Participants' Roles in the Context of a Video Club

Elizabeth A. van Es *
* Department of Education, University of California, Irvine

Online Publication Date: 01 January 2009

To cite this Article van Es, Elizabeth A.(2009)'Participants' Roles in the Context of a Video Club',Journal of the Learning Sciences,18:1,100 — 137
To link to this Article: DOI: 10.1080/10508400802581668
URL: http://dx.doi.org/10.1080/10508400802581668

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: http://www.informaworld.com/terms-and-conditions-of-access.pdf

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.
Participants’ Roles in the Context of a Video Club

Elizabeth A. van Es

*Department of Education*

*University of California, Irvine*

This study examines the nature of teacher participation in the context of a video club. Video clubs are professional development meetings in which teachers watch and discuss excerpts of video from their classrooms. In this study, I adopt a situative perspective to examine how teachers develop in their participation to accomplish the goals of the video club. In particular, I examine the roles participants play and explore teachers’ participation in four roles that correspond with key goals of the video club. Analysis revealed that teachers’ participation shifted in qualitatively different ways over time, with the teachers coming to prompt the group to discuss student mathematical thinking, to propose a variety of interpretations of student ideas, to build on one another’s ideas, and to challenge one another’s thinking in order to advance the group’s conversations. This analysis suggests that the group learned how to participate in roles central to accomplishing the goals of the video club. Studying teacher learning through a lens of participation provides insight into the ways in which teachers coordinate themselves to engage with the goals of professional development and has implications for designing professional development that helps teachers develop practices for teaching mathematics for understanding.

An important aspect of mathematics education reform is that teachers listen carefully to students’ ideas and use those ideas, at least in part, to inform pedagogical decisions (Arvold, Turner, & Cooney, 1996; Ball, Lubienski, & Mewborn, 2001; National Council of Teachers of Mathematics, 2000). Although this is a worthwhile goal, it is not without its difficulties (Ball, 2001; Schifter, 2001). Chamberlin (2005) explained that students have difficulty expressing their thinking clearly,
particularly from an adult perspective. In addition, it may be challenging for a teacher to identify the mathematics idea underlying a student comment, particularly if the idea is not clearly communicated. Finally, teachers tend to focus on the pedagogical aspects of classroom situations, so they may not pay attention to student ideas. Thus, if teachers are to use student thinking to inform pedagogical decisions, they need to “learn to notice” student mathematical thinking.

The construct of noticing has received increased attention in mathematics education in recent years (Ainley & Luntley, 2007; V. Jacobs, Lamb, Philipp, Schappelle, & Burke, 2007; Mason, 2002; Sherin, 2007; Star & Strickland, 2008; van Es & Sherin, 2002). This research proposes that an important type of knowledge for teaching is being able to identify important events in the midst of instruction and to reason about those events in order to make informed pedagogical decisions. Although experienced teachers have developed ways of looking at and making sense of their practice during instruction, current mathematics reform initiatives call on teachers to learn new ways of “noticing” classrooms, what I refer to as a “professional vision for reform teaching” (van Es & Sherin, 2008, p. 244).

Video has become a common tool for helping teachers learn to notice (V. Jacobs et al., 2007; Santagata, Zannoni, & Stigler, 2007; Sherin, 2007; Star & Strickland, 2008; van Es & Sherin, 2002). Video can capture much of the complexity of classrooms, providing teachers with a record of what occurred. Furthermore, a group of teachers can view the same clip and have a conversation around a common artifact of practice. Additionally, video can be reviewed several times from multiple perspectives, allowing teachers to gain deeper insight into important teaching and learning issues.

At the same time, research on teacher professional development has highlighted the importance of teachers developing as a community to learn to teach in new ways (Borko, 2004; Wilson & Berne, 1999). In particular, teachers need time to learn content and pedagogical practices, and they need access to and support from human and social resources to support and facilitate their learning (Cochran-Smith & Lytle, 1999; Gamoran et al., 2003; Hawley & Valli, 1999). In addition, they need to be empowered to shape and direct their own learning and have opportunities to engage in collaborative reflection with their colleagues (Gwyn-Paquette, 2001; Hawley & Valli, 1999; Wilson & Berne, 1999). Finally, they need to both learn how to participate in communities of practice and learn about the norms that govern participation, as well as develop a sense of commitment to their own and the group’s growth (Grossman, Wineburg, & Woolworth, 2001).

In prior work, I designed and facilitated a particular type of video-based professional development, a video club, to help teachers learn to notice student mathematical thinking. In a video club, a group of teachers come together to view and discuss video segments from one another’s classrooms (Sherin, 2000). Video clubs
are designed to engage teachers in a way that will support developing community, providing time and space for teachers to collectively inquire into student thinking as it occurs in their teaching (Sherin & Han, 2004). Furthermore, video clubs allow teachers the opportunity to “break set” (Putnam & Borko, 2000, p. 6) with their typical teaching routines and reexamine events from their classrooms that they may not have noticed initially.

Analysis of teacher learning in the video club discussed herein revealed that the teachers came to notice and interpret student mathematical thinking in new ways over time (van Es & Sherin, 2008). In particular, they initially focused on the overall engagement of the whole class in the segments they viewed and offered broad, general evaluations of what occurred. Over time, they shifted to attend to particular student mathematical ideas, and they came to interpret and reason about what they observed, basing their analyses on the specific details of the events that occurred in the clips they viewed. This sort of analysis mirrors the kind of analysis mathematics reform calls on teachers to employ while teaching, that is, directing their attention to student thinking and probing into the particulars of student ideas.

This study builds on that work but asks a different set of questions. The goal of the study reported in this article was to investigate teachers’ learning in the context of a full year of participating in a video club. In line with recent research on teacher learning (Borko, 2004; Putnam & Borko, 2000), I use a situative lens to examine the development of teachers’ patterns of participation over the course of the year. Investigating changes in teachers’ patterns of participation can provide insight into how teachers develop practices for inquiring into student thinking, as well as how they develop as a community to accomplish this goal. Drawing on Wenger (1998), I frame participation in terms of the roles participants adopt to engage in the learning task. By roles, I refer to the positions group members assume in order to participate in the video club discussions. Thus, the central research questions for this study were the following: (a) What roles do participants adopt as they engage in video analysis of classrooms? (b) What is the nature of teachers’ participation in these roles, and how does their participation develop over time? and (c) Does teachers’ participation in these roles contribute to the group engaging in substantive analysis of student thinking?

To answer these questions, I first characterize the range of roles participants adopt in a video club environment. Then I closely examine teachers’ participation in particular roles that reflect key goals of the video club meetings to understand both the ways in which teachers adopt these roles, as well as how participation in these roles helps the group accomplish the goals of the video club. To be clear, the purpose of this article is not to measure how often teachers played these roles. Rather, the purpose is to understand the qualitative nature of teachers’ participation in these roles and how their participation evolved as teachers progressed through the series of video club meetings.
STUDYING TEACHERS’ PARTICIPATION IN PROFESSIONAL DEVELOPMENT

To pursue this line of inquiry, I adopt the situative perspective (Greeno, 2003) to study the development of teacher participation. Central to this perspective is that learning is situated; that it occurs in everyday contexts; and that it is a function of the activity, context, and culture in which it occurs (Brown, Collins, & Duguid, 1989; Vygotsky, 1978). As Lave and Wenger (1991) described, this perspective places an emphasis on “activity in and with the world and on the view that agent, activity, and the world mutually constitute each other” (p. 33). Thus, learning cannot be separated from the settings in which it happens. Particularly relevant to this study is the idea that learning involves a transformation of participation (Rogoff, 1995) and that effective professional development occurs in communities that promote teachers’ active participation in the learning setting (Borko & Koellner, 2008; Little, 2002).

The Lens of Participation

The situative perspective places an emphasis on participation and practice and conceives of learning not as a change in mental processes but as “changes in participation in socially organized activities” (Borko, 2004, p. 4). As individuals move from the periphery of a community to the center, they become more active participants within that community, adopting new roles and participating in the routine activities of a particular group (Lave & Wenger, 1991). Furthermore, according to Gee (2004), shifts in patterns of participation are informed by an understanding of the roles and positions people can fill within a community’s activities. This perspective implies that studies of teacher learning in professional development should examine both how teachers participate in these settings and the shifts in patterns of participation over time.

Additionally, the purpose for activity influences how individuals participate to accomplish a task. This perspective draws attention to the distribution of labor among participants in social environments (Cole, 1996; Cole & Engestrom, 1993; Leont’ev, 1978). Ogawa, Crain, Loomis, and Ball (2008) explained that the division of labor “legitimates certain actions of subjects as they are positioned in coordinated relationships structurally united by a common object” (p. 87). Thus, roles are a joint coordination of individuals in a situation seeking to accomplish their individual and group goals, and the particular roles that can be taken on are shaped by the goals at hand. For studies of professional development, this dimension places importance on examining how the tasks in professional development define ways in which teachers can participate, as well as how teachers coordinate their activity in order to accomplish individual and collective goals.
Finally, activities have established norms that dictate how to participate in them. These norms, or what Clancey (1995) referred to as the “social choreography,” orient individuals to one another, as well as to how information is communicated, what constitutes an idea worthy of investigation, and how to make sense of one’s practice. In addition, the sequential order of talk is itself a type of social organization that influences who has access (or not) to the ideas being discussed (Goffman, 1981; Goodwin, 1981). Furthermore, Tannen (1993) proposed that in any given speech-act, both the speaker and hearer have expectations, or frames, about what and how to discuss a particular topic, about how to participate in a particular context, and about how to interact with others in particular settings. In addition, individuals are continuously constructing knowledge as they participate in and negotiate meaning through their interactions with others. Thus, the norms and conventions for participation in a professional development community and the discourse of that community influence the roles teachers adopt, how teachers participate in these roles, and how teachers interact with one another to accomplish their goals.

The Lens of Teacher Learning Communities

An important implication of the situative perspective for teacher learning is that professional development environments are valuable when they embody a learning community. Teacher professional development, specifically, has a history of being short term, individualized, and disconnected from practice (Ball & Cohen, 1999; McLaughlin & Mitra, 2001). However, an important aspect of teacher learning communities is that teachers engage in long-term collaboration with their colleagues, focusing on issues that relate to the day-to-day practice of teaching (Darling-Hammond, 1997; Grossman, Wineburg, & Woolworth, 2000; Little, 2002). Research has also pointed to the importance of teachers having control over and taking responsibility for their own learning (Carpenter & Lehrer, 1999; Cochran-Smith & Lytle, 1999; McLaughlin & Talbert, 2001). That said, Wilson and Berne (1999) pointed out that little research has investigated the specific interactions and dynamics that enable teacher learning communities to become a space for teacher development. In addition, Little (2003) explained that studies on teacher interaction in professional development point to the challenges teachers face in engaging in “sustained and deep consideration of teaching problems and possibilities” (p. 919). She suggested that an important direction of research is to explore participants’ conceptions of the activity and work in which they are engaged and the ways that the participation structures and group norms create opportunities for teachers to participate in substantive work focused on the particulars of practice.

In this article, I examine this issue by investigating how teachers adopt various roles, as well as how their patterns of participation in these roles change over time as they come to understand the nature and goals of the professional development
activity. In particular, I hypothesize that as teachers become socialized into ways of analyzing video of student thinking, they will adopt roles that will support the group engaging in substantive analysis of student thinking. I now discuss the details of the study.

RESEARCH DESIGN

Context of the Study: The Mapleton Video Club

This study examines a group of teachers participating in a year-long video club at Mapleton1 Elementary School. The primary purpose of the Mapleton Video Club was to provide teachers with opportunities to investigate student mathematical thinking. Research in mathematics education and professional development has highlighted the fact that learning to attend to student thinking can help teachers teach mathematics for understanding (Franke & Kazemi, 2001; Smith, 2001). In particular, when teachers attend closely to students’ ideas, it can provide opportunities for both teacher and student learning and can have a positive influence on student achievement (Fennema et al., 1996; Franke, Carpenter, Levi, & Fennema, 2001; Franke & Kazemi, 2001). However, attending to student thinking is not a simple matter. Given the complexity of teaching, teachers constantly have to make decisions about where to direct their attention (Ainley & Luntley, 2007). As research has proposed that one of the core activities of teaching is being able to “size up students’ ideas” (Ball et al., 2001, p. 453), teachers need to develop skills for listening to and making sense of student ideas (Ball & Cohen, 1999; Rodgers, 2002). Therefore, the research team designed the video club with the central goal to help teachers learn to notice student mathematical thinking.

At the same time, given the literature on effective professional development, we brought the teachers together to view video records from their own classrooms to develop this skill. We attempted to promote a stance of inquiry (Cochran-Smith & Lytle, 1999; Seago, 2004) and to develop a discourse where all participants pose questions, make conjectures, and engage collectively in the analysis to understand the events being observed. In particular, we encouraged teachers to interpret, or reason about, what they observed and to use evidence from the clips we viewed to support their analyses. This discourse is similar to that adopted by Borko, Jacobs, Eiteljorg, and Pittman (2008) in their professional development program, which is rooted in Dewey’s notion of “progressive inquiry.” Furthermore, given the affordances of video, such as the ability to represent the complexity of teaching, to facilitate multiple viewings of the same segment, and to enable teacher collaboration around a common artifact of practice, we thought this environment would be

---

1Mapleton is pseudonym for the school in which this research was conducted.
particularly well suited for helping teachers learn to probe into the particulars of student thinking.

In practice, then, the facilitator2 prompted the teachers to examine students’ ideas about mathematics if teachers did not raise these issues on their own. The nature of the prompts ranged from general questions (e.g., “What did you notice?” or “What do you think they understand about decimals?”) to more specific questions focused on students’ mathematical understanding (e.g., “Did you see how Jose was counting on his fingers?”). Furthermore, to encourage teachers to inquire into and interpret what they noticed, the facilitator often asked questions of the following type: “Why do you think Jose was using that method?” And finally, to direct teachers to use evidence from the clips, the facilitator asked questions such as “Where did that happen in the video segment?” To be clear, the facilitators did not have predetermined ideas about what were “correct” interpretations of the clips they viewed. Rather, the goal was to bring the group together to discuss interesting moments of student thinking as captured on video and to engage in in-depth discussions of these ideas.

Although the primary purpose of the video club was to help teachers learn to attend to and interpret students’ mathematical thinking, the facilitators had other goals as well. These included developing a supportive and trusting environment, using teachers’ ideas to inform the direction of the meetings, and valuing one another’s ideas equally. The teachers mentioned that they also had other goals. Some teachers remarked that they wanted to participate because it gave them an opportunity to work with their colleagues, and others reported that they thought it would be valuable to view one another’s teaching on video. Another motivation for participating was that the teachers could possibly earn professional development credit from their school district. Overall, the members had a variety of reasons for participating, but the group agreed that the primary focus would be to understand how video might be used as a tool to reflect on mathematics teaching and learning.

The group met 10 times throughout the 2001–2002 school year, one or two times each month from October to May. Each meeting was approximately 60 to 75 min long. All 10 meetings followed the same format. Typically, the group viewed video segments from two of the participating teachers’ classrooms. The first half of the meeting was used to view and discuss the first segment, and the second half was spent viewing and analyzing the second segment. The facilitator began each meeting by framing the viewing of the first clip, summarizing the mathematics topic and the lesson. The teacher whose clip was shown was also invited to provide background about the lesson. Each teacher shared clips from his or her own classroom two or three times throughout the year.

2For 7 of the 10 meetings, I was the facilitator. Another researcher on the research project facilitated the other three meetings.
The process of selecting segments for the group to view was the same for each meeting. Before each meeting, a researcher videotaped mathematics lessons in two of the participating teachers’ classrooms. The lessons were 50 to 60 min long. The researcher typically placed the video camera in the back of the classroom and placed three microphones throughout the room; the teacher wore a lapel microphone. When the students worked in small groups, the researcher used the audio mixer to listen in on conversations taking place throughout the classroom and then made choices about which discussions to capture on video. While videotaping, the researcher noted interesting mathematics ideas the students raised and identified potential segments for the group to view.

After the classroom observation, the same researcher viewed the tapes from each of the classrooms and, using the notes as a guide, edited several segments that highlighted the interesting mathematics issues raised in class. These segments were a continuous 5 to 7 minutes or they were brief segments edited together to create a segment that was 5 to 7 minutes long. The segments came from whole-class discussions, student–student interactions, or a student explaining at the board. They showed students working through a mathematics problem or explaining how they had solved a problem, or they highlighted teachers and students discussing a student’s solution method. The research team then viewed the segments together and identified a segment that appeared to capture the most interesting and rich representation of student thinking. The researcher prepared a corresponding transcript to accompany the viewing of the segments.

Participants

Participants in the study were seven fourth- and fifth-grade elementary teachers who had a range of teaching experience, from 1 to 19 years (see Table 1). Five of the teachers taught fourth grade, and two of the teachers taught fifth grade.³

The district had adopted a reform-based mathematics curriculum 2 years prior to this study. Four of the teachers had used the curriculum for those 2 years, but this was the first year the other three teachers in the study (Drew, Linda, and Yvette) had used the curriculum. The video club group came together as part of a university–school district partnership. The district had expressed an interest in working with university faculty on a range of professional development activities. Given this interest, the lead researcher and I approached a district-level administrator and offered to facilitate a video club with mathematics teachers. The administrator was enthusiastic about the project and identified a school and the particular grade-level

³One of the fifth-grade classroom teachers elected not to participate because she was seeking medical care during the year of the study. Two of the participants, Elena and Linda, were certified to teach special education, and they were assigned to coteach with two fourth-grade classroom teachers as part of the district inclusion program. Pseudonyms are used to protect the teachers’ identities.
teachers for this project. The research team met with the teachers to provide information about the video club and corresponding research. The teachers were paid for their participation.

Data Collection

Data for this study included videotapes and transcripts of the 10 video club meetings. Two facilitators attended each meeting, with one responsible for facilitating the meeting and the other primarily responsible for videotaping the session. The meetings took place in one of the participating teacher’s classrooms. Before the meeting, the facilitators arranged a group of desks in a semi-circle, with a television monitor centered in front of the desks. A video camera was placed off to the side of the monitor, and a microphone was placed in the middle of the group to capture all participants’ voices. After each meeting, the videotapes were digitized and transcribed.

Analysis

Qualitative methods based on fine-grained analyses of videotapes (Schoenfeld, Smith, & Arcavi, 1993) and the constant comparative method (Glaser & Strauss, 1967) were used to examine teachers’ roles in the video club setting. I used discourse analysis (Goffman, 1981; Goodwin, 1981) to investigate how participants’ talk shaped the roles participants adopted over the course of the video club meetings. The unit of analysis consisted of segments of conversation defined by shifts in the topic of conversation, what J. K. Jacobs and Morita (2002) defined as an “idea unit” and Grant and Kline (2004) referred to as “meaningful chunks.” Conversation analysts point to the importance of examining the broader conversational context to determine participation because it is through conversation and turn taking that roles are defined (Duranti, 1997; Sacks, Schegloff, & Jefferson, 1974).
Therefore, participation was examined at the level of the idea unit. I segmented each of the 10 meeting transcripts based on topic. A second researcher segmented four of the meeting transcripts. The four transcripts were randomly selected but came from the beginning, middle, and end of the series of meetings. After segmenting the transcripts separately, we compared our results. Interrater reliability was 83%. Any disagreements were resolved through discussion until consensus was reached. The average length of the idea units across all 10 meetings was 1 min 43 s, with the average across the first three meetings 1 min 31 s and the average length across the final three meetings 1 min 44 s.

Data analysis consisted of two phases (see Table 2). The first phase involved identifying the range of roles participants played in the video club. I began this phase by reviewing the data to generate a list of the range of roles participants adopted in the series of meetings. Prior research on the nature of teacher participation in professional development informed the ways teachers might participate in a setting such as the video club (Franke & Kazemi, 2001; Kazemi & Franke, 2004; Little, 2003). Although this research informed the analysis, I derived and defined the actual roles from the data. Once I created a comprehensive list of role types, I reexamined the data to ensure that these roles captured the range of ways in which individuals participated in the video club meetings. I then examined each idea unit and coded for evidence of each role being played. In addition, I coded whether the teacher or facilitator participated in these roles. As in the first phase, a second researcher reviewed four transcripts and coded what roles were played and by whom. Interrater reliability was 81%. We discussed differences until consensus was reached. Initial analysis involved examining the frequency with which each role was taken up within segments over the course of the 10 meetings.

The goal of the second phase of analysis was to examine if teacher participation in the video club changed in ways that helped teachers to accomplish the goals of the video club meetings. Analysis occurred in two steps. First, after identifying the range of roles participants adopted, I targeted four roles that corresponded with the central goals of the video club, and I created detailed characterizations of group

<table>
<thead>
<tr>
<th>Phase</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>Identify types of roles participants play across 10 meetings</td>
</tr>
<tr>
<td></td>
<td>Examine frequency each role is played across all 10 meetings</td>
</tr>
<tr>
<td></td>
<td>Identify who participates in roles per idea unit across all meetings</td>
</tr>
<tr>
<td>Phase 2</td>
<td>Role analysis</td>
</tr>
<tr>
<td></td>
<td>Make detailed characterizations of Prompter, Proposer, Builder, and Critic</td>
</tr>
<tr>
<td></td>
<td>Analyze participation in four roles in two early and two late meetings</td>
</tr>
<tr>
<td></td>
<td>Examine shifts in participation in four roles over time</td>
</tr>
</tbody>
</table>
members’ participation in each role. To understand the nature of participation in these roles, I conducted a comparative analysis to identify key qualitative dimensions for further analysis related to each role. Rather than analyzing the data with a preconceived notion of how these roles might function in the video club context, I derived an understanding of these roles from the data.

In the second step of analysis, I coded two early and two late meetings to understand how participants took on roles that related to the primary goals of the video club and to study shifts in teachers’ participation in these roles over time. In particular, I created a table that noted who participated in these roles within each idea unit for the first two and the final two meetings. I also created another table that listed how group members participated in the roles of focus for all four meetings, based on the dimensions identified in the first step of this stage of analysis (Miles & Huberman, 1994). A second researcher also created a table for each meeting, noting the nature of group members’ participation in the four roles for the two early and two late meetings. Any differences between our characterizations were discussed until consensus was reached. Analysis consisted of looking for qualitative shifts in participation among all participants in the club. In addition, I looked for confirming and disconfirming evidence for shifts in teachers’ participation in these four roles from the beginning to the end of the series of meetings (Thomas, Wineburg, Grossman, Oddmund, & Woolworth, 1998). The following section presents the results of the data analysis.

RESULTS AND ANALYSIS

To begin, I provide an example of the kind of discussion that took place in the video club meetings and present the results related to Phase I analysis, the roles participants played. Then I present the results of Phase II analysis, namely the nature and development of teachers’ participation in several roles related to key goals of the video club meetings.

Phase I: Participants’ Roles in the Video Club Meetings

In order to illustrate the range of roles participants adopted, I want to first give a sense of a typical discussion that took place in the meetings. In the following example, the teachers discuss a clip in which they viewed one student, Javier, solving various multiplication problems in the context of a game. The game is played the following way: Students are placed in pairs and given a stack of modified playing cards. Between 1 and 10 dots are printed on each card. Each student selects two cards from the stack and then multiplies the values on the two cards. The student who has the greatest product wins the round. Students are encouraged to challenge one another if they disagree about who has the greater product. In the video seg-
ment viewed in the meeting, Javier played several rounds of the game, with two different partners, selecting cards, multiplying the values, and in some instances, challenging, or being challenged by, his given partner. Upon viewing the segment, the participants had the following exchange:

Facilitator: So what did you notice?
Daniel: Javier doesn’t know his times tables.
Wanda: Are we talking about the first [pair of students] or the second?
Yvette: Any of them. Cause it’s the same …
Daniel: He’s in both … They switched the partners.
Facilitator: The student on the right is the same.
Daniel: Well, on the positive side … when [Javier] drew [the cards] 8 [and] 6, he didn’t know it [from memory], he used a chart, and then a drawing or two later, he got a [card with six dots] and then [a card with eight dots] and he knew 48 right then. So he had some kind of recall after using the chart and practicing.
Wanda: And [later] he was counting on the card [when he drew the cards with 3 and 6 dots].
Daniel: What was he doing?
Wanda: He was counting the groups. (Teacher counts on hand to illustrate student counting different groups.)
Yvette: He was counting it that many times.
Frances: Yeah, he was keeping track. (Teacher taps on paper to illustrate.) He was counting one, two, three, four, five, six and then he was keeping track. So he knew he counted 6 one time, 6 the second time, 6 the third time.
Daniel: Well, then he knows what the meaning of multiplication is.
Yvette: He just hasn’t retained the facts.
Frances: And for him, retaining is so hard.
Yvette: What they need is a taste of facts every day.
Frances: But you know … there is always that group of kids who don’t learn those darn facts. [In third grade] we used to do five minutes [of facts] at least three times a week, and yet still … you’d think they know them.
Yvette: But with the [students] clustered [in ability groups] last year [in fourth grade], we did a lot of fact work and I could really zero in …
Frances: But I have kids that don’t know their math facts now [in fifth grade]. They don’t remember them.
Elena: What I’m finding though, because we differ on that whole clustering philosophy, that the kids who don’t know [their multiplication facts], we make modifications for them, like with a chart or they use a slate board … and I think those are some modifications that could be made with kids who really do have a difficult time with their math facts …
Facilitator: Can I just bring us back to the video for a second?

In this exchange, the participants took on a range of roles as they discussed Javier’s mathematical thinking. Data analysis revealed that over the course of the 10 meetings, the participants played two different types of roles, namely organizational
and discussion roles (see Table 3 for a description and example of each role). Organizational roles reflect those positions that provide structure for and maintenance of the meetings, whereas discussion roles shape the substance of the conversations that take place.

Let’s consider how the participants adopted both organizational and discussion roles in the excerpt above. For the sake of making clear which roles participants adopted, I discuss them here in terms of individual speaking turns. However, when I coded this segment, I coded the roles at the level of the idea unit, noting that the roles of Prompter, Clarifier, Proposer, Builder, Supporter, and Critic were adopted in this segment. To begin, the facilitator adopted the role of Prompter when she signified to the group that it was time to discuss the clip, asking, “So, what did you no-

<table>
<thead>
<tr>
<th>Type</th>
<th>Role</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational</td>
<td>Coordinator</td>
<td>Informs group what clips will be viewed and presents agenda for meeting</td>
<td>“Today, we’ll take a look at a clip from Drew’s class.”</td>
</tr>
<tr>
<td></td>
<td>Clarifier</td>
<td>Ensures all participants have access to same information</td>
<td>“Isn’t that the boy in the blue shirt?”</td>
</tr>
<tr>
<td></td>
<td>Mediator</td>
<td>Diffuses tension among group members or keeps climate of meeting comfortable</td>
<td>“I’m sorry. I didn’t mean to belabor the point there.”</td>
</tr>
<tr>
<td>Discussion roles</td>
<td>Prompter</td>
<td>Invites participants to discuss video clip and initiates issues to explore</td>
<td>“So, what did you notice?”</td>
</tr>
<tr>
<td></td>
<td>Proposer</td>
<td>Offers issue, explanation, or claim to discuss</td>
<td>“What does he mean when says, ‘I was counting’?”</td>
</tr>
<tr>
<td></td>
<td>Supporter</td>
<td>Supports a participant’s interpretation</td>
<td>“Maybe she thought the value of each side was 1, instead of 6.”</td>
</tr>
<tr>
<td></td>
<td>Critic</td>
<td>Challenges claim or explanation</td>
<td>“I don’t think that’s what he was doing there.”</td>
</tr>
<tr>
<td></td>
<td>Builder</td>
<td>Provides additional information to develop an idea</td>
<td>“Then he had two lines [with 10 blocks in each] that he didn’t split, so that would mean he knew he needed two rows of 10.”</td>
</tr>
<tr>
<td></td>
<td>Summarizer</td>
<td>Synthesizes ideas under discussion</td>
<td>“Are you saying that the mathematical language is what’s hard for kids?”</td>
</tr>
<tr>
<td></td>
<td>Blocker</td>
<td>Disregards issues raised and closes the discussion</td>
<td>“I’d rather hear what others have to say …”</td>
</tr>
</tbody>
</table>
One teacher, Daniel, then played the role of Proposer when he claimed that Javier does not know his times tables. The role of Clarifier entered when Wanda, Daniel, Yvette, and the facilitator sorted out which pair of students the group was discussing.

Shortly after, Daniel and Wanda both played the role of Proposer, claiming that Javier has some understanding of multiplication based on the fact that, when he drew two cards with six and eight dots respectively, his answer was 48 and interpreting that he used a counting strategy to multiply 3 and 6. Additional roles came into play as the discussion continued. Daniel played the role of Prompter when he asked the group, “What was he doing?” Wanda continued as the Proposer when she interpreted Javier’s hand movement as counting different groups. Yvette and Frances participated as the Builder when they provided details from the clip to support Wanda’s proposal. Daniel continued in the role of Proposer as he concluded that Javier “knows what the meaning of multiplication is.” Yvette then adopted the role of Proposer when she stated, “He just hasn’t retained the facts,” and Frances adopted the role of Supporter to express agreement with Yvette’s claim.

As the discussion progressed, Yvette continued in the role of Proposer when she claimed, “What they need is a taste of facts every day.” A new role emerged, that of Critic, when Frances responded to Yvette and stated that even when she had her students practice their facts every day, they still did not know them by memory. Frances continued in this role when she challenged Yvette’s claim that ability grouping would help students learn their facts. Elena also adopted the role of Critic when she offered an alternative perspective and suggested that the teachers modify instruction for students who have difficulty learning their multiplication facts. This segment of the conversation then concluded with the facilitator adopting the role of Prompter, directing the teachers’ attention back to the video segment. This discussion, and the movement of roles among the participants, was typical of what occurred throughout the series the meetings, with the teachers and facilitators adopting both organizational and discussion roles as they discussed the video segments they viewed.

An important point to emphasize is that these roles are not the only ones that participants might adopt in a video club or other professional development context. Rather, they are the roles that appeared in the case studied herein. Furthermore, although the purpose of this article is not to analyze the frequency with which participants took on these roles over time, it is useful to have a sense of what roles participants adopted in the discussions. For that purpose, Table 4 presents the average percentage of idea units in which teachers adopted these roles over the course of the ten meetings (More specific information concerning the roles all participants adopted per meeting can be found in Appendixes A, B, and C.) As revealed in Table 4, the teachers played the following six roles most frequently: Proposer, Builder, Clarifier, Critic, Prompter, and Supporter. The second phase of analysis focused on teachers’ participation in four roles that most closely related to accomplishing the goals of the video club. This analysis and the results are described below.
Phase II: Role Analysis

The purpose of the second phase of analysis was to explore changes in teachers’ participation in the four roles of Prompter, Proposer, Builder, and Critic. I examined teacher participation in these roles for two reasons. First, I narrowed my analysis to only discussion roles because participation in these roles most directly shapes the substance of the conversation. Second, I chose to analyze teachers’ participation in the four roles identified because they reflect central goals of the video club. The first role, Prompter, corresponds to the goal of engaging the group in discussions of student thinking. Prior research revealed that teachers tend to focus on teachers’ pedagogical strategies when analyzing teaching episodes (Sherin & Han, 2004). Furthermore, it is widely believed that teachers should have an active role in their learning and that they should help determine and shape what they learn (Darling-Hammond & McLaughlin, 1995; Little, 1993; Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003). Therefore, I sought to understand whether teachers participated in the Prompter role in a way that directed the group to notice and discuss student mathematical thinking in the video segments.

The second role, Proposer, reflects the goal of encouraging teachers to interpret and offer a range of explanations for the events they notice. Whereas some research on teacher expertise has suggested that expert teachers often make judgments based on interpretations (Berliner, 1994), other studies have found that teachers are often quick to judge what they observe (Copeland, Birmingham, DeMeulle, D’Emidio-Caston, & Natal, 1994; Sabers, Cushing, & Berliner, 1991; Sherin, 1998) and that they do not often articulate how they formed their judgments. Thus, I examined the extent to which teachers adopted the role of Proposer in ways to offer substantive interpretations of the events in the video clips and, in particular, of student mathematical thinking.

The third role, Builder, relates to the goal of developing ideas and claims with evidence. As Rodgers (2002) pointed out, teachers often attend to “what they wish were so” rather than focusing on the particulars that occurred when reflecting on their practice. Therefore, I sought to understand if participation in this role helped accomplish the goal of honing in on the details of the classroom interactions and, in particular, using the video and transcripts as evidence for claims.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coordinator</th>
<th>Clarifier</th>
<th>Mediator</th>
<th>Prompter</th>
<th>Proposer</th>
<th>Supporter</th>
<th>Critic</th>
<th>Builder</th>
<th>Summarizer</th>
<th>Blocker</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of idea units</td>
<td>11</td>
<td>99</td>
<td>18</td>
<td>83</td>
<td>184</td>
<td>102</td>
<td>87</td>
<td>134</td>
<td>23</td>
<td>19</td>
</tr>
<tr>
<td>Percent</td>
<td>5</td>
<td>50</td>
<td>9</td>
<td>40</td>
<td>95</td>
<td>33</td>
<td>43</td>
<td>70</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

\(^a\text{N} = 194.\)
Finally, in the Critic role, individuals explore alternative explanations and interpretations for the events they noticed. In professional development, teachers typically act as supportive colleagues (Barnett, 2002), and they rarely engage in a discourse that involves challenging one another’s thinking (Ball, 1997a; Darling-Hammond, 1997; Grossman et al., 2000). Thus, I chose to investigate teachers’ participation as Critics because it would be in this position that they would disagree, challenge, and encourage the exploration of alternative explanations of students’ mathematical thinking. I now present the results related to the nature and development of teachers’ participation in each role.

The role of Prompter. Data analysis revealed three different ways in which group members participated in the Prompter role: soliciting, redirecting, and expanding. (See Table 5 for a definition and example of each type of prompt.) When individuals adopted the solicit prompt, the purpose was to invite participation. They did this in three ways, by initiating either an open prompt, a general prompt related to a topic of teaching and learning, or a specific prompt focused on detailed elements related to teaching and learning.

Overall, both the teachers and the facilitators used all three types of prompts throughout the series of meetings. Furthermore, the facilitator adopted the Prompter role more than the teachers in the first two meetings (see Appendixes B and C). In particular, the facilitator adopted this role in 67% of the idea units, and the teachers participated as Prompters in 22% of the idea units early. However, by Meetings 9 and 10, the teachers’ and facilitators’ participation in this role was roughly the

<table>
<thead>
<tr>
<th>Prompt</th>
<th>Definition</th>
<th>Types</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solicit</td>
<td>Invites participants to discuss a noteworthy event</td>
<td>Open</td>
<td>“What do you notice?”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General teaching and learning issue</td>
<td>“What method do you use to teach fractions?”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specific teaching and learning issue</td>
<td>“And then she [says], ‘And then we gotta go back and check the next one. The next one would be one million.’ What is she talking about?”</td>
</tr>
<tr>
<td>Redirect</td>
<td>Shifts a discussion in progress and states a different noteworthy event</td>
<td></td>
<td>“But I wanted to say, I also think, Daniel, you had to show them a visual [representation].”</td>
</tr>
<tr>
<td>Expand</td>
<td>Invites participants to further develop an idea being discussed</td>
<td></td>
<td>“So, do you think when she’s more certain, he’ll challenge her [answer]?”</td>
</tr>
</tbody>
</table>
same, with the teachers and facilitators adopting it in 56% and 60% of the idea units, respectively.

Analysis of two early and two late meetings revealed that the teachers shifted in their participation in this role over time. In particular, in the two early meetings, just three teachers adopted this role over the two meetings. In contrast, six of the seven teachers adopted this role in the final meeting. All of the teachers except for Drew, the first-year teacher, adopted the role of Prompter and participated in this role in the final two meetings.

Another important result is that the teachers shifted in how they participated in this role. When they participated as Prompters early on they primarily redirected discussions, followed by soliciting the group to discuss issues they found relevant. Furthermore, the kinds of events the teachers identified as noteworthy changed over time. In Meetings 1 and 2, the teachers who adopted this role initiated discussions around a range of issues, asking the following types of questions: “Do [the students] all have rulers at their desk?” “But doesn’t Lorraine get it then?” and “How do you feel about teaching both [methods]? Do you teach them both ways or do you stick to just the conventional [method]?” These examples illustrate the teachers’ prompting about both general and specific teaching and learning issues. In addition, they noticed a variety of types of issues related to classroom management, students’ mathematical understanding, and teachers’ pedagogical strategies.

In the late meetings, however, the teachers’ prompts looked quite different. They primarily solicited others to participate, followed by inviting participants to expand their ideas. Furthermore, when they adopted either stance in this role, they directed the group to discuss the details of students’ mathematical thinking. For example, in the late meetings, they posed the following prompts: “I’m not making the connection between the first part of her explanation and the second part … how did she make that transition …” “I didn’t understand what he [meant]. ‘Since there’s five going down, you can just put one up and over’” and “Why was his first answer 9? [The transcript] says, ‘That’s the combination I’m talking about. There’s 9 a.m. and 5 p.m., right? How many times do you see the combination 9 and 5?’ And he said 9. What was he thinking?” Data analysis revealed that in the first two meetings, the teachers prompted the group to discuss student thinking in 33% of the idea units in which they took on this role. In Meetings 9 and 10, however, they prompted the group to discuss the particulars of student thinking in 70% of the segments in which they adopted this role. Thus, in the role of Prompter, teachers came to participate in ways that directed the group to discuss the particulars of students’ thinking and probed group members to articulate their claims and interpretations as well.

The role of Proposer. As with the role of Prompter, video club members participated as Proposer in different ways. To begin, participants adopted different
stances in the role of Proposer (see Table 6 for definitions and examples of each type of stance). Table 6 shows that when participants adopted the role of Proposer, the function of their comments was to judge an event, make an observation, prescribe a course of action to take, or reason about an idea. Furthermore, participants adopted one of two perspectives, offering either a definitive or a tentative claim. Analysis revealed that the teachers shifted in their participation in this role over time.

Over the course of the series of meetings, the teachers played the role of Proposer in almost all of the idea units (see Appendix B), and they participated in this role much more frequently than did the facilitator. The facilitator participated very little in this role in the first two and final two meetings. Although the teachers’ participation remained steady across the 10 meetings, an important change can be seen in how they participated in this role. Early on, teachers’ comments in this role served primarily to propose evaluations of issues under discussion. However, in the two final meetings, they shifted to reasoning about the events in most of the segments in which they adopted this role. There were a total of 44 idea units across Meetings 1 and 2. Teachers proposed judgments in 56% of the segments and reasoned in 40% of them. In Meetings 9 and 10, there were 46 idea units. As Proposers, the teachers reasoned in 70% of the segments and they judged events in 37% of them. Thus, in this role, the teachers came to reason more about the issues they discussed over time, and this stance aligned more closely with the goals of the video club.

Further analysis revealed that teachers changed in the perspective they adopted as well. For example, 71% of the reasoning proposals were definitive in nature in the first two meetings. In contrast, in the final two meetings, 60% of the teachers’ proposals were tentative in nature. The following example illustrates the definitive stance teachers adopted in their reasoning comments. In Meeting 1, the teachers

<table>
<thead>
<tr>
<th>Stance</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Judge</td>
<td>Offer a claim that is judgmental in nature</td>
<td>“I liked the reiteration as you were going through, saying two and five tenths and then two and five-hundredths …”</td>
</tr>
<tr>
<td>Observe</td>
<td>Offer an observation of an event in the video segment</td>
<td>“I noticed the enthusiasm of the group.”</td>
</tr>
<tr>
<td>Prescribe</td>
<td>Offer a course of action that an individual should take</td>
<td>“What I do is have them find the area of one of those small squares and then count if they are having problems.”</td>
</tr>
<tr>
<td>Reason</td>
<td>Offer a claim that is interpretive in nature</td>
<td>“They understand the grid. They know that the numerator is the part shaded in.”</td>
</tr>
</tbody>
</table>
viewed a clip in which the students worked on number patterns. The teacher wrote the following on the board:

1 inch = 3 miles
2 inches = ____ miles
3 inches = ____ miles
9 inches = ____ miles

The students were asked to solve the problems individually and then discuss with a partner how they had solved them. One student explained his method: “Three times two, four, six, is six, then three, six, nine, then four, eight, twelve … You’re supposed to add … it’s add three times.” After viewing the clip, the group discussed this student’s approach and Wanda remarked:

He’s confused because it went 2 inches equals how many miles, so he was thinking 2, 4, he was grabbing onto the 2 inches … he’s worrying more about the inches instead of the miles which is what he needs to do. And so when he goes on later and he’s counting by fours, he’s got 4 inches and he’s thinking, “Okay, I’ve got 4 inches, so I’ve got 3 miles, 4, 8, 12.” He’s reversed the problem. Where he should really think, “I’ve got 4 inches, each of them equals 3 miles, take 3 four times.” He’s reversed it. We were talking about arrays. He was doing the array wrong. That’s what he was doing.

Here, Wanda reasoned about the students’ thinking, and she did so in a definitive way. She asserted directly that he is confused and that he has done the array wrong. She also made statements that suggest she has assessed the error correctly and that her assessment is indisputable: “He’s thinking …” “He should really think …” “He’s reversed it …” and “That’s what he was doing.”

In contrast, in the final meetings, the teachers adopted a more tentative, uncertain stance to their interpretations of students’ thinking. For example, in Meeting 10, the group viewed a clip in which the students used a tree diagram of train departure times to solve several probability problems. In the clip, one student, Kendall, helped another student, Brandon, find the probability of getting on a morning train at 9 a.m. and getting on an evening train at 5 p.m. As she offered assistance, Kendall created an analogy for Brandon, asking him to think of the problem in terms of shirts and pants. He has four pairs of pants and three shirts. Each pair of pants has a single number on them—6, 7, 8, or 9 (like the morning departure times on the tree diagram)—and each shirt has a number on it—3, 4, or 5 (like the evening departure times on the tree diagram). She then asked, “How many times can he wear his pants with a 9 and his shirt with a 5 on it together?” Upon viewing the clip, the teachers had the following discussion:
Elena: Why was his first answer 9? It says, “That’s the combination I’m talking about. There’s 9 a.m. and 5 p.m., right? How many times do you see the combination 9 and 5?” And he said 9. What was he thinking?

Wanda: Maybe because that’s, if you exclude the 9, that’s what on the …

Frances: I don’t know. He might have just not listened.

Linda: And maybe he wasn’t listening to the whole question. Because the first time, let’s see, he said 4. The difference between 5 and 9 is 4. Maybe that’s where he got the 9.

Yvette: Or there’s 4. There’s 6, 7, 8, 9. There’s 4 choices.

Daniel: I don’t know what he did. I mean, I don’t know if he really knows by the end that it’s one. You know, it’s like, “One? Yeah, right, one. Okay.”

Wanda: Right. And when [Kendall] went to the t-shirts, he came up with 2.

Frances: Yeah, 2/12ths.

Wanda: I think he actually had a mathematical basis for figuring that. I think that wasn’t a throw-out answer … because he has a 9 o’clock shirt and a 5 o’clock pair of pants, so it’s 2.

Daniel: The missing piece is the shirt and the pants. How many times can you wear a shirt with a 9 and pants with a 5 on it together. The missing piece is, I guess, that after you wear it, you can’t wear it tomorrow. You can wear it whenever you want. Does anyone know what I’m saying here?

Frances: He might think I can wear it today and tomorrow, so I could wear it twice.

Daniel: I don’t know … I think I know what she’s getting at …

Frances: Doesn’t she tell him that you can only wear the combination once? She tells him that at one point. If you have a 9 shirt and a 5 pant, and you can only wear it once …

Wanda: (reading from transcript) “How many times can you wear his shirt with a 9 on it and his pants with a 5 on it together?”

Facilitator: I’m not sure. I don’t see where she says, “You can only wear it once.”

Wanda: I’d have to watch it again …

Daniel: I’d have to look at the journal and how the question really is.

This excerpt is rather different. The teachers jointly discussed Brandon’s thinking, as well as considered Kendall’s analogy and whether it was an appropriate example to help Brandon understand probability. Through this discussion, the teachers were much more cautious about making claims about Brandon’s thinking. In fact, none of the teachers made a direct claim about his understanding. They used such phrases as “I don’t know,” “I think,” and “I’m not sure,” suggesting that they were hesitant to draw a conclusion about what Brandon understands. In addition, both Wanda and Daniel remarked that they would like to review the video or see the actual problem before making a claim. Thus, we see the teachers being more tentative in their comments, and this stance was more characteristic of their participation in this role in the final two meetings. This perspective is noteworthy because it opens up the discourse for the group members to offer alternative explanations and explore the events they observed in greater detail in order to make a claim about student understanding.
It is important to note that the teachers were also more tentative when prescribing a course of action to take. Early in the meetings, a teacher would offer a prescription by stating, “What I would do …” or “When you teach that next, what you should do …” whereas in the final two meetings the teachers were tentative in their prescriptions as well, stating, “Maybe a good idea would be to …” or “Another way you could teach that might be to …” We see evidence here that the teachers adopted a perspective of uncertainty, regardless of the stance they adopted or the issues about which they made claims.

The role of Builder. In the third role of focus, Builder, individuals participated in two ways: tagging information onto a conversation or connecting ideas to the ongoing discussion (see Table 7). Tagging refers to offering information that is tangentially related to the issue under discussion, whereas connecting refers to providing details and information that is directly related to the issue under discussion.

Analysis revealed several important findings related to teachers’ participation as Builders. From the beginning to the end of the series of meetings, the teachers increased in their participation as Builders. In particular, the teachers adopted this role in 51% of the idea units across Meetings 1 and 2 and in 75% of the idea units in the final two meetings. Additionally, the role of Builder became more prominent in the idea units in the later meetings. In other words, more teachers participated in this role per segment in Meetings 9 and 10. On average, just two comments per segment in which this role was adopted were intended to build an idea in the first two meetings, whereas an average of five comments were made per segment in the

<table>
<thead>
<tr>
<th>Approach</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tagging</td>
<td>Offering information that is tangentially related to the issue under discussion</td>
<td>Following the statement “I wish we had a list of what the kids need to know and what would be nice for the kids to know,” the Builder comments, “When this [curriculum] series first came out, the [district curriculum coordinator] said, ‘You must teach these lessons’ and they gave us the lessons. Then, there were some we could skip.”</td>
</tr>
<tr>
<td>Connecting</td>
<td>Providing details and information that is directly related to the issue under discussion</td>
<td>Following the statement “He was finding the counting pattern and extending it to the other numbers,” the Builder states, “Because he says 2 inches is 6 and then he got to 27 when he counted by 9’s.”</td>
</tr>
</tbody>
</table>
final two meetings in which Builders developed an idea. 4 Furthermore, early on, 61% of the teachers’ comments in this role were coded as tagging, whereas 39% were connecting. In the final two meetings, 59% were coded as connecting and 41% were tagging. An increase in participation in this role over time within an idea unit and a shift in how teachers built on to the discussions suggests that the teachers came to contribute more substantive information to develop an idea under discussion.

Although it is useful to see that the teachers participated more in this role, it is also important to understand how tagging and connecting comments functioned in the conversations. Analysis revealed that both tagging and connecting comments related to the idea under discussion but that they interacted with the discussions in different ways. As an illustration, in the ninth meeting, the teachers viewed a segment in which students converted fractions to decimals and then to percents. Students were given the fraction ¼ and then asked to convert it to a decimal and then to a percent. After the teachers viewed the clip, the following discussion ensued:

Facilitator: What do they seem to understand about fractions?
Linda: I think [the students] can visualize the part out of a grid [of one hundred cubes]. The first [day], some kids actually had to count how many blocks, but now I can just show them a grid, cut it into four parts, and they’ve got 25 [percent].
Daniel: I think that’s a good example. I think I should have … I didn’t do as many of those, like you have the grid so they can see. That helps with equivalent fractions a lot.

Clearly, Daniel’s comment relates to Linda’s remark about the students coming to understand the fractional part of a grid consisting of 100 cubes. However, his comment is considered tagging because he did not build on the students’ understanding in a direct way. Instead, he used an example from his own experience to make a comment related to the phenomenon under discussion. In fact, he built on Linda’s idea by commenting on the appropriateness of the pedagogical strategy as it relates to student understanding rather than delving into the specifics of students’ thinking to further explore what students seemed to know about the relationship between fractions, decimals, and percents.

Now, let us contrast this example with a discussion in which teachers connected to the ideas under discussion. Recall the conversation in Meeting 10 in which the members discussed Brandon’s understanding of probability. In that conversation, several teachers turned to the transcript to provide detailed evidence to support a claim. First, Frances proposed that Brandon came up with his answer because he

4In general, I coded participation at the level of the idea unit. For the role of Builder, I also looked at the rate of participation within an idea unit. Increased participation in this role within idea units over time would suggest that the teachers provided more explanation to further develop an idea under discussion.
was not listening carefully, and Linda built on this idea when she stated, “And maybe he wasn’t listening to the whole question. Because the first time, let’s see, he said 4. The difference between 5 and 9 is 4.” Linda referred to the transcript to quote exactly what he said to support the claim that the student may not have listened to the question. Later Wanda noticed that “when [Kendall] went to the t-shirts, he came up with 2.” Frances built on that idea when she said, “Yeah, two-twelfths,” providing precise details from the segment to develop Wanda’s idea. Finally, further along in the conversation, Daniel expressed a concern that Kendall’s example, namely using the combination of wearing a shirt and pair of pants, was not the same as the combination of getting on a train at 9 a.m. and 5 p.m. Frances then asked, “Doesn’t she tell him that you can only wear the combination once? She tells him that at one point.” Her question is followed by Wanda reading a quote from the transcript: “How many times can you wear his shirt with a 9 on it and his pants with a 5 on it together?” This excerpt illustrates several group members connecting to one another’s comments with evidence from the video segment and transcript as they tried to make sense of Brandon’s thinking and Kendall’s example. This was typical of how group members participated as Builders when they connected ideas in the final two meetings.

To be clear, the teachers did connect statements to advance the conversations in the early meetings as well. However, in the early meetings, fewer individuals participated in this way within an idea unit. For instance, in Meeting 1 the group viewed a clip in which students explored the relationship between fractions and decimals. In the first part of the clip, the students compared fractions of different values. After viewing this portion of the clip, Frances remarked as follows:

Frances: They seem to understand that the fractions are pieces.
Facilitator: What makes you think that?
Frances: Because they could go from one-tenth to six-tenths. They knew it was one-tenth, two-tenths, three-tenths to six-tenths. They seem to understand the pieces. It seemed to have caught on, which you don’t see in the video, but later in the week. They used the chart and someone came up with the idea that if you don’t have the chart, you could use sticky papers.
Facilitator: How would you do that?
Frances: Well, one kid got ten Post-it notes and said, “I’m making one-tenth.” And another kid divided the Post-it into ten pieces.

In this example, Frances built on her proposal that the students in the segment understand that fractions are pieces as she connected evidence from the clip and from her experiences with her students to support this claim. However, unlike the example in Meeting 10, she was the only member participating in this excerpt, and she built on her proposal only when prompted to do so. These examples illustrate the evolution of group members’ patterns of participation in this role over the course of the meetings.
The role of Critic. Finally, data analysis revealed several important findings related to the role of Critic. Participants played this role in two different ways. Additionally, the teachers adopted this role more than the facilitators throughout the series of meetings. Finally, when the teachers participated in this role, their comments were primarily focused on the students in the clips they viewed.

Similar to the other three roles, the Critic role was adopted in different ways. In particular, two different stances were associated with the role of Critic, namely counter and question stances. (See Table 8 for definitions and examples of each type of stance.) Both types of stances served to challenge an idea raised by a participant, however the counter stance was more overt whereas the question stance was more subtle in nature. In addition, when teachers countered an idea they did so in one of two ways. Either they directly disagreed or challenged an idea, or they countered a proposal by offering another claim or interpretation.

In terms of who adopted the Critic role, analysis revealed that the teachers participated in this role much more frequently than did the facilitators in both the early and the late meetings, with the teachers adopting this role in five times as many idea units as the facilitators. Teachers typically suppress conflict in professional development and rarely challenge others or press for explanations (Grossman et al., 2000). Instead, they prefer to use professional development as a place for peer support and the sharing of pedagogical practices (Barnett, 2002). In this video club, however, the teachers adopted a role in which they challenged one another’s thinking and objected to proposals that other members raised for discussion.

Analysis revealed that when teachers acted as Critics, their comments focused more on the students than the teacher in the video segment. Of the 39 idea units in which the teachers adopted the role of Critic, 67% were focused on the student, 21% were focused on the teacher, and 12% were about the curriculum developers. Perhaps by focusing the conversation on the students, the teachers were able to avoid conflict because they were not directly commenting on one another’s teach-

<table>
<thead>
<tr>
<th>Stance</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counter</td>
<td>Disagree with or challenge the previous speaker’s comment</td>
<td>“Um, I don’t think so. [The curriculum] assumes [that this concept] is new for the students.”</td>
</tr>
<tr>
<td></td>
<td>Offer an alternative perspective for an idea under discussion</td>
<td>“I look at it differently. At least she had geometry on her page and made the connection to a previous lesson.”</td>
</tr>
<tr>
<td>Question</td>
<td>Question the claim under discussion without openly disagreeing with the individual who made the claim</td>
<td>“But is it a problem [that he solved the problem that way]?” “I don’t know. I’d like to see his paper to see what he wrote down.”</td>
</tr>
</tbody>
</table>
ing. However, analysis of how teachers adopted this role showed that they played it in ways that appeared to press on one another’s thinking.

Across the early and late meetings, the teachers primarily countered one another’s ideas when they played Critic. Of the 39 idea units in which teachers participated as Critics, in 54% of the segments, Critic countered a previous proposal; in 26% of the segments, Critic questioned an idea; and in the other 20%, Critic offered alternative explanations. However, closer examination revealed that the teachers countered less and offered alternative perspectives and questioned ideas more later in the series of meetings. In particular, in the early meetings, 68% of Critic remarks countered, 11% offered alternative perspectives, and 21% questioned ideas. In the later meetings, 40% of Critic comments countered, 30% offered alternative perspectives, and 30% questioned ideas under discussion.

To illustrate the differences in teachers’ participation in this role, I return to the excerpt in which the group discussed Javier solving various multiplication problems in the context of a game. During that discussion, two teachers had the following exchange:

Yvette: What they need is a taste of facts every day.
Frances: But you know … there is always that group of kids who don’t learn those darn facts. [In third grade] we used to do five minutes [of facts] at least three times a week, and yet still … you’d think they know them.
Yvette: But with the [students] clustered [in ability groups] last year [in fourth grade], we did a lot of fact work and I could really zero in …
Frances: But I have kids that don’t know their math facts now [in fifth grade]. They don’t remember them.

Here, Yvette proposed that in order for students to learn multiplication facts, they need practice, and she suggested that ability grouping students would provide her the flexibility to meet this need for a particular group of students. Frances countered this proposal by pointing out that when she taught third grade the previous year, she had the students practice their facts several times a week and they still did not learn them. In addition, as a fifth-grade teacher, Frances had witnessed that some of her students still did not know their multiplication facts, suggesting that ability grouping and spending more time practicing facts may not be the best approach. This exchange illustrates the kind of discourse teachers engaged in throughout the series of meetings when they adopted the role of Critic, expressing disagreement and opposition about one another’s ideas.

Over time, however, the teachers came to challenge one another’s ideas by offering alternative explanations. Returning to Meeting 10, recall that the group discussed Brandon’s understanding of probability in the context of the train problem. During the discussion, the facilitator posed a question to the group related to one of Brandon’s answers, and several teachers participated to reason about his thinking:
Facilitator: At one point Brandon says, “That would be like 8 times. I think 8.” So, where does the 8 come from? It’s on the second page.

Wanda: He was so confused that I really think he was just throwing things out.

Daniel: I thought he could have been thinking 9 a.m. to 5 p.m. is 8 hours.

Wanda: 8 hours. Yeah, good.

Yvette: “That would be 8 times. I think 8.”

Here, Wanda offered a relatively weak explanation for Brandon’s thinking, stating that he was just throwing out an answer. Rather than directly oppose this proposal, Daniel offered an alternative explanation and one that was more substantive as well. He proposed that Brandon may have calculated the difference between 9 a.m. and 5 p.m., and that is how he arrived at his answer. Wanda followed by supporting his statement, which suggests that she did not perceive Daniel to be criticizing or openly challenging her initial proposal. Over time, Critics appeared in discussions primarily to offer alternative interpretations of ideas under discussion or to question an idea under discussion. I now discuss these results.

**DISCUSSION**

In this article, I set out to understand the nature of teachers’ participation in a video club and how their participation evolved over the course of the video club meetings. I adopted a situative perspective and focused on teachers’ participation in roles that reflected four central goals of the video club. This lens is particularly useful because it draws attention to the nature and development of teachers’ participation in relation to accomplishing the goals of professional development. I defined learning as shifts in teachers’ patterns of participation in central roles of the video club and investigated the development of their participation in these roles that not only enabled them to learn to analyze student thinking but also allowed them to take ownership of their learning.

Analysis revealed that the teachers shifted in their participation in the four roles of focus over time. In particular, they came to participate in the role of Prompter more often, and they shifted in the issues they raised in this role, prompting the group to attend to the particulars of students’ mathematical thinking by the end of the series of meetings. As Proposers, the teachers reasoned more over time, as well as adopted a more tentative stance in their proposals. Furthermore, in the Builder role, the teachers came to connect the comments they made in this role to the issue under discussion, using the video segments and transcripts as sources of evidence for their claims. Finally, as Critics, the teachers continued to counter one another’s ideas over time, but they also used this role to propose alternative explanations and to question others about their interpretations. Thus, the teachers participated in these roles in ways that helped the group accomplish the goals of the video club.
This result is similar to Franke and Kazemi’s (2001) examination of teachers’ generative growth in professional development. Not only did the group develop particular knowledge and skills, but members also took on new roles in relation to the knowledge and skills. This is a worthwhile result given the importance of teachers’ collective and active participation in their learning (Carpenter & Lehrer, 1999; Porter, Garet, Desimone, Yoon, & Birman, 2000).

Several important issues arise related to participation in each role. The fact that most of the teachers took on the role of Prompter over time suggests that the teachers became more central to accomplishing the goals of this group (Wenger, 1998). Although research has highlighted the fact that teachers are generally passive in their learning (Burbank & Kauchak, 2003), this finding shows that most of the teachers became active participants in this context, as they each contributed to and influenced what the group discussed. Furthermore, it is not a trivial matter for teachers to learn to attend to the particulars of student mathematical thinking (Ball, 1997b). The fact that the teachers participated as Prompters in a way that focused the group’s attention on analyzing specific student ideas suggests that substantive learning occurred.

Turning to the role of Proposer, participation in this role early on involved judging, prescribing, and reasoning, all with a definitive perspective. This approach suggested to the group that there was only one way to analyze the events being discussed. Over time, Proposers reasoned more and positioned statements more tentatively. This shift is important, because mathematics teacher professional development encourages teachers to step back and contemplate student ideas and to probe students about their thinking (Rodgers, 2002). In the Proposer role, the participants came to engage in this kind of analysis, adopting a less certain and more contemplative approach to interpreting student ideas (Cochran-Smith & Lytle, 1999; Seago, 2004).

In addition, the definitive and tentative stances that Proposers adopted highlight issues of access and authority that came into play in these discussions (Ryu, 2006). Comments and statements made in definitive ways positioned the speaker in this role as an authority and did not invite comment from other members. Alternatively, when speakers were more tentative in their discourse, more participants had access to the conversations and to the ideas being discussed. Thus, they were able to jointly develop understandings of the events in the segments. This shift from a certain to an uncertain stance in the discourse enabled ownership of the ideas to become more distributed among group members, such that no one person was the knower and all members could contribute to the group’s learning.

An important finding related to the Builder role is that over time the teachers connected detailed information from the video segments and transcript to the discussions in ways that helped advance conversations. This type of participation in this role helped the discussions move from what Little and Horn (2007) referred to as just talking to engagement in consequential conversations. Little (2003) dis-
cussed teachers’ accounts of practice and their function as resources for professional community. Although there is certainly value to teachers revisiting, sharing, and reconstructing interpretations of their own classroom events, introducing these experiences as evidence for claims in the video club appears to draw the group away from the goal of attending to particular events in the video clips. Because all members do not have access to the particulars of these experiences, they may be limited in the ways in which they can participate in order to help the group engage in sustained discussions of video records of practice.

Finally, over time, Critics continued to challenge participants’ ideas but did so in ways that were less aggressive and that shifted the focus of the comments away from the teachers in the clip and on to the students and their thinking. This shift suggests that teachers may have been careful to avoid openly critiquing one another, keeping in line with an implicit rule of the club, which was not to evaluate one another’s practice. In addition, they may have viewed themselves as remaining in line with an important goal of the video club, which was to maintain a focus on the students. Furthermore, questioning an idea or offering an alternative perspective may function in a similar way to Proposers adopting a tentative stance, that is, to press on an idea and open it up for further investigation.

An important point for consideration is how the transformations in participation in these roles occurred. The nature of facilitation is beyond the scope of this article, but the relationship between facilitation and teacher learning is not inconsequential. From a situative perspective, the video club facilitator is the more experienced other scaffolding teachers to learn how to participate in this enterprise. Analyzing the particulars of student thinking is not a typical practice for teachers. Thus, teachers needed to learn how to do this work. There is some evidence that the facilitator participated in the four roles of focus in ways that helped the teachers learn how to play them. For example, though the teachers increased their participation in the Prompter role over time, the facilitators participated in this role more than the teachers over the course of the 10 meetings. As organizers of the video club group, the facilitators had particular goals at the start and may have used this role to make those goals public to the group. By embedding the goal of attending to students’ mathematical thinking in the discourse when adopting this role, the facilitators may have been able to model the kinds of events that are worth noticing and discussing, making transparent to the teachers how to participate in this role in productive ways.

Furthermore, the facilitators selected the clips for the group to view in this particular model of a video club. They spent a great deal of time thinking about what was interesting mathematically and what was noteworthy about students’ thinking about the mathematics in the video clips. Thus, the facilitators noticed as they observed and videotaped in the classroom and reviewed and selected the clips. In the video club, then, the work of the facilitator involved helping the teachers to notice the particular events in the segments and to develop a discourse for discussing what was mathematically worthwhile as represented in the segments.
A final important point to consider is the interaction between participation in these roles. The analysis here provides insight into some ways in which members coordinated their participation to accomplish the goals of the club. In particular, early on, participation looked more like what Ryu (2006) described as the panel discussion structure, with a teacher or facilitator posing a question, a group member responding, followed by minimal development of an idea and then the group proceeding to discuss the next issue. Over time, however, multiple members participated in the four roles of focus in ways that supported sustained discussions. For example, when Prompters’ solicitations were tightly connected to specific student ideas, Proposers typically followed by reasoning about the ideas, and Builders provided detailed evidence to develop Proposers’ claims. Furthermore, as Proposers’ claims became more tentative over time, Critics appeared and offered alternative interpretations of the events under discussion. Thus, there appears to be an interaction in the particular ways in which these roles were played that enabled the teachers to engage in sustained discussions of student thinking. Perhaps as the teachers shifted in the ways they participated in some roles over time, they supported new types of participation in other roles that helped the group engage in in-depth analyses of student thinking, what one might call the communal reflective inquiry discourse.

CONCLUSION

Shortcomings

Although this study points to important ways in which teachers participated in a video club in order to support learning to notice student thinking, several additional issues remain to be investigated. First, this study focused on one video club setting. Additional research is needed to investigate the extent to which these roles appear in other video-based professional development programs as well as to attempt to more precisely define the range of roles that appear in such settings. A second area for research concerns the relationship between shifts in patterns of teachers’ participation and other aspects of the video club. This includes how the facilitator helped the teachers understand the practices for analyzing video so teachers could adopt roles that support accomplishing this goal, as well as how the clips they viewed afforded opportunities for teachers to participate in new ways. Finally, just as teachers followed different paths in learning to notice student thinking (van Es & Sherin, 2008), they may have also followed different paths as they learned to participate in new ways in the video club.

Implications

These findings have important implications for the design of professional development environments. Clearly, a range of factors in this video club influenced teacher
learning. First, the participants had enough time and continuity to form a community and to take on substantial roles within the community, helping one another learn to notice. Second, some things the facilitator did, especially identifying clips, helped make this happen (Sherin, Linsenmeier, & van Es, 2006). Third, the participants had time to (a) recognize why noticing was important for them, (b) develop themselves in community roles, (c) develop their noticing capabilities, and (d) develop and get answered some of their confusions about noticing. Finally, they were facilitated in making the club their own. This was not a case of professional development being handed to the teachers; rather, they had a lot of control (van Es, 2007). From a design perspective, it is important to consider how teachers or school leaders might take on some of the responsibilities of coordinating and facilitating video clubs, such as selecting clips that highlight interesting student thinking or providing teachers with opportunities to participate centrally in their ongoing development.

This study also offers implications for the facilitation of video-based professional development. We see here that in some cases group members participated in ways that developed the conversation in substantive ways. In other instances, the nature of their participation inhibited the group from participating in deep sensemaking of student ideas. Facilitators can use this information as a guide for noticing teacher participation—for identifying those moments in professional development when a specific type of participation may inhibit accomplishing the goals of the group and for considering ways to “save” the discussion in order for group members to have sustained discussions of student learning and teaching practice.

Finally, I do not intend to propose that facilitators assign particular roles to individuals in video club meetings or video-based professional development. Rather, I focus on teachers’ roles as a way to capture the development of teacher participation in the video club and to argue that the teachers developed new practices such that they had some control over their learning while also working toward accomplishing the goals of the video club. Ultimately, however, professional development is concerned with helping teachers learn knowledge and practices they can employ in their teaching to support student learning. The analysis presented here provides evidence that this group of teachers learned to participate in ways to help them learn to inquire into student thinking in ways advocated by mathematics education in the video club context. Elsewhere (Sherin & van Es, 2008) I have reported that this same group of teachers employed similar strategies while teaching—they paid increased attention to student thinking while teaching, and they reasoned about student ideas in the midst of instruction. Although the video club did not have an explicit goal of changing teachers’ classroom practices, the analysis discussed herein suggests that as the teachers were empowered to participate in new ways in the video club, they came to “own” these practices such that they could appropriate them for use in their teaching. Designing professional development with
attention to both the content of teacher learning as well as teacher participation may show promise for helping teachers develop new practices for noticing student thinking and adopting a student-centered, responsive approach to mathematics instruction.

ACKNOWLEDGMENTS

The research reported in this article was supported by National Science Foundation Grant REC-0133900. The opinions expressed are my own and do not necessarily reflect the views of the supporting agency. I would like to thank Miriam Gamoran Sherin, Allan Collins, Louis Gomez, David Hammer, Janet Kolodner, and the anonymous reviewers for their thoughtful comments and suggestions.

REFERENCES


### Appendix A

**Frequency All Participants Adopted x Roles Across Idea Units**

<table>
<thead>
<tr>
<th>Meeting</th>
<th>No. of Idea Units</th>
<th>Coordinator</th>
<th>Clarifier</th>
<th>Mediator</th>
<th>Prompter</th>
<th>Proposer</th>
<th>Supporter</th>
<th>Critic</th>
<th>Builder</th>
<th>Summarizer</th>
<th>Blocker</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19</td>
<td>21</td>
<td>47</td>
<td>16</td>
<td>74</td>
<td>84</td>
<td>16</td>
<td>47</td>
<td>47</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>16</td>
<td>48</td>
<td>16</td>
<td>76</td>
<td>100</td>
<td>28</td>
<td>44</td>
<td>56</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>25</td>
<td>50</td>
<td>25</td>
<td>88</td>
<td>100</td>
<td>38</td>
<td>50</td>
<td>75</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>29</td>
<td>71</td>
<td>25</td>
<td>50</td>
<td>96</td>
<td>63</td>
<td>46</td>
<td>83</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>50</td>
<td>69</td>
<td>19</td>
<td>94</td>
<td>88</td>
<td>31</td>
<td>44</td>
<td>63</td>
<td>25</td>
<td>31</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td>21</td>
<td>63</td>
<td>16</td>
<td>74</td>
<td>100</td>
<td>53</td>
<td>63</td>
<td>74</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>15</td>
<td>13</td>
<td>13</td>
<td>0</td>
<td>80</td>
<td>100</td>
<td>33</td>
<td>40</td>
<td>80</td>
<td>27</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>22</td>
<td>14</td>
<td>41</td>
<td>5</td>
<td>73</td>
<td>86</td>
<td>41</td>
<td>50</td>
<td>77</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>21</td>
<td>29</td>
<td>57</td>
<td>19</td>
<td>76</td>
<td>90</td>
<td>38</td>
<td>48</td>
<td>71</td>
<td>29</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>25</td>
<td>24</td>
<td>64</td>
<td>12</td>
<td>80</td>
<td>100</td>
<td>28</td>
<td>48</td>
<td>76</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Overall</td>
<td>194</td>
<td>24</td>
<td>52</td>
<td>15</td>
<td>76</td>
<td>94</td>
<td>37</td>
<td>48</td>
<td>70</td>
<td>19</td>
<td>9</td>
</tr>
</tbody>
</table>

*Note:* Data are percentages unless otherwise noted.
## Appendix B

Frequency Teachers Adopted x Roles Across Idea Units

<table>
<thead>
<tr>
<th>Meeting</th>
<th>No. of Idea Units</th>
<th>Coordinator</th>
<th>Clarifier</th>
<th>Mediator</th>
<th>Prompter</th>
<th>Proposer</th>
<th>Supporter</th>
<th>Critic</th>
<th>Builder</th>
<th>Summarizer</th>
<th>Blocker</th>
<th>Summarizer</th>
<th>Blocker</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19</td>
<td>0</td>
<td>47</td>
<td>11</td>
<td>21</td>
<td>84</td>
<td>16</td>
<td>37</td>
<td>47</td>
<td>5</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>8</td>
<td>44</td>
<td>4</td>
<td>24</td>
<td>100</td>
<td>28</td>
<td>44</td>
<td>56</td>
<td>8</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>0</td>
<td>50</td>
<td>13</td>
<td>25</td>
<td>100</td>
<td>38</td>
<td>50</td>
<td>75</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>4</td>
<td>71</td>
<td>17</td>
<td>33</td>
<td>92</td>
<td>54</td>
<td>21</td>
<td>79</td>
<td>13</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>6</td>
<td>63</td>
<td>13</td>
<td>50</td>
<td>88</td>
<td>31</td>
<td>44</td>
<td>81</td>
<td>6</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td>0</td>
<td>53</td>
<td>16</td>
<td>47</td>
<td>100</td>
<td>47</td>
<td>58</td>
<td>63</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>15</td>
<td>7</td>
<td>13</td>
<td>0</td>
<td>20</td>
<td>100</td>
<td>20</td>
<td>40</td>
<td>80</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>22</td>
<td>9</td>
<td>41</td>
<td>5</td>
<td>64</td>
<td>91</td>
<td>27</td>
<td>50</td>
<td>77</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>21</td>
<td>14</td>
<td>52</td>
<td>14</td>
<td>52</td>
<td>90</td>
<td>38</td>
<td>48</td>
<td>67</td>
<td>14</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>25</td>
<td>4</td>
<td>64</td>
<td>0</td>
<td>64</td>
<td>100</td>
<td>32</td>
<td>40</td>
<td>76</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

**Note:** Data are percentages unless otherwise noted.
### APPENDIX C

Frequency Facilitators Adopted × Roles Across Idea Units

<table>
<thead>
<tr>
<th>Meeting</th>
<th>No. of Idea Units</th>
<th>Coordinator</th>
<th>Clarifier</th>
<th>Mediator</th>
<th>Prompter</th>
<th>Proposer</th>
<th>Supporter</th>
<th>Critic</th>
<th>Builder</th>
<th>Summarizer</th>
<th>Blocker</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19</td>
<td>21</td>
<td>21</td>
<td>5</td>
<td>63</td>
<td>0</td>
<td>11</td>
<td>16</td>
<td>11</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>16</td>
<td>28</td>
<td>4</td>
<td>72</td>
<td>4</td>
<td>24</td>
<td>4</td>
<td>4</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>25</td>
<td>25</td>
<td>13</td>
<td>88</td>
<td>13</td>
<td>13</td>
<td>25</td>
<td>13</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>29</td>
<td>50</td>
<td>4</td>
<td>54</td>
<td>25</td>
<td>17</td>
<td>13</td>
<td>33</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>50</td>
<td>44</td>
<td>13</td>
<td>75</td>
<td>44</td>
<td>6</td>
<td>19</td>
<td>38</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td>22</td>
<td>11</td>
<td>0</td>
<td>47</td>
<td>32</td>
<td>21</td>
<td>11</td>
<td>37</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>15</td>
<td>13</td>
<td>7</td>
<td>0</td>
<td>80</td>
<td>27</td>
<td>13</td>
<td>0</td>
<td>33</td>
<td>27</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>22</td>
<td>23</td>
<td>23</td>
<td>0</td>
<td>68</td>
<td>36</td>
<td>9</td>
<td>5</td>
<td>41</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>21</td>
<td>14</td>
<td>24</td>
<td>0</td>
<td>71</td>
<td>24</td>
<td>5</td>
<td>0</td>
<td>19</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>25</td>
<td>24</td>
<td>32</td>
<td>8</td>
<td>48</td>
<td>12</td>
<td>16</td>
<td>12</td>
<td>20</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Overall</td>
<td>194</td>
<td>24</td>
<td>27</td>
<td>5</td>
<td>67</td>
<td>22</td>
<td>14</td>
<td>11</td>
<td>25</td>
<td>13</td>
<td>0</td>
</tr>
</tbody>
</table>

*Note:* Data are percentages unless otherwise noted.