Imagination, Brokers, and Boundary Objects: Interrupting the Mentor-Preservice Teacher
Hierarchy when Negotiating Meanings

Martha M. Canipe, Northern Arizona University

Kristin L. Gunckel, University of Arizona

Abstract

The mentor-preservice teacher hierarchy, that privileges mentor teacher talk and experience, often dominates mentor-preservice conversations. To realize the full potential of teacher education approaches designed to engage preservice and mentor teachers together in shared learning and teaching tasks, attention is needed to better understand the dynamics and implications of mentor-preservice teacher interactions. We analyzed how and when preservice and mentor teachers introduced ideas to group conversations and whose ideas were taken up by the group during a colearning task. We found that mentor teachers tended to dominate group sense-making. However, preservice teacher use of imagination, the actions of teacher educators as brokers, and the use of boundary objects temporarily interrupted the dominant hierarchy. We conjecture that these moments raised preservice teacher status within the group so that mentor teachers took up preservice teachers' ideas. Implications for promoting more equitable preservice teacher participation in sense-making with mentor teachers are discussed.

Imagination, Brokers, and Boundary Objects: Interrupting the Mentor-Preservice Teacher Hierarchy when Negotiating Meanings

Working with mentor teachers is a hallmark experience of preservice teacher education. In student teaching, where preservice teachers are placed full time in mentor teachers' classrooms, and in field placements during university-based course work prior to student teaching, preservice teachers spend significant time with mentor teachers. Research on preservice-mentor teacher experiences shows that the master-apprenticeship model of teacher preparation, where classroom teachers model their practice, emphasize management strategies, and give evaluative feedback to preservice teachers, is the most common approach (Bradbury & Koballa, 2008; Clarke, Triggs, & Nielsen, 2014; Franke & Dahlgren, 1996; Wang & Odell, 2002). In this model, classroom teachers are positioned as experts and preservice teachers are expected to reproduce the practice of their mentor teachers. This situation creates a hierarchy that privileges mentor teacher knowledge and limits preservice teachers' opportunities to make connections between coursework and field experiences (Clarke et al., 2014; Hoffman et al., 2015; Wang & Odell, 2002; Zeichner, 2010).

Innovative approaches to field preparation offer alternatives to counter the traditional master-apprenticeship model. These approaches, such as colearning (Canipe & Gunckel, 2013, Gunckel & Wood, 2016; Turner & Blackburn, 2016), coteaching (Koballa, Bradbury, Glynn, & Deaton, 2008; Scantlebury, Gallo-Fox, & Wassell, 2008), and teacher residencies (Klein, Taylor, Onore, Strom, & Abrams, 2013; Solomon, 2009), attempt to blur boundaries between experts and novices, university coursework and classroom field placements, and the theoretical and practical work of teaching by creating opportunities for mentors and preservice teachers to work together on shared tasks. Many of these models show promise as they build community, increase

collaboration between preservice and mentor teachers, and enhance preservice and mentor teacher opportunities to learn from and with each other (Gallo-Fox & Scantlebury, 2016; Gorodetsky & Barak, 2008; Klein et al., 2013).

However, research also shows that there are challenges with these models as well. For example, preservice-mentor teacher collaborations can collapse when mentor teachers are unwilling to share teaching responsibilities (Soslau, Gallo-Fox, & Scantlebury, 2018) or when preservice and mentor teachers have different expectations about the preservice-mentor teacher relationship (Koballa et al., 2008; Scantlebury et al., 2008). These challenges show that even innovative approaches break down when they come up against dominant narratives of learning to teach and the well-established mentor-preservice teacher hierarchy. In order to realize the full potential of these approaches to preservice teacher field education, close attention is needed to better understand the dynamics of preservice-mentor teacher interactions when working together, identify opportunities to interrupt the traditional hierarchy, and increase preservice teacher participation in sense-making conversations with mentor teachers.

In this study, we examined preservice and mentor elementary teacher conversations during a colearning task that engaged group members in analyzing children's science ideas. Colearning is an approach to preservice teacher preparation that is designed to engage preservice and mentor teachers in constructing shared understandings while working together on teaching-related activities (Canipe & Gunckel, 2013, Gunckel & Wood 2016; Koballa et al., 2008; Turner & Blackburn, 2016). These activities may include tangible objects, such as curriculum materials, student assessments, or transcripts of children's talk, around which meanings are made (Canipe & Gunckel, 2013; Nolen, Horn, Ward, & Childers, 2011; Tsui & Law, 2007). A teacher educator may facilitate preservice and mentor teachers' conversations to encourage joint sense-making.

We used Wenger's (1998) modes of belonging framework to analyze mentor and preservice teachers' group conversations during a colearning task involving analyzing a transcript of student talk. Modes of belonging are ways of interacting with others to negotiate meanings from experiences. This framework allowed us to see how and when preservice and mentor teachers were able to introduce ideas to group conversations and whose ideas were taken up by the group during negotiation of meanings. Our research questions were

1. Who participated in the negotiations of meanings during the colearning tasks and what modes of belonging did they use?
2. What are potential opportunities for interrupting the preservice-mentor teacher hierarchy?

Background

Hierarchical Challenges in Preservice-Mentor Teacher Relationships

Analysis of preservice-mentor teacher conversations shows that when working together, mentor teachers often take the dominant role. Mentor teachers typically have the most input into conversations with preservice teachers, they tend to control the topics discussed, and they often introduce the most topics into these conversations (Crasborn, Hennissen, Brouwer, Korthagen, & Bergen, 2011; Haggarty, 1995; Hoffman et al., 2015). Furthermore, mentor teachers typically use directive approaches in their interactions with preservice teachers, telling preservice teachers how to teach and critiquing preservice teachers' teaching, rather than asking about and listening to preservice teachers' ideas (Crasborn et al., 2011). In these types of interactions, mentor teachers occupy an elevated status that enables them to define the learning opportunities available to both preservice and mentor teachers during teaching-related discussions.

Mentor teacher domination in conversations is not entirely because mentor teachers demand this role. Interestingly, both preservice and mentor teachers tend to expect that mentor teachers will take the directive position, passing down to preservice teachers knowledge and skills gained from experience in the classroom (Bradbury & Koballa, 2008). Preservice teachers frequently express frustration when mentor teachers do not provide direction and give direct feedback (Bradbury & Koballa, 2008; Hoffman et al., 2015). That both preservice teachers and mentor teachers tend to enact the master-apprentice relationship attests to the strength with which the mentor-preservice teacher hierarchy is established in preservice teacher education.

The ubiquity of the mentor-preservice teacher hierarchy points to several common issues in ways that field preparation is often organized. One issue is a perceived divide between university-based course work and field-based experiences, where coursework is seen as focused on generalized principles of teaching, while field work is viewed as focused on practical aspects of teaching (Britzman, 2003; Cochran-Smith & Lytle, 1999; Cochran-Smith et al., 2015; Janssen, Westbrook, & Doyle, 2014; Labaree, 2003; Mikeska, Anderson, & Schwarz, 2009; Smagorinsky, Cook, & Johnson, 2003). While teacher education courses and field experiences both provide important resources for developing preservice teachers' understanding of what it means to be a teacher (Horn, Nolen, Ward, & Campbell, 2008), because of the perceived divide between university and field experiences, neither preservice nor mentor teachers may recognize how knowledge and practices learned in university-based courses are relevant to classroom teaching (Brouwer & Korthagen, 2005; Feiman-Nemser & Buchmann, 1985; Kennedy, 1999; Korthagen, Loughran, & Russell, 2006; Rozelle & Wilson, 2012; Smagorinsky et al., 2003; Valencia, Martin, Place, & Grossman, 2009). As a result, both mentor and preservice teachers may feel it is the mentor teachers' role to model teaching as they enact it in classrooms and miss opportunities

to engage in more reflective or inquiry-based approaches to working together (Clarke et al., 2014; Franke & Dahlgren, 1996; Koballa, Kittleson, Bradbury, & Dias, 2010; Taylor, Klein, & Abrams, 2014; Valencia et al., 2009).

The second issue is that mentor teachers often receive little preparation in how to be effective mentor teachers (Bradbury & Koballa, 2008; Hoffman et al., 2015; Valencia et al., 2009). They may rely on their own preparation as teachers for models of working with preservice teachers (Bullough et al., 2002; Haggarty, 1995). As such, they tend to give evaluative feedback and directive guidance, explaining to preservice teachers how to teach rather than supporting preservice teachers in reflecting on practice (Crasborn et al., 2011; Glenn, 2006; Hoffman et al., 2015). The lack of guidance for adopting new models of interaction with preservice teachers leads to mentor teachers defaulting to the master-apprenticeship model.

Alternatives to the Traditional Master-Apprentice Model

Efforts to nurture different models for preservice-mentor teacher relationships exist. Some models, such as teacher residencies, attempt to redefine the roles of mentor teachers, preservice teachers, and teacher educators (Gorodetsky & Barak, 2008; Klein et al., 2013; Martin, Snow, & Torrez, 2011). Other approaches focus more on relationships between mentors and preservice teachers. Feiman-Nemser (1998) advocated for educative mentoring, where mentors and preservice teachers inquire together into practice and ideas from both mentors and preservice teachers are equally valued (Bradbury, 2010). Coteaching models position mentors and preservice teachers together as co-planners, co-teachers, and co-reflectors on teaching, providing opportunities for preservice and mentor teachers to learn alongside each other from practice (Scantlebury et al., 2008; Siry, 2011).

Similarly, colearning models also place preservice teachers and mentor teachers in situations where they learn together about teaching, although there is more of a focus on discourse and shared sense-making than in coteaching models (Canipe & Gunckel, 2013; Gunckel & Wood, 2016; Koballa et al., 2008; Turner & Blackburn, 2016). The concept behind colearning is that preservice teachers and mentor teachers come from two different communities (i.e. the community of novice teachers taking academic coursework and the community of experienced teachers working in schools), each with characteristic ways of talking about and making sense of teaching and learning (Gee, 1989; Wenger, 1998). Bringing these communities together requires connecting ways of talking about teaching present in teacher preparation courses to experiences and perspectives mentor teachers bring from teaching in the classroom. Colearning activities engage preservice and mentor teachers in authentic teaching-related activities, such as analyzing student thinking or curriculum materials, that require both parties to draw on each other's strengths to negotiate shared meanings together. As with teacher residencies and coteaching models, colearning attempts to disrupt the master-apprentice model by working to diminish the theory-practice divide, provide mentor teachers with support in their roles as mentors, and engage preservice and mentor teachers together in more egalitarian partnerships.

Conceptual Framework

Meanings are the sense that people make of experiences and are fundamentally located in the process of negotiation with others (Wenger, 1998). Our previous research has examined the meanings that get negotiated by preservice and mentor teachers in colearning tasks and the extent to which these meanings represent blendings of ideas from the two different discourse communities (i.e., preservice teachers' course-work discourse and mentor teachers' classroom-

based discourse) (Gunckel & Wood, 2016). Building on this prior research, in this study we wanted to better understand how preservice and mentor teachers negotiate their shared meanings.

Figure 1 shows how we conceptualize preservice and mentor teacher participation in the negotiation of meanings. The left and right sides of the figure show the modes of belonging (Wenger, 1998) available to preservice and mentor teachers for interacting with each other during the colearning task. Each mode of belonging can lead to either participation or non-participation in the negotiation of meanings and results in more or less influence on meanings negotiated within a group. *Engagement* describes the ways that individuals are involved in group sense-making. When a group member puts forth an idea that is adopted by the group, engagement leads to participation. However, when a group member produces a proposal but their idea is ignored or rejected by the group, the individual becomes a non-participant in the negotiation and is marginalized from the sense-making which occurs within the group. *Imagination* is required to connect ideas put forth to relevant experiences, either real or vicarious and through time – past and future. Individuals may use imagined experiences as a basis for putting forth ideas, leading to participation in the negotiations. Conversely, imagination can lead to non-participation when someone imagines that the meanings within the group belong do not belong to them. *Alignment* brings together engagement and imagination to coordinate meanings within the group. Participants in negotiations attempt to persuade others to align their meanings with each other. However, alignment can lead to non-participation in the negotiation when group members follow along through literal compliance or submission to others.

At any given moment during a negotiation of meaning, depending on which modes of belonging are being used, a person may be either a participant or a non-participant in the negotiations of meaning (Wenger, 1998). Thus, some modes of belonging may lead to

participation and others may lead to non-participation. Non-participation does not mean a person is not active or talking; it means that their ways of interacting lead to either not having influence or being marginalized from the group sense-making process. In an ideal colearning task, preservice and mentor teachers would all use modes of belonging that lead to participation in negotiations of group meanings. More likely, for a given group, some modes of belonging may be used more often and lead to having more or less overall influence on the meanings negotiated within the group.

The relative influence of preservice and mentor teacher participation on group meanings is represented in Figure 1 by the proportion of the center box shaded for either preservice or mentor teachers. In an ideal colearning task, preservice and mentor teachers would be proposing and taking up each other's ideas on a mostly equal basis. *Boundary objects* (Akkerman & Bakker, 2011; Star & Griesemer, 1989; Wenger, 1998), such as curriculum materials or other artifacts that have meanings to both preservice and mentor teachers, may help group members coordinate their negotiations. The box above labeled *brokers* represents people who work across preservice and mentor teachers. Brokers are members of neither the preservice teacher nor mentor teacher community, but are able to assist in coordinating group members' modes of belonging in their negotiations of group meanings (Akkerman & Bakker, 2011; Wenger, 1998). The bracket represents this relationship. Below we describe how we used this framework to analyze group conversations during the colearning task.

Methods

Context and Participants

This study took place in the context of a project, called [name blinded], within an elementary teacher preparation program of a large university in the southwestern United States.

The purpose of the project was to create stronger connections between university course work and field placement classrooms by linking the theory and practice of teaching elementary mathematics and science. The project extended over three semesters, including two semesters of content-methods teaching courses and one semester of student teaching. During the two semesters prior to student teaching, preservice teachers were placed with mentor teachers in elementary classrooms for nine hours per week. Preservice teachers used their time in the field classrooms to complete assignments for their content-methods teaching courses.

A signature feature of the project was joint events during which preservice teachers and their field classroom mentor teachers participated together on colearning tasks. These tasks required preservice and mentor teachers to work together on teaching-related activities. Example tasks included analyzing strengths and weaknesses of science curriculum materials, designing groupworthy mathematics lessons, conducting interviews with children about their mathematical thinking, and analyzing children's scientific ideas. Joint events were two-and-a-half hours in length and occurred after school hours at the school where the mentor teachers taught. Preservice teachers self-selected into this cohort knowing that it included the joint events. Mentor teachers were compensated for their after-school time. Mentor teachers also participated in a two-and-a-half hour professional development session at the beginning of the project that included strategies for supporting preservice teachers in making connections between university coursework and field-based experiences.

The participants in this study came from two cohorts of preservice and mentor teachers. The first cohort consisted of 9 preservice teachers and 11 mentor teachers while the second cohort consisted of 11 preservice teachers and 12 mentor teachers. The mentor teachers taught in four Title I elementary schools. Both preservice and mentor teachers were predominantly white

women. Preservice teachers were all in the senior year of their undergraduate degree program. Mentor teachers had seven to thirty years of teaching experience and most had prior experience serving as a mentor teacher.

During the colearning task that is the focus of this paper, participants worked in small groups composed of both mentor and preservice teachers. The small groups ranged in size from four to six participants. Groups were composed of two to three pairs consisting of a preservice teacher and the mentor teacher in whose classroom the preservice teacher was placed for field work. In each joint event, there were inevitably some preservice or mentor teacher absences, which resulted in some groups having an odd number of participants.

Science Talk Colearning Task

This study focused on conversations during the science talk colearning task, which was part of a joint event that occurred during week four of the fifteen-week science methods course. In this task, mentor and preservice teachers viewed two video clips of a teacher conducting a science talk (Gallas, 1995; Rosebery & Ballenger, 2008) with first grade children about what happens when a book and a piece of paper are dropped at the same time (Hammer & van Zee, 2006). Preservice and mentor teachers discussed the children's ideas about the paper and the book falling. The purpose of the task was to provide groups with an opportunity to make sense of children's ideas about scientific topics and begin to see children's talk as a resource for learning science (Davis, Petish, & Smithey, 2006; Mikeska et al., 2009; Warren, Ballenger, Ogonowski, Rosebery, & Hardicourt-Barnes, 2001).

The colearning groups had a transcript, with line numbers, of the conversation in the video. Discussion prompts provided by the science methods course instructor guided groups' analyses of the children's talk (Table 1). These prompts encouraged participants to reflect on

ideas and experiences that the children in the video were using to make sense of the science content. To give preservice and mentor teachers opportunities to talk, participants were directed to take turns reading the discussion prompts to begin the group discussions. This colearning task lasted 30 minutes (including watching the video clips). The second author of this article was the instructor for the science methods course and planned and led this joint event.

Because this study focused on preservice and mentor teacher participation in negotiations of meaning, it was imperative that we focus on the colearning task that would have the greatest opportunity for preservice and mentor teachers to participate equitably. Our previous research on colearning tasks suggested that the most equitable tasks are ones that privilege neither preservice nor mentor teacher knowledge of the context of the task (Canipe & Gunckel, 2013). Of the colearning tasks in the project, the science talk task was the most accessible to both preservice and mentor teachers for several reasons. First, the task used a video of children who were not familiar to either the preservice or mentor teachers. As such, neither preservice nor mentor teachers had prior knowledge or previously-formed opinions about the children's ideas or their capabilities. Second, the science talk involved content that was not part of either the preservice teachers' methods course or the mentor teachers' classroom curricula, maximizing the chances that the focus of the science talk would be new to both preservice and mentor teachers. None of the other colearning tasks in the project fit both of these criteria.

Data Collection and Analysis

We recorded two conversations each for nine small groups: four groups from one cohort and five groups from the other cohort. Seven groups were video-recorded and two were audio-recorded. A total of 17 conversations were analyzed¹. One conversation occurred after watching

¹ Due to technical difficulties, only the second conversation for one of the groups was recorded.

the first video clip and the other occurred after watching the second video clip. Each conversation lasted approximately ten minutes and we transcribed 165 total minutes of conversations for analysis. We assigned pseudonyms to all group members.

We began our analysis by parsing each small group conversation into episodes. Each episode consisted of all of the group talk around a single topic. Usually, episodes were focused on the discussion prompt that framed the conversation. Episodes were subdivided into talk turns with each turn consisting of the utterance of one participant. A new turn began with the utterance of a different participant. Some episodes were quite long (e.g. 65 turns) and others were quite short (e.g. 6 turns), depending on the topic of conversation.

We developed codes for each of the modes of belonging shown in Figure 1. Three codes described participation in the negotiations of meaning (e.g. participation: engagement) and three codes described non-participation (e.g., non-participation: engagement). We then applied each code in the transcripts, modifying our descriptions of each code based on evidence in the transcript. Once we reached agreement on the codes, we used the revised codes (Table 2) to analyze the entire data set. When assigning a code we examined individuals' contributions as well as the responses of other members of the group to these contributions. We want to be clear that we were not analyzing the meanings that the preservice and mentor teachers negotiated or any learning that may have happened. Instead, our codes identified ways that preservice and mentor teachers participated or not in the negotiation of meanings within the group.

To establish reliability, each author independently coded (Saldaña, 2016) two full conversations and compared results. Cohen's Kappa (Cohen, 1960) for interrater reliability was 0.98. Each author then coded half of the remaining conversations.

Findings

Our analysis of the preservice and mentor teachers' conversations showed that the majority of the time, mentor teachers were participants and preservice teachers were non-participants in the negotiations of meanings in the groups. However, the analysis also uncovered some occasions in which preservice teachers had opportunities to negotiate meanings with mentor teachers. In the following sections, we first provide an example of a typical conversation during the colearning task in which the mentor teachers over-participated in the meaning-making. We then present examples of ways in which preservice teachers were sometimes able to make greater contributions to the group sense-making.

Mentor Teachers as Principal Participators

In all of the groups across both cohorts, mentor teachers tended to dominate conversations, not only in terms of the time spent talking, but also in controlling the meanings negotiated within the group. An excerpt from a group of two preservice teachers (Beatrice and Trish) and three mentor teachers (Melody, Tonya, and Simone) provided an example. In this conversation, the group discussed what they found most interesting in the students' talk.

Excerpt 1

- 1 Tonya (MT): [Reading the provided prompt] "What did you find most interesting or surprising about the students' talk?"
- 2 Trish (PST): That they actually gave examples of why they were thinking what they were thinking. 'Cause I know with a lot of the really little kids they kind of say things and they don't really describe it or they might not even know how to describe it. But I liked that Ebony [student in the video] was saying about if you put the book on the scale and you put the paper on the scale

they would weigh different. So what he knows about things that are heavier he would assume it would fall faster cause it's heavier.

- 3 Simone (MT): The vocabulary strength was very interesting to me.
- 4 Melody (MT): That's what I was going to say. The word "force."
- 5 Simone (MT): Yeah.
- 6 Beatrice (PST): Yeah.
- 7 Simone (MT): She was saying, he kept saying the word "strength." "Strength; it's stronger."
- 8 Trish (PST): Yeah.
- 9 Simone (MT): And I'm wondering.
- 10 Melody (MT): [reading from the transcript] "Has more force."
- 11 Simone (MT): Went, yeah, but the word was "strength."
- 12 Tonya (MT): I was impressed with that word. It reminded me of Rita saying, "Well my kids used 'baby' instead of 'embryo.'" And yet the kid knew and then I made that connection the kid knew weight but didn't know the word "weight." It's a young child, but knew strength.

In this discussion, the group was trying to make sense of the words that the students were using to talk about what they thought would happen. The group discussed the children's use of the words "strength" and "force" when the children were talking about what would happen when the book and the piece of paper were dropped. On first examination, it seems that this conversation was one in which the group moved together towards agreement of what was interesting in the children's talk.

However, examining the preservice and mentor teachers' modes of belonging shows that more was going on in this conversation. Preservice teacher Trish initially proposed an idea to the group that combined her experience with students and what she observed in the video of the science talk (line 2). Neither the mentor teachers nor the other preservice teacher in the group responded to this idea. Instead, mentor teacher Simone focused on the vocabulary that the children in the video were using (line 3). Mentor teacher Melody followed, taking up the focus on the children's vocabulary (line 4). The group then went along with this line of conversation, ignoring the initial idea contributed by Trish.

In this episode, the mentor teachers were participants in meaning-making through engagement as a mode of belonging because they introduced ideas that were taken up by others. Trish's engagement was as a non-participant because her ideas were ignored, or at least not taken up by the mentor teachers or anyone else in the group. By the end of the episode, both preservice teachers Trish's and Beatrice's utterances of "yeah" signaled their alignment with the mentor teachers, again marking them as non-participants in the group meaning-making.

We saw this general pattern repeated in all of the groups. The preservice teachers offered ideas, mentor teachers offered their own ideas and rarely took up preservice teachers' contributions, and preservice teachers eventually aligned with mentor teachers' ideas. That this pattern showed up in most of the episodes in all of the groups indicates how difficult it was for preservice teachers to be participants in the group negotiation of meanings.

Using Imagination as a Mode of Belonging to Increase Preservice Teacher Participation

However, we did see occasions where this pattern was interrupted. One way this occurred was when preservice teachers and mentor teachers used imagination as a mode of belonging. Here we present two examples.

Imagining Student Talk. A group of three preservice teachers (Felice, Leah, and Priscilla) and three mentor teachers (Yarra, Wanda, and Mauricio) were discussing the importance of a statement made by one of the children in the video. The topic of the science talk in the video was what would happen if a book and a piece of paper were dropped at the same time. The child in the video said that the book would fall first because that was what had happened when she had dropped a book and a piece of paper at home. Earlier in the conversation, mentor teacher Yarra had wondered if this child was being honest about her experience. Excerpt 2 picked up at the point where Yarra began to consider reasons for why the child made the statement.

Excerpt 2

- 14 Yarra (MT): I think it was the excitement and the enthusiasm, and whether she had something to say or not, she was gonna find a way to make sure that she was contributing. Which is fine.
- 15 Felice (PST): I think it goes along with the lines of when you're reading a story, and you're trying to, "Oh, has anyone else been to the fair?" "Well, my uncle owns a carnival." "Well, my grandma took me to the fair last week." Then you just get everybody saying one thing—a bunch of things at once. Then you get those kids who are like, "Well, I rode a pony at the fair," even though they probably didn't, or maybe they [cross talk].
- 16 Yarra (MT): "Well, I rode an elephant."
- 17 Felice (PST): Yeah, right. Right. I think it's just that building of, "I wanna be in this conversation too."

18 Yarra (MT): Exactly. Maybe I felt that because I teach older kids, and these were little ones. I try to think back to when my sons were that age, but it just struck me as funny that I drew this one for my own comment.

In this excerpt, the mentor and preservice teacher worked to make sense of why the student in the video had shared the story about dropping a book and piece of paper at home. Mentor teacher Yarra shared her idea that the student was trying to find a way to join in the conversation. In this moment, Yarra was imagining that the student made up her experience in order to not be left out of the discussion (line 14). Preservice teacher Felice elaborated on Yarra's statement by giving an example of how children sometimes make up experiences in order to have something to say in a group. She described how a teacher might read a story and ask children to make connections between themselves and the story. She imagined what the children might say to connect to a story about going to the fair. Felice used imagination as a mode of belonging, envisioning what the students might say in that scenario to contribute to the conversation. Yarra added on, providing another example of what a student might say, in line with Felice's examples (line 16). Then in line 18, Yarra used imagination to think about how the young children in the video were different from the older students she taught and affirmed Felice's contributions again.

In this excerpt, both the preservice and mentor teacher used imagination as a mode of belonging. Unlike in many of the excerpts, however, the mentor teacher took up and affirmed the preservice teacher's contribution. Felice was able to use imagination to build on Yarra's idea and Yarra acknowledged Felice's comments as a valid contribution, continuing to build on Felice's comments in return. By using examples from imagined students to support her argument, Felice

gained the status she needed to enter the conversation with Yarra and get her contribution to the conversation taken up by a mentor teacher.

Imagining Teacher Moves. Another example of using imagination as a mode of belonging to participate in group negotiations of meanings came from a group of two preservice teachers (Vera and Colleen) and two mentor teachers (Ulysses and Vicky). In Excerpt 3, the group discussed the second video clip in which children were sharing their ideas about what had happened after they had had a chance to drop a book and a piece of paper. One of the children in the video claimed that the paper fell first when he dropped the two objects. In this excerpt, only preservice teacher Vera spoke.

Excerpt 3

- 52 Vera (PST): All right, number six, what did you think when Ebony said the paper would fall first? I think I like more wanted to hear his reasoning.
- 53 Vicky (MT): Mmmhmm
- 54 Vera (PST): Like, how he saw that. Because I mean, of course we knew that wasn't right but he was so adamant that it was so. I think it would have been cool for him to have gotten up and like had to drop the book and the paper again.
- 55 Vicky (MT): Mmhmmm
- 56 Vera (PST): You know, just to kind of like figure it out on his own that, "Oh maybe I made a mistake," versus like when someone else does it for you.
- 57 Ulysses (MT): It is kind of hard for somebody who is like that to admit they are wrong, like we didn't hear much from Ebony towards the end when he figured out

maybe his hypothesis was incorrect. So like you said, maybe for him explain why at the beginning.

58 Vera (PST): Right.

59 Ulysses (MT): And try to talk through that um he may have even like found out a flaw in his logic or we would have figured out why he thought that.

60 Vera (PST): Because if he had gotten up there and done it, you know, if it is right in front of him that he like, he just saw what actually happened. He is going to have a harder time trying to, you know, rather than have to go back and fix his mistakes.

61 Ulysses (MT): But I also thought he's definitely a kid that needs to be affirmed because he kept saying, "To me, that is what happened to me."

62 Vera (PST): Yeah, I liked that though.

In this excerpt the group worked to make sense of how to respond to a student's seemingly "wrong" answer to the question about what happened when he dropped a book and a piece of paper. Vera began the conversation by reading the question and offering her answer (line 52). Vera shared things she would have liked to hear from the student (line 52) as well as what she might have asked Ebony (line 54). As she talked, Vera imagined how she would respond to Ebony's idea if she were the teacher in the classroom (lines 52 & 54). She then talked about the potential for the student's learning if the teacher responded in that way (line 56). In lines 53 and 55, mentor teacher Vicky gave encouraging utterances. Ulysses also used imagination when he noticed Vera's idea and connected it to his own experiences with students (lines 57 and 61). He also picked up on Vera's suggestions about the implications for student learning (line 59). Like Felice, Vera was able to use imagination to enter into the conversation

and had a mentor teacher legitimize her contribution. In Vera's case, she imagined herself as a teacher as a way to get her ideas taken up in the group.

Both the Felice example and the Vera example represent a departure from the typical mode of belonging afforded to the preservice teachers in the group conversations. Rather than being marginalized in the conversations, both Felice and Vera were able to use imagination as a way to gain entry into negotiations of meaning with their mentor teachers. We saw this type of interaction happen at least once in four of the nine groups, suggesting that imagining student ideas or teacher moves could be fruitful for preservice teachers while working together with mentor teachers on colearning tasks.

Using Brokers and Boundary Objects to Increase Preservice Teacher Participation

We also identified in our data potential brokers and boundary objects that functioned to open spaces for preservice teachers to be participants in negotiations of meanings within the groups. Here we present one example of each.

Brokers. The teacher educator intervened in the conversation in one group. In this conversation (Excerpt 4), the group of three mentor teachers and two preservice teachers had been trying to make sense of what the children meant when they used the word "force."

Excerpt 4

196 Andrea (MT): See, I think they—if you're talking about like photosynthesis or something- they will try to use that word for every answer because they think like that's what we're talking about.

197 Zoe (PST): That's like the smart word to use.

198 Andrea (MT): “So, I'm gonna use the word.”

- 199 [Author] (TE): If they're playing school [voice fading] - because they're looking for the answer that they think you want.
- 200 Andrea (MT): Yeah, and it's—but it sounded like that's what she was doing.
- 202 Andrea (MT): Because she really didn't—she couldn't explain it, she just kept saying—
- 203 Zoe (PST): She kept saying “force.” I don't think she understood the concept.
- 204 [Author] (TE): She said, “The book had force,” though.
- 205 Ron (MT): What line is that? The force?
- 206 Zoe (PST): Maybe like—
- 207 Zoe (PST): In life experience if she was like on the soccer team her coach would say kick the ball with extra force or something and it'll go farther, you know what I mean? Life experiences, heard the word, maybe used the word in school one time. [Inaudible]
- 208 [Author] (TE): She's got this idea that things could—like a person could have force.
- 209 Andrea (MT): Like push me with that force.

At the beginning of this excerpt, mentor teacher Andrea explained to the group that children try to use a vocabulary word that they think the teacher wants them to use without knowing what the word means (line 196). Preservice teacher Zoe followed along with this line of reasoning. In line 197 she elaborated on Andrea's explanation, stating that children like to use words that sound “smart.” Later, in line 203 mentor teacher Andrea stated that she didn't think the girl in the video could explain what the word “force” meant and preservice teacher Zoe restated Andrea's idea in line 204, suggesting that she was in agreement with Andrea. This exchange is another example of how the preservice teachers often aligned with mentor teachers' ideas.

However, when the teacher educator entered the conversation, the modes of belonging shifted somewhat. The teacher educator entered the conversation to try to interrupt the deficit talk about children's ideas by prompting the whole group to think more deeply about what the children were saying and why (line 204). Zoe responded by offering some ideas for life experiences that the child might have used to think about the word "force" (line 208). This turn shows another example of imagination, as Zoe was imagining what relevant experiences a child might have to make sense of the word "force." Importantly, this contribution was different from the deficit view that the mentor teachers were offering. In line 208 the teacher educator affirmed Zoe's idea and in line 209 mentor teacher Andrea appeared to take up Zoe's new direction to think about what sense the children were making of the word "force." Thus, Zoe's modes of belonging shifted from a non-participant: alignment to participant: imagination and participant: engagement by offering an idea and getting it taken up by the mentor teacher.

In this episode, the teacher educator served as a broker for Zoe, opening a space for her to contribute meaningfully to the conversation and get her idea considered by the mentor teacher. The teacher educator's status likely helped. Zoe might have felt that since the teacher educator was her course instructor, she should say something in response to the teacher educator's prompting to reconsider the children's thinking. The mentor teachers might have felt that they should also follow the teacher educator, maybe because she was the facilitator of the activity or maybe because she was a professor with conferred standing. The teacher educator mostly stayed on the periphery of the group and when the opportunity presented itself, she was able to shift both the focus of the conversation and the preservice teacher's mode of belonging in the conversation, effectively opening new possibilities for meaning in the group conversation.

Boundary Objects. In all of the groups, the transcript functioned to support negotiations among group participants. Both preservice teachers and mentor teachers referred to the transcript. Most frequently, it was the mentor teachers who used the transcript to support their ideas. However, there were brief instances in two groups in which preservice teachers used the transcript to contribute to the group conversation. For example, in Excerpt 5, a group of two preservice teachers and two mentor teachers were talking about what was important about what one of the children had said in the video.

Excerpt 5

104 Noelle (PST): Eighty. Line 80 is, “Because it’s what really happened when I did it at my dad’s house with a Pinocchio book and a piece of paper. I dropped them both, and the book fell down first.” I think what’s important is that she has her prior knowledge—

105 Fernanda (MT): She has her prior knowledge, and she know—she’s seen it before.

106 Noelle (PST): Mm-hmm.

107 Fernanda (MT): Of course, she’s making it happen.

108 Allie (MT): She’s making it up as she—

109 Noelle (PST): Yeah.

In line 104, preservice teacher Noelle read directly from the transcript what the child in the video had said. Noelle then made a claim about what she thought was important about the child’s statement, suggesting that it was evidence that the child was using prior knowledge, or prior experience, to make sense of what happened with the book and the paper. In line 105, mentor teacher Fernanda took up Noelle’s idea and elaborated a bit, stating that the child had seen a book and a piece of paper fall at the same time previously and that is why she thought the

book fell first. Noelle signaled that the mentor teacher's statement and elaboration aligned with her own idea (line 106). The transcript seemed to lend Noelle's statement a sense that her idea was worthy of consideration. The transcript may have opened an opportunity for Noelle to get her idea out to the group and taken up by a mentor teacher for negotiation. Unfortunately, for Noelle, in the next line (107), Fernanda discounted the idea by suggesting that the child in the video made up the episode with the Pinocchio book. Nevertheless, however brief, the appearance of these moments where preservice teachers were able to refer specifically to the transcript to lend credence to their ideas suggests that boundary objects around which preservice and mentor teachers can negotiate meaning could be important resources for nurturing preservice teachers' participation in the negotiation of meaning with mentor teachers.

Summary of Findings

Figure 2 explains how preservice and mentor teachers participated in negotiating meanings during the colearning task. The figure shows that mentor teachers dominated the negotiations. The mentor teachers used engagement, imagination, and alignment to participate in the negotiations in ways that enabled them to get their ideas taken up by the group more often than preservice teachers were able to do (represented by the larger portion of the box shaded for mentor teacher participation). For preservice teachers, engagement and alignment led to non-participation in negotiations because their ideas were discounted or marginalized. However, there were moments in which preservice teachers were able to make contributions that mentor teachers took up. Preservice teachers were able to use imagination as a mode of belonging to participate more equitably with mentor teachers. The teacher educator was also able to broker openings for preservice teachers to get their ideas considered by mentor teachers. Additionally, although the video transcript was usually used by mentor teachers to propose meanings,

preservice teachers were also occasionally able to leverage the transcript as a boundary object (represented by the relative position of the black bar in Figure 2) to propose alternative meanings that were briefly taken up by mentor teachers. In our discussion, we theorize about the significance of these findings for interrupting the hierarchy in mentor-preservice teacher colearning interactions.

Discussion

Colearning, like coteaching and teacher residencies, is specifically designed to counter the traditional master-apprenticeship model in preservice field preparation by blurring boundaries between field and university-based experiences and between novices and experts (Canipe & Gunckel, 2013, Gunckel & Wood, 2016; Koballa et al., 2008; Scantlebury et al., 2008; Solomon, 2009; Turner & Blackburn, 2016; Zeichner, 2010). Yet, the findings from this study illustrate how difficult it is to disrupt the mentor-preservice teacher hierarchy. Based on our findings, we conjecture that what often appears to be preservice and mentor teachers working together amiably is actually mentor teacher control of the group sense-making process. This situation suggests that although colearning is designed to create spaces where preservice and mentor teachers can make connections between different ways of talking about teaching characteristic of their respective communities, structural changes alone are not sufficient to counteract the strength of the mentor-preservice teacher hierarchy. While researchers may advocate for program designs that disrupt traditional program boundaries within teacher education (Gunckel & Wood, 2016; Scantlebury et al., 2008; Zeichner, 2010; Zeichner, Payne, & Brayko, 2015), without attention to the ways in which preservice and mentor teachers participate in making sense of their experiences in these programs, changes to program structures alone may not achieve the desired goals.

However, in our findings we saw moments when the traditional hierarchy between mentor and preservice teachers was temporarily interrupted. These moments occurred when preservice teachers' status in the group was elevated. As shown in figure 2, while these moments did not result in equal participation in the negotiation of meaning, they did afford preservice teachers opportunities to participate that might not have been possible in other settings. Imagination as a preservice teacher mode of belonging for participating in group negotiations, the actions of the teacher educator as a broker, and the use of the transcript as a boundary object all conferred elevated status on preservice teachers, interrupted the traditional hierarchy, and allowed preservice teachers to participate in the negotiation of meanings.

Imagination

Of the three modes of belonging, imagination was the one that offered preservice teachers the most success in being able to participate in the negotiation of meanings within their groups. When preservice teachers made contributions to the group conversation using imagined experiences, mentor teachers took up preservice teachers' contributions to the group conversation. At these moments, preservice teachers were more equitable participants with mentor teachers.

One explanation for the change in how mentor teachers responded to preservice teachers' ideas is that imagination allowed preservice teachers to vicariously share in the experience of being a classroom teacher. While this experiential perspective was based in imagined events, mentor teachers may have perceived preservice teachers' ideas as more relevant than preservice teachers' idealized notions about teaching that they may have developed from their university coursework. It is also possible that preservice teachers' imagined experiences served to activate mentor teachers' imaginations and they were more able to relate to preservice teachers' ideas

because they could imagine a similar situation in their own classroom. Either way, imagination lent credibility to preservice teachers' ideas that might otherwise have been seen by mentor teachers as naïve.

This use of imagination may offer a unique opportunity to interrupt the traditional hierarchies that exist in preservice-mentor teacher relationships. In contrast to a situation where mentors are reminded by a facilitator that everyone in the group, including preservice teachers, should participate in the conversation, supporting preservice teachers' use of imagination implicitly positions them as participants who can make contributions to group meaning-making, thus interrupting the traditional mentor-preservice teacher hierarchy in these moments.

Brokers

The presence of a broker offered another opportunity to interrupt the traditional hierarchy. During most of the colearning event, the teacher educator was primarily a facilitator in that she designed and introduced the task to the participants. However, she became a broker when she conferred status on the preservice teacher's idea that momentarily interrupted the hierarchy in the group and positioned the preservice teacher as someone making a valuable contribution.

We recognize that during this moment the teacher educator was leveraging her status to interrupt the dominant hierarchy. As such, we do not suggest that teacher educators should direct mentor-preservice teacher conversations or otherwise take advantage of the power that their status lends. At the same time, however, there are moments when teacher educators can act as brokers to create openings that allow preservice teachers to get their ideas on the table and participate with mentor teachers in group sense-making processes. Such moments also model for

mentor teachers new ways to interact with preservice teachers, helping them to re-imagine their role as mentors (Bullough et al., 2002; Haggarty, 1995).

Boundary Objects

Boundary objects are artifacts that can be used as resources as a group negotiates meanings (Akkerman & Bakker, 2011; Star & Griesemer, 1989; Wenger, 1998). In the science talk colearning task, groups were provided with transcripts of the video. These transcripts were used by preservice and mentor teachers to support their contributions to the group conversation. While the transcripts were most often used by mentor teachers, there were moments in which preservice teachers used the transcripts to support their own ideas, and in these moments the mentor teachers took up the preservice teachers' contributions. Although the transcript itself did not carry meanings, it was an unambiguous representation of ideas shared by students in the video. As such, when preservice teachers connected their ideas to particular moments in the transcript, the transcripts conferred status on preservice teachers as people with something valuable to contribute to the conversation and their ideas were more likely to be taken up as part of the negotiation of meanings. In this way, the mentor-preservice teacher hierarchy was temporarily interrupted.

Conclusion

Although we found that during the colearning tasks, mentor teachers tended to dominate group sense-making, we also found that preservice teacher use of imagination, the actions of the teacher educator as a broker, and preservice teacher use of boundary objects temporarily interrupted the mentor-preservice teacher hierarchy and provided more opportunity for preservice teachers to participate in the negotiation of meanings. In making our argument, we want to be clear that we are not suggesting that mentor teacher contributions to sense-making are

not valuable. Preservice teachers have to navigate learning situated in both university and field contexts and mentor teachers play an important role in helping preservice teachers make connections between what they learn in course work and field placements (Anderson & Stillman, 2003; Horn et al., 2008). Indeed, the premise behind colearning and similar approaches is that preservice teachers can learn much by engaging with mentor teachers in joint activity and sense-making. Ideally, in these types of approaches sense-making spaces would resemble the model in Figure 1, where mentors and preservice teachers are participating equally in negotiation of meanings using all three modes of belonging. However, when mentor teachers dominate the sense-making, opportunities for preservice participation in negotiations of meaning are lost. Thus, care must be taken to ensure that when working together, both preservice and mentor teachers have equitable opportunities to participate in the negotiation of meanings. Because the hierarchy is ingrained, efforts are needed to provide mentor teachers and preservice teachers with new ways to interact when working together.

While the type of colearning activity we examined might be logistically challenging in some teacher preparation programs, there are elements teacher educators could include in a variety of settings. For example, written assignments for methods courses which require preservice teachers to engage with students in field placements could be leveraged as boundary objects to facilitate conversations between mentor and preservice teachers. Furthermore, teacher educators could offer guidance for types of conversations that mentor teachers might have with preservice teachers related to these assignments. For example, prompts that include asking preservice teachers to imagine how students will respond to a particular activity or question might facilitate preservice teachers' use of imagination to participate in the negotiation of meanings in conversations with their mentor teachers. Additionally, teacher educators working

in the field as supervisors could potentially act as brokers to encourage these types of sense-making discussions between mentors and preservice teachers.

A key to interrupting the mentor-preservice teacher hierarchy and increasing preservice teachers' participation in negotiation of meanings with mentor teachers lies in mentor teachers' perception of preservice teachers as people with valuable ideas. While the findings from our examination of a colearning task identified three potential ways that preservice teacher status may be elevated, there are undoubtedly other approaches as well. Supporting more equitable relationships between mentor and preservice teachers requires attention to raising preservice teachers' status.

One limitation of our study is that we looked at one colearning activity. Further research into how mentor-preservice teacher dynamics play out in other colearning activities or other field preparation approaches could provide more insight into when and how preservice teachers are participants in shared sense-making with mentor teachers. Another limitation is that the colearning activity that we analyzed was designed to minimize master-apprentice interactions. Conversations among these same mentor and preservice teachers might look different in less-structured situations. Finally, this analysis occurred in the context of preservice teachers learning to teach science and thus the findings are currently limited to mentor-preservice teachers' science sense-making conversations. Mentor-preservice teacher interactions might look different in the context of other subject areas. Nevertheless, the brief opportunities that we saw in these conversations for interrupting the traditional mentor-preservice teacher hierarchy and creating more equitable preservice teacher participation in sense-making during conversations with mentor teachers suggest that, if nurtured elsewhere, they could potentially increase the impact of colearning and other new approaches to field preparation in teacher education more broadly.

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Table 1

Sample Discussion Prompts

What did you find most interesting or surprising about the students' talk? Why?

What experiences were these students using to make sense of the question?

What did you think when Ebony [child in the video clip] said the paper would fall first?

How are students providing evidence for their claims?

Why does Rachel [child in the video clip] emphasize that her group found the same result twice?

Table 2
Coding Scheme

Mode of Belonging	Participation	Non-Participation
Engagement		
Definition	“having one’s ideas adopted”	“marginality through having one’s ideas ignored”
Description	A group member contributes an idea that becomes part of the group conversation.	A group member makes an effort to contribute an idea to the group, but the idea is not taken up for discussion by other members of the group.
Imagination		
Definition	“vicarious experience through stories”	“assumption that someone else understands what is going on”
Description	A group member uses imagination to enter the conversation and their idea becomes part of the group conversation.	A group member explicitly identifies a source of expertise outside themselves. Ex. “I’m sure there was some reason he did it like that.”
Alignment		
Definition	“persuasion through directed experience”	“literal compliance”
Description	A group member agrees with another group member after being convinced through conversation.	A group member indicates agreement with another group member’s contribution through verbal cues such as “yes” or “uh huh.”

Note. Definitions from Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. New York: Cambridge University Press, p. 190.

Figure 1: Conceptual framework for preservice and mentor teacher negotiations of meanings

Figure 2: Preservice and mentor teacher negotiation of meanings during the science talk colearning task.