member's transience was also seen in the following thread from the April 16 meeting, when Barbara left the room to bring an example assessment into the room for the team to discuss. The immediate conversational context surrounding this thread was the team's discussion of which assessment to give, an area of disagreement for Mary and Barbara. During Barbara's brief absence from the meeting, a discussion between the remaining group members illustrated the politicking prompted by one participant's transience

> Barbara: Okay, I need to grab the…[leaves room]
> Mary: But she just emailed it to me. Thank you.
> Anne: So did we just say we're going to put it off?
> Mary: We didn't say yet.
> Anne: Yeah, that's where I end up coming on this too with this one. I'm willing to see next year to try. Let's see.
> Mary: Alright, and then primary.
> Barbara: [enters room] I have it. I've got it.

Anne and Mary used the opportunity to align their positions against giving the assessment that Barbara favored. Doing so in the presence of Carol and Peggy shaped the following conversation about which assessment to give. When the team's attendance was in flux, their discourse was more heavily politicized. This politicization shaped the leadership, participation, and situated learning of the participants. It also affected the lexical style of the team members, much of which involved their use of rhetoric, specifically ethos and logos.

Rhetoric

Rhetoric heavily influenced the situated learning of the data team through its impact on the team's discourse. Rhetoric shaped instances of negotiation between team members by introducing an element of persuasion into the team's discourse.
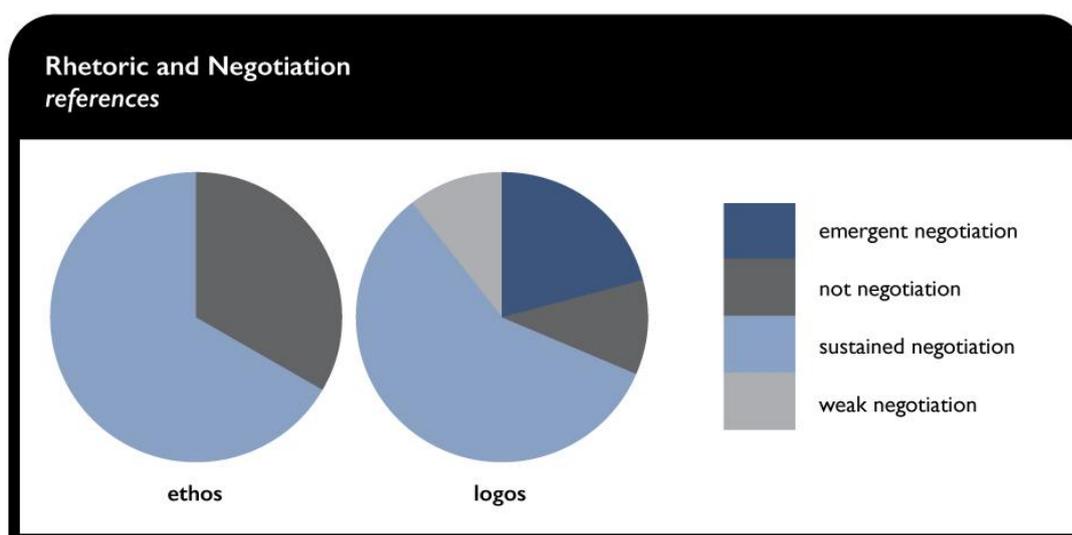
Figure 7. Rhetoric and negotiation.

The figure displays the number of references for each code, and is shown only to illustrate trends in the data team meeting transcripts. Figure 7 illustrates that ethos and logos were the most present rhetorical techniques in the group's discourse during instances of sustained

negotiation. Logos was utilized in discursive situations when the group was at weak or emerging levels of negotiation (Nelson, Slavit, & Duel 2012). Ethos was utilized in instances of extreme types of negotiation, where they were intensely negotiating or not negotiating at all. In instances of emerging or weak negotiation, slight re-constructions of the team's operational logic might have pushed them to a more productive discussion or outcome. Ethos was used either to completely reframe or end discussions.

Logos

Logos is a rhetorical device that appeals to the audience's logic of the defined topic. Logos was utilized by the team when most of their topics had already been subject to social construction, and they were applying already constructed logic in the process of negotiating around topics. An example from the March 12 meeting illustrated Barbara's use of logos to appeal to the existing logic of the team for the purpose of changing Anne's position on the way the team understood gaps in student learning.

> Anne: No that's fair. That's a fair thing to say. And I would add to that, not – okay, I'm going to take away my pushing because that's just mental. You're right. But the reason I said that is because I'm concerned that they just may have a hole because, you know, kids don't necessarily learn completely.
> Barbara: So then if that's the case, we might need to look at the assessment and what we're using to put them into the groups. And maybe there's a hole in the assessment if there's a hole.

Barbara and Anne had both constructed their own operational logic, and in order to change the other's opinion, they needed to change the logic being used by other speakers. Later in the same meeting, in order to have her concern heard, Anne re-labeled her rationale for not wanting to move students forward from not "taking away" to not "pushing" them too much. Barbara responded with even more logos:

> So that's the difference of I guess the terminology. Are you pushing the kids ahead? Or are they ready to be moved ahead?

Barbara heard Anne, but her response was to use logos to re-label the issue as one of *assessment*, not *instruction*. Barbara used logos to successfully remove the "hole in the learning or instruction" from the discourse by re-characterizing it as a hole in assessment, which was more easily dismissed by the team, as part of their function was to revamp the phonics assessment. Barbara used this reframing of the team's operational logic to advocate for moving all the instructional groups further along in the curriculum. It also allowed her to tacitly revisit the social positioning of the team's members as an opportunity to reposition herself as more of a leader.

Ethos

Ethos is a rhetorical device that references a group's higher ideals as a method of persuasion. In the realm of politicized rhetoric in the data team's discourse, appeals to ethos were mainly used in references of extreme agreement or extreme disagreement within the team as a way to attempt to bring the team closer together on an issue. When redefining operational logic was not an option in disagreements, the team turned to defining its own ethos to resolve issues. This team's ethos was constantly being renegotiated through the

team's situated learning, and it was therefore highly subject to the intertextuality of the team's discourse (Reynolds, 1993). It was, therefore, highly sensitive to instances of transient membership in the team. In the meeting on March 26, Madeline used ethos to establish a narrative within the team's discourse about incorporating students' phonics into their written work. Her implication was that the DDM for the district asked students to do this. She did this early in the conversation, emphasizing the K-3 curriculum. She emphasized the need to emphasize student skills, this time framing it within the context of the second grade curriculum.

> Madeline: The extension group. I wonder…I'd be curious to know how they're applying that in their everyday writing. Do you know what I mean? Like kids always do better on this than in their connected text writing. It would be interesting to have that one flash draft and take it and just do a quick like short vowel check.

Towards the end of the meeting, Madeline tried to position the discourse within the context of the students' writing, which was how the district measured growth as phonics students, through a DDM that incorporated varied aspects of the writing process in a holistic writing assessment.

> Madeline: And looking at their writing and looking at whether applying. We're keeping it connected to what they're doing.

The socially constructed versions of the team's ethos were extended intertextuality through the team's discourse over time. As a transient team member in this meeting, Madeline guided the team's discourse over the length of the March 26 meeting, in an attempt to reframe their work utilizing references to the group's ethos. This affected the group's discourse on the issue of contextualizing phonics for their students, evidenced by Anne's comments in the following meeting on April 2:

> Anne: I noticed that there's the suggestion here going back to what we used to do to create literature connections so that you're putting the words back in to some sort of context…I thought, oh, well, that's back to what we used to do, you know, where you actually put the words back into some sort of context and have the kids practice that as another thing.

Here, Anne was able to incorporate Madeline's previous comments into a subsequent meeting to shape the conversation. It helped to redefine the team's purpose around writing instruction more than phonics instruction, which enabled them to move past the phonics testing issue and re-orient themselves to the work at hand.

Discussion

Much of the research on teachers' collaborative work in data teams deals with outlining the conceptual framework for how they should ideally function. Some studies link the presence of data teams within a school to student outcomes. Few empirical studies actually look at how teachers' collaboration affects data team members, and what influencing factors shape their learning experience. The findings of this study indicate the importance of proximity and transience as factors that heavily influence the degree to which data team members collaborate, and influence the qualitative nature of that work.

Proximity

Proximity shaped collaborative activity beyond the scope of the meetings, in some cases extending the collaborative time of the group, while in others directing the content of their collaboration. The research literature on data teams suggests that organizing for collaborative work is one of the primary concerns of establishing practices for teachers collaborating with student data. This act of organizing is often referred to in the abstract—as a process. However, as teachers increasingly engage in collaborative work with student data, it is critical that educators and researchers are aware of the importance of the role physical location plays in shaping teachers' collaborative work in data teams. In this particular case, teachers were located in adjacent rooms confined to one hallway in the school. There were no other physical barriers to serve as limiting factors in their collaborative engagement (Valada, 2014). Despite this, the arrangement of the rooms impacted the nature of teachers' collaborative engagement with this data team.

O'Leary et al.'s (2014) work indicates that perhaps physical geography is not as important to the quality of collaboration as perceived proximity. Connecting this work directly to the education field proves difficult, as many collaborative structures deal with face to face encounters that have little to no mediation via technology. Additionally, O'Leary et al. (2014) studied only dyads, and collaborative activity in education involves groups of larger sizes with varying degrees of social complexity. While many have theorized about the impact of technology on collaborative teams, collaboration in education is socially complex, and must be studied during instances of interaction to appreciate its complexity. Understanding the face-to-face nature of collaboration in schools should be a priority, given the rise of collaborative endeavors in education.

The most significant impact of proximity on the nature of the data team's work was in the area of joint enterprise. Joint enterprise is a necessary component of any community of practice (Lave & Wenger, 1991), and it was clear from the frequency of coded words shown in figure 3, that proximity impacted how the teachers' viewed the teams' work. Teachers who were in locations more central to where their colleagues would be, or had access to more frequent interactions with each other were far more apt to refer to the joint nature of their work together. The nature of the teachers' participation in this data team then shaped the situated learning that the teachers constructed, with the outcomes of their collaborative work ultimately being determined in large part by where their classrooms were located relative to each other. Those who felt more connected to the team were able to "pop-in" and collaborate more often and freely, while those on the geographic periphery had their collaborative opportunities limited.

Transience

While researchers have indicated the importance of time for collaborative activity (McGrath, 1991; Vadala, 2014) few point out the importance of attendance as it relates to the frequency of collaboration. Many studies have been conducted connecting teacher absences to student achievement. Transience during the data team meetings heavily influenced the situated and social learning of the participants in this study. In any collaborative setting, the democratization of work politicizes the actors engaged in it (Biesta, 2007). Their critical reflection and dissent stimulated the discourse that is central to collaborative learning (Achinstein, 2002). During meetings that occurred when a teacher was absent, the meetings featured more politicized negotiation between the participants. In segments of meetings where a teacher left the room—even briefly—the political nature of the discourse was

drastically altered. The attendance of an additional person, an outsider, to the meeting also resulted in a meeting comprised almost entirely of political positioning and negotiation. Previous work on data teams (Schildkamp & Poortman, 2015; Schildkamp, Poortman, & Handelzalts, 2015) did not account for changing membership on data teams. Examining the process of one data team revealed that consistent attendance cannot be assumed, and that transience impacted the discourse, and therefore the learning of participating teachers.

This study illustrates that in meetings with less transience, more team members expressed the joint nature of their work together, while in instances of greater transience, there was less of an orientation towards joint enterprise. Considering the importance of joint enterprise to the working of a community of practice (Lave & Wenger, 1991) and joint work to teachers' collaboration (Little, 1990), the ability of a data team to develop a shared identity around mutual engagement in a joint enterprise is critical to their functioning. An outcome that is eased through careful consideration of the impact of the factors of proximity and transience can have on the collaborative efforts of teachers.

While many educators and researchers understandably will follow developments in the arena of technology enhanced collaboration, it is the physical context of collaborating teachers within schools that has the greatest potential to change the educational experience of students by changing teachers' pedagogy through their professional learning in collaborative situations. While many have advocated for collaborative data use, few have emphasized the key aspect of its function, which is to stimulate teachers' situated learning. Implementing data teams and other similar measures without understanding their purpose, or how teachers learn from engaging in them limits their potential to improve educational practices. Realizing the role that proximity and transience play in shaping teachers' collaborative learning in this instance should influence educational leaders as they design new ways of connecting teachers with one another. It should also influence how researchers study collaborative practices in action.

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