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Elizabeth A. van Es & Miriam Gamoran Sherin

To cite this article: Elizabeth A. van Es & Miriam Gamoran Sherin (2006) How Different Video Club Designs Support Teachers in “Learning to Notice”, Journal of Computing in Teacher Education, 22:4, 125-135, DOI: [10.1080/10402454.2006.10784548](https://doi.org/10.1080/10402454.2006.10784548)

To link to this article: <https://doi.org/10.1080/10402454.2006.10784548>



Published online: 03 Mar 2014.



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How Different Video Club Designs Support Teachers in "Learning to Notice"

Elizabeth A. van Es and Miriam Gamoran Sherin

Abstract

Video is currently a key element of numerous professional development programs, yet relatively little is known about how video fosters changes in teachers' thinking. This study examines how a particular type of video-based professional development, namely video clubs, supports teacher development. Video clubs are professional development environments in which groups of teachers come together to view and discuss videos of one another's teaching. In this paper, we study how two different video club designs support teachers in "learning to notice" classroom interactions in new ways. Data for this study include a pre- and post-interview conducted with each participating teacher from the two video clubs. Analysis reveals that, for one group, the scope of their comments became focused on a particular issue, interpreting the mathematical ideas expressed by students in the video excerpts. In contrast, the second group developed a range of perspectives for discussing the video segments. We argue that the different designs of the video clubs influenced the ways in which the two groups of teachers "learned to notice."

Since the introduction of portable video equipment in the early 1960s, video has been seen as an important tool for teacher education and professional development. Video is now widely used in preservice teacher education programs across the United States and is also a common feature of many professional development programs for practicing teachers. In mathematics education in particular, many innovative video-based programs have recently been developed including video cases, lesson study materials, and multimedia software. Little is known, however, about how the design of video-based programs influences what teachers learn. Recent research suggests that teacher learning is situated, that is, that particular features of the environment interact with what and how teachers learn (Putnam & Borko, 2000). Thus, issues of design are critical to consider.

In addition, more research is needed to understand what teachers learn in video-based professional development. Although many programs have been designed with the purpose of teaching teachers about subject matter or about new pedagogical techniques (Wang & Hartley, 2003), we take a different approach. Specifically, we examine how video-based professional development can support teachers in "learning to notice" classroom interactions in new ways. We claim that the skill of noticing is a key component of teacher expertise as teachers must decide where to pay attention in a complex and often unpredictable environment (Leinhardt & Greeno, 1986).

This study takes place in the context of a particular type of video-based professional development, namely video clubs. A video club consists of a group of teachers who meet to watch and discuss videos of one another's teaching (Sherin, 2000; Tochon, 1999). In particular, we study how two different video club contexts support teachers in "learning to notice" classroom interactions in new ways. We begin by reviewing what it

means for teachers to learn to notice and then discuss why a video club might support teachers in this endeavor. This is followed by a discussion of the results from each video club. Rather than focus on the video club discussions themselves, our analysis explores similarities and differences in how the two groups of teachers analyze video in a pre- and post-interview context. Then, we consider how the designs of the two video clubs may have influenced the teachers' analyses. To conclude, we describe the implications of our work for the design of video-based professional development and for future research on teacher cognition.

The Role of Video in Learning to Notice

This study investigates the ways in which teachers examine classroom interactions and how their focus can change as a result of viewing video with other teachers. As such, two perspectives from the literature frame this research. First, we consider how researchers characterize the role of "noticing" in teacher practice. Second, we explore the reasons why video might be a productive medium for helping teachers "learn to notice" classroom interactions in new ways.

Noticing as Teacher Expertise

A number of researchers argue that a key component of teaching expertise is the ability to notice and interpret what is happening in one's classroom (Berliner, 1994; Frederiksen, 1992; Mason, 2002). For example, Goodwin (1994) explains that members of a professional discipline become attuned to certain phenomena and are able to make sophisticated judgments concerning such phenomena. With respect to teachers in particular, Berliner (1994) suggests that expert teachers efficiently assess classroom situations, recognizing meaningful patterns in what they observe. Similarly, Rodgers (2002b) and Frederiksen (1992) describe the importance of teachers being able to select those classroom interactions that they consider noteworthy and to then ascribe meaning to such events. What is key, then, is for teachers to develop the ability to identify what is significant in a classroom situation and to have ways to effectively reason about those situations.

In synthesizing and adding to this research, we propose that the skill of noticing consists of two main aspects: (a) identifying what is important in a teaching situation and (b) drawing on one's knowledge of teaching and learning to reason about the situation (Sherin, in press; van Es & Sherin, 2002). The first aspect of noticing involves the ability to focus one's attention on what is significant in a complex situation. Frederiksen (1992) describes this as making a "call-out," while Goodwin (1994) discusses this ability using the term "highlighting." In a classroom in particular, many things are happening simultaneously and the teacher must decide what deserves immediate consideration.

The second characteristic of noticing involves using knowledge of one's context to reason about events that occur. Teachers have a wealth

of knowledge about their students, curriculum, and school context, and they use this detailed knowledge to make sense of what they observe. This idea is supported by prior research that finds that as individuals become familiar with a particular type of situation, they are better able to analyze the same types of situations in the future (Lesgold et al., 1988).

Although we emphasize these two characteristics of noticing, we do not mean to imply that noticing takes a single form across all teachers in all contexts. Instead, part of the point of this paper is to examine how teachers' noticing develops in two video club designs and what differences there may be as a result.

Video and Teacher Learning or "Why Video?"

Video has been used for decades in teacher learning, and it appears to show promise in supporting teachers in learning to notice. In particular, video appears to portray the richness of classroom interactions, and it can be used in contexts that allow teachers time to reflect on these interactions (Sherin, 2004; Sherin & Han, 2004). Furthermore, video affords multiple viewings so teachers can examine events several times with different perspectives. For instance, a teacher might examine the same interaction between two students, once from the viewpoint of management concerns and another time for the purpose of understanding student thinking. Alternatively, a teacher might review the same interaction multiple times in order to deeply analyze the students' ideas. In this way, reflecting on video offers an opportunity for teachers to notice aspects of classroom interactions of which they may not have been aware on an initial viewing of the video or when the event originally took place in their classroom.

More specifically, the video club environment seems particularly well suited to supporting teachers in learning to notice for several reasons. First, prior research on teacher learning suggests that there is value in teachers coming together to examine artifacts from their own classrooms (Roberts & Wilson, 1998). When teachers have a common referent on which to focus their discussions, they can engage in in-depth analyses of important issues related to teaching and learning. Second, teachers rarely have opportunities to see images of teaching and learning from their colleagues' classrooms, and video clubs allow teachers to do just that. Third, watching video as a group allows for multiple perspectives on the same event to be explored, much more so than if a teacher were to examine video independently (Lampert & Ball, 1998). For these reasons, video clubs appear to show promise in prompting teachers to examine classrooms in new ways.

Research Design

Video Club Design

Data for this study comes from two different video clubs, the Mapleton Video Club and the Wells Park Video Club.¹ The Mapleton Video Club consisted of seven fourth and fifth grade elementary teachers from an urban school and included both novice and veteran teachers. This video club met ten times throughout the 2001–2002 school year, one or two times each month from October to May. The ten meetings shared the same format. Prior to each meeting, a member of the research team videotaped mathematical lessons from two of the teachers' classrooms. The same researcher then viewed the tapes and identified a brief segment in which students discussed mathematical issues in either a whole class discussion or in a small group setting. The researcher also prepared a corresponding transcript for the video club meeting. In all, clips from each teacher's classroom were viewed two or three times throughout the year. Each meeting was videotaped.

The Mapleton Video Club was designed with a particular goal in mind brought by the researchers in conjunction with the district administration.² In particular, the sessions were designed to help teachers focus on students' mathematical thinking. It was for this reason that the researcher picked classroom video excerpts in which students' thinking was prominent. Furthermore, during the video club sessions, a researcher, acting as facilitator, prompted the teachers to examine students' ideas about mathematics and to use evidence from the video to support their claims about the students' understanding. Toward that end, the facilitator asked the following types of questions: "What do you think Joey meant when he said, 'You put one up over that (column)'?" "Where does it say that in the transcript?" "So, what do you think he understands about multiplying fractions?" This design is supported by recent research on teacher learning and professional development (Ball & Cohen, 1999; Smith, 2001), as well as research on mathematics teaching and learning (Carpenter & Fennema, 1992; Schifter, 1998). Such research has shown that attending to student thinking is a critical dimension of effective mathematics teaching.

The Wells Park Video Club consisted of six elementary school teachers from a suburban school, with both novice and experienced teachers. There was one first-grade teacher, two fourth-grade teachers, and three teachers who taught "specials"—music, Spanish, and physical education. This video club met six times in the spring of the 2002 school year, once a week from the end of April to the middle of June. Each meeting had the same format. Prior to the meeting, one teacher videotaped a lesson from his or her classroom and selected a 5–7 minute video clip to share at the meeting. Before showing the clip, the teacher introduced a particular topic or issue that he or she wanted the group to examine while viewing and discussing the excerpt. To be clear, a researcher did not facilitate these meetings; a researcher was present to observe and take field notes of the meetings but did not participate in the discussions in any way. The researcher also videotaped each of the six meetings.

Like the Mapleton Video Club, the Wells Park Video Club was designed with a particular goal, albeit a different one. This club was initiated by the school principal as part of the school's mentoring program. In this case, the purpose was for novice and veteran teachers to have time and space to come together to talk about issues of teaching and learning. Recent research supports this design as well. Specifically, research on teacher learning points to the value of teachers engaging in inquiry about their practice with their colleagues, particularly related to personal questions that arise from events within their own classrooms (Lampert & Ball, 1998; Wilson & Berne, 1999).

Data

The goal of this study was to investigate how two video club contexts influenced how teachers noticed and interpreted classroom interactions. Toward this end, we designed a clinical interview that would allow us to assess, before and after participation in a video club, the ways in which teachers comment on video excerpts. It is this interview data that serves as the focus of our analysis in this study.

Specifically, data for this research include videotapes and transcripts of two individual interviews with each teacher from each video club group. The first interview took place before the first video club meeting and the second interview took place following the final video club meeting. In the interviews, teachers viewed two or three 2–5 minute long video segments of mathematics lessons from elementary classrooms.³ The segments came from published, research-based professional development programs. The

¹ The names of the schools and the teachers are pseudonyms.

² The authors participated as both researchers and facilitators of the Mapleton Video Club. In this way, we were participant observers (Spradley, 1980) in this video club group. Although some may argue that participating so intimately in the research process threatens the validity of the research, we adopt Peshkin's perspective (1988) that no research is completely objective. In fact, we believe that participating actively in the video club enabled us to understand, in an in-depth way, the range of factors that come into play as teachers examine their practice through video.

segments illustrated a variety of classroom activity structures, including student group work, whole class discussions, and student presentations at the board. In addition, each segment portrayed students explaining their mathematical thinking. Both the teacher and the students were visible in each clip.

Upon viewing each clip, the teachers were asked to respond to the prompt, "What do you notice?" After the teachers responded to this question, the researcher asked repeatedly, "Is there anything else you noticed?", until the teachers responded that they had nothing else to say. The same segments were viewed in the pre- and post-interviews.

Data Analysis

Qualitative methods, based primarily on fine-grained analyses of videotapes (Schoenfeld, Smith, & Arcavi, 1993), were used to examine the teachers' analyses of the video segments shown in the interviews. To analyze teacher learning, we focused on the two key aspects of noticing described earlier: *what* the teachers chose to attend to in the video and *how* they reasoned about those events (Hughes, Packard, & Pearson, 2000). More specifically, *what* teachers attend to was examined through two dimensions, the Agent and the Topic that the teachers identified. Agent refers to *whom* they noticed in the clip, the Student, the Teacher, or Other. In this category, Other may refer to a comment teachers made about curriculum designers or school administrators. Topic refers to *what* the teachers noticed. Drawing on Frederiksen, Sipusic, Sherin, and Wolfe (1998), we used the categories of Mathematical Thinking, Pedagogy, Climate, and Management. Mathematical Thinking refers to mathematical ideas and understandings. Pedagogy refers to techniques and strategies for teaching the subject matter. Climate refers to the social environment of the classroom (e.g. "The teacher treated all the students fairly" or "It seemed like the students really liked that activity"), and Management refers to statements about the mechanics of the classroom (e.g. "The students were behaving well while working in groups" or "The teacher did a nice job handling that disruption").

Two additional dimensions were used to examine *how* teachers reason about the events they noticed, the Stance and Focus they adopted in their analysis. In particular, Stance considers the position the teachers adopted to analyze practice (Describe, Interpret, or Evaluate). Describe refers to statements that recounted the events that unfolded in the clip. Evaluate refers to statements that were judgmental in nature, in which the teachers commented on what was good or bad or could or should have been done differently. Interpret refers to statements in which the teachers made inferences about what they noticed, with the intent of explaining what happened and why. The fourth dimension, Focus, is somewhat different than the others, in that it applies to each of the previous three dimensions. Specifically, Focus is concerned with whether a teacher's comments in a particular dimension were dominated by a single category (a Narrow perspective) or whether the teacher considered multiple categories within a single dimension (a Broad perspective). Table 1 summarizes these four analytic categories.

There were three phases to this analysis. In the first phase, the interviews were transcribed. Next, two researchers jointly chunked the transcripts based on when the teachers raised a new issue about the video segment they viewed. We call these chunks "segments." This method is similar to Jacobs and Morita's (2002) notion of dividing a transcript into "idea units." Any points of disagreement were discussed until consensus was reached.

Table 1: Dimensions of Analysis for Teacher Noticing

Dimensions of Analysis	Description of Dimension	Categories within Dimension
Agent	Whom is identified	Student, Teacher, Other
Topic	What topic is discussed	Mathematical Thinking, Pedagogy, Climate, Management
Stance	How event is analyzed	Describe, Evaluate, Interpret
Focus	Whether comments relate predominantly to one or more categories	Broad perspective, Narrow perspective (applied to each dimension)

In the second phase of analysis, two researchers independently coded each segment along the three dimensions of Agent, Topic, and Stance. Overall inter-rater reliability was 81%. Any differences between the two coders were discussed and resolved through consensus. Based on this analysis, a table was created indicating the number and percent of segments within each category for each teacher. This was completed for both the pre- and post-interviews. The percentages were then examined to identify differences in teachers' analyses of classroom interactions from the pre-interview to the post-interview. This information is provided in Appendix A (page 134) for the Mapleton Video Club and in Appendix B (page 135) for the Wells Park Video Club.

The goal of the third phase of analysis concerned the dimension of Focus, whether teachers had a Broad or Narrow perspective on the dimension of Agent, the dimension of Topic, and the dimension of Stance. To do this, we used the percentages provided in Appendices A and B to identify whether a teacher had a single primary focus or had multiple foci within each dimension. Specifically, when one of the percentages within a dimension was greater than 50%, then the dimension was coded as Narrow. For example, a teacher who made 75% of the comments about the teacher and 25% about the student, was considered to have a Narrow perspective on the Agent dimension. A teacher who made 40% of her comments about the student, 35% about the teacher, and another 25% coded as other (e.g. curriculum developers) had multiple foci, what we call a Broad perspective.⁴

In the previous phase of analysis, we used the percentages of teacher comments to understand the specific categories on which the teachers focused their analyses in each dimension. In this stage, the Broad and Narrow characterizations serve a different purpose: to make clear if teachers tended to notice a single category, regardless of which one, within a dimension, or if they were more varied in the kinds of events they noticed. This approach provided us with a common window that could be used to look at teachers' noticing across all three dimensions of Agent, Topic, and Stance.

Results

In this section, we present the results of the data analysis by examining teachers' foci on the three dimensions described above. This is followed by a discussion of how the video club designs may have influenced the teachers' noticing over time. To begin, analysis of the data suggests that participants in both video clubs came to look at classroom interactions in new ways over time. However, there were important differences between

³ The teachers in the Mapleton Video Club viewed and discussed three clips, while those in the Wells Park Club viewed and discussed two clips. Both groups viewed clips highlighting number patterns and the concept of division. The Mapleton group also viewed a clip that illustrated the mathematical topics of area and perimeter.

⁴ In the case where a teacher's comments in one category were greater than 50%, but the teacher's comments in a second category were within 10% of that amount, the teacher's perspective was still considered Broad. For example, if 55% of comments were focused on the teacher and 45% were focused on the student, then the teacher would be characterized as having a Broad perspective on Agent.

Table 2: Pre-Interview: Dimension of Agent

Mapleton Video Club: Pre-Interview		Wells Park Video Club: Pre-Interview	
Teacher	Agent	Teacher	Agent
Daniel	Broad: Student/Teacher	Brad	Narrow: Teacher
Drew	Narrow: Student	Brenda	Narrow: Student
Elena	Narrow: Student	Carol	Narrow: Teacher
Frances	Narrow: Student	Don	Narrow: Student
Linda	Narrow: Teacher	Melinda	Narrow: Student
Wanda	Narrow: Student	Sandra	Narrow: Student
Yvonne	Narrow: Student		

Table 3: Pre-Interview: Dimension of Topic

Mapleton Video Club: Pre-Interview		Wells Park Video Club: Pre-Interview	
Teacher	Topic	Teacher	Topic
Daniel	Broad	Brad	Broad
Drew	Narrow: Mathematical Thinking	Brenda	Broad
Elena	Broad	Carol	Broad
Frances	Broad	Don	Broad
Linda	Broad	Melinda	Broad
Wanda	Narrow: Climate	Sandra	Broad
Yvonne	Broad		

the two groups in the changes that took place. Specifically, the teachers in the Mapleton Video Club developed a uniform perspective in their analysis of video, one that was generally more narrow and focused than the teachers' initial perspective for analyzing video. In contrast, the teachers in the Wells Park Video Club maintained diverse perspectives for analyzing video. Furthermore, these perspectives, for the most part, were broader in scope than that of the Mapleton Video Club.

Teachers' Initial Approach to Viewing Video

Analysis of the pre-interview data reveals that both groups of teachers initially made similar types of comments when discussing classroom interactions viewed on video. For example, first consider the ways that the teachers' discussed the dimension of Agent, that is, who in the video stood out to the teachers. (See Table 2.) Across both video club contexts, all but one teacher had a Narrow perspective. In other words, the teachers generally saw a single agent as key in the video excerpt. Furthermore, among both groups, the majority of participants attended to the student in the video, though there were some participants who attended to the teacher.

Next, consider the topics that the teachers mentioned in the pre-interviews. (See Table 3.) Eleven of the thirteen teachers had a Broad perspective on this dimension of analysis, discussing several topics rather than primarily only one topic. Upon a closer inspection, however, an interesting difference was apparent. Specifically, if we rank order the topics of mathematical thinking, pedagogy, and climate, we find quite a

Table 4: Pre-Interview: Dimension of Stance

Mapleton Video Club: Pre-Interview		Wells Park Video Club: Pre-Interview	
Teacher	Stance	Teacher	Stance
Daniel	Narrow: Describe	Brad	Broad
Drew	Narrow: Describe	Brenda	Narrow: Interpret
Elena	Broad	Carol	Narrow: Interpret
Frances	Broad	Don	Broad
Linda	Broad	Melinda	Broad
Wanda	Broad	Sandra	Narrow: Interpret
Yvonne	Broad		

variety among the eleven teachers in terms of the relative significance of these topics. For example, Brad discussed mathematical thinking most frequently, followed by pedagogy, and then climate. (See Appendix B.) In contrast, Don made the majority of comments about climate, followed by pedagogy, and then mathematical thinking. (See Appendix B.) This variety is evident both in the Mapleton Video Club group and across the Wells Park Video Club participants. Although the majority of teachers adopted this Broad perspective, this was not exclusively the case in the Mapleton Video Club. In that context, two teachers had a Narrow perspective on the dimension of Topic; Yvonne primarily examined issues of climate and Drew primarily examined issues of mathematical thinking.

Finally, on the dimension of Stance, we see that some teachers in each video club context had a Narrow perspective while others had a Broad viewpoint. (See Table 4.) Interestingly, the two teachers in the Mapleton Video Club who had a Narrow perspective both described what they noticed in the video excerpts. In contrast, the three teachers in the Wells Park Video Club who had a Narrow perspective to Stance all interpreted what they noticed, that is, they attempted to draw inferences and conclusions from what they saw in the video.

As shown here, the teachers in both video clubs began with fairly similar perspectives for analyzing classroom video. They adopted a Narrow perspective for discussing the Agent in the video, generally had a Broad perspective on the dimension of Topic, and finally, the teachers used different Stances to discuss the video excerpts. With this understanding of the teachers' initial perspective to viewing video, we are now in a position to consider changes in the teachers' analyses of video over time. Specifically, using data from the post-interviews, we consider changes that occurred for participants in each of the video club contexts and explore differences in these changes between the two video club groups.

A Shift in Noticing: Mapleton Video Club

To begin, we examine the post-interview data from the Mapleton Video Club. This analysis reveals that the teachers became more focused in their comments along all three dimensions of Agent, Topic, and Stance, from the pre- to the post-interview. (See Table 5.) Overall, the teachers came to emphasize the students in the clips, directed most of their comments to issues of mathematical thinking, and adopted a more interpretive stance. For a more detailed summary of the individual teachers' analyses of the video segments in the pre- and post-interview, see Appendix A.

In terms of Agent, as mentioned previously, six of the seven teachers had a Narrow perspective in the pre-interview, with five of the six focusing their comments on the students in the clips, and one teacher, Linda, directing her comments to the teacher in the clips. The remaining teacher, Daniel, had a Broad viewpoint in the pre-interview, noticing both the students and the teacher in the clips almost equally. In the post-interview, however, all of the teachers' exhibited a Narrow perspective, attending primarily to the student. While this represented a considerable shift for Linda and Daniel, those teachers who attended primarily to the student

in the pre-interview commented on this agent to a greater degree in the post-interview. For example, in the pre-interview 54% of Frances' comments focused on the student. In the post-interview 80% of her comments now concerned the student.

Second, on the dimension of Topic, five of the seven of teachers had a Broad perspective early on, noticing a range of topics. In the post-interview, four of these five teachers' comments narrowed in scope, and they commented primarily on issues of mathematical thinking. Although Elena maintained a Broad perspective, she too increased her comments on mathematical thinking. (See Appendix A).⁵ The two other teachers adopted a Narrow perspective in the pre-interview; Yvonne focused on climate and Drew attended to issues of mathematical thinking. In the post-interview, these teachers maintained a Narrow perspective. Yvonne's comments shifted to focus on mathematical thinking, and Drew increased in the percentage of comments he made about this topic. In sum, the data illustrates that, over time, all of the participants in the Mapleton Video Club developed a uniform, Narrow perspective in terms of the Topic they attended to in the post-interview.

Finally, the teachers also shifted on the dimension of Stance, generally becoming much more interpretive in the post-interview. Specifically, in the pre-interview, the perspective of five of the seven teachers on the dimension of Stance were Broad in nature, as they described, evaluated, and interpreted what they noticed. In the post-interview, in contrast, four of these teachers were now coded as having a Narrow perspective to Stance. Furthermore, in all four cases, this Narrow perspective emphasized interpreting the events that they noticed. Only Frances maintained a Broad stance from the pre- to the post-interview. However, we note that in the pre-interview most of her comments were descriptions or evaluations of what she noticed, while in the post-interview, she interpreted what she noticed the most frequently.

In the case of the two teachers who adopted a Narrow perspective to Stance in the pre-interview, these teachers both broadened in their perspective to Stance in the post-interview. Still, like Frances, a closer examination of the data reveals that although none of their comments were more than 50% in a particular category, the greatest percentage of their comments were interpretive in nature. This was not the case for either teacher in the pre-interview, as they both described and evaluated what they noticed more early on. These results suggest that although not all of the teachers narrowed on the dimension of Stance, they all interpreted the events they noticed more in the post-interview than they did in the pre-interview. In sum, the teachers in the Mapleton Video Club appeared to narrow in their noticing on all three dimensions, developing a uniform focus on interpreting students' mathematical thinking. To be clear, by claiming that the Mapleton participants adopted a *narrow* perspective

Table 5: Mapleton Video Club Teachers' Overall Analytic Focus in the Pre- and Post- Interview

Teacher	Agent		Topic		Stance	
	Pre	Post	Pre	Post	Pre	Post
Linda	Narrow (Teacher)	Narrow (Student)	Broad	Narrow (Math Thinking)	Broad	Narrow (Interpret)
Elena	Narrow (Student)	Narrow (Student)	Broad	Broad	Broad	Narrow (Interpret)
Wanda	Narrow (Student)	Narrow (Student)	Broad	Narrow (Math Thinking)	Broad	Narrow (Interpret)
Daniel	Broad	Narrow (Student)	Broad	Narrow (Math Thinking)	Narrow (Describe)	Broad
Frances	Narrow (Student)	Narrow (Student)	Broad	Narrow (Math Thinking)	Broad	Broad
Yvonne	Narrow (Student)	Narrow (Student)	Narrow (Climate)	Narrow (Math Thinking)	Broad	Narrow (Interpret)
Drew	Narrow (Student)	Narrow (Student)	Narrow (Math Thinking)	Narrow (Math Thinking)	Narrow (Describe)	Broad

Table 6: Wells Park Video Club Teachers' Overall Analytic Focus in the Pre- and Post- Interview

Teacher	Agent		Topic		Stance	
	Pre	Post	Pre	Post	Pre	Post
Brad	Narrow (Teacher)	Broad	Broad	Broad	Broad	Broad
Brenda	Narrow (Student)	Narrow (Teacher)	Broad	Broad	Narrow (Interpret)	Narrow (Describe)
Carol	Narrow (Teacher)	Narrow (Student)	Broad	Narrow (Climate)	Narrow (Interpret)	Broad
Don	Narrow (Student)	Broad	Broad	Broad	Broad	Narrow (Describe)
Melinda	Narrow (Student)	Broad	Broad	Narrow (Climate)	Narrow (Interpret)	Broad
Sandra	Narrow (Student)	Broad	Broad	Broad	Broad	Broad

in their analyses, we do not mean to suggest that they became limited in their noticing. Instead, we use the term to emphasize that these teachers developed the ability to focus closely on particular events and to investigate them in a deep way.

A Shift in Noticing: Wells Park Video Club

The teachers in the Wells Park Video Club also developed new perspectives for commenting on the video excerpts from the pre- to the post-interviews. However, in contrast to the Mapleton Video Club, the Wells Park group did not adopt a uniform perspective for viewing video over time. Instead, the teachers exhibited a range of different perspectives both in the pre- and in the post-interviews. (See Table 6.) For a more detailed summary of the individual teachers' analyses of the video segments in the pre- and post-interview, see Appendix B.

On the dimension of Agent, recall that all six teachers began with a Narrow perspective, in which four of the teachers attended to the student and two attended to the teacher in the video. In the post-interview, in contrast, four of the teachers now had a Broad perspective on the dimension of Agent, commenting on both the students and the teacher. The

⁵ To be clear, Elena's perspective on topic is characterized as Broad in the post-interview because none of her comments on any one topic exceed 50%.

other two teachers maintained a Narrow focus on the dimension of Agent. However, in both cases, these teachers switched the agent that was the focus of their comments. For example, Carol initially emphasized the teacher in the video, but in the post-interview, she primarily commented on the students. In this way, all six of the Wells Park participants exhibited a new perspective, broadening on the dimension of Agent in their analyses.

In terms of Topic, the six teachers began with a Broad perspective, commenting on multiple issues related to mathematical thinking, pedagogy, climate, and management. Analysis of the post-interviews reveals that four of the teachers maintained this Broad perspective. Interestingly, however, all four of these teachers shifted in the relative order of the different topics to which they attended. For instance, although Brad initially emphasized mathematical thinking (50%), pedagogy (28%), and climate (11%), in that order, in the post-interview he attended to climate (46%), pedagogy (30%), and mathematical thinking (16%).⁶

In contrast, two of the Wells Park teachers became more focused in their comments on the dimension of Topic, illustrating a Narrow perspective in the post-interview. Yet although their comments in the category of climate increased to more than 50%, both teachers also began to comment on issues in topic areas that had not been addressed in the pre-interview. Specifically, Carol raised issues related to management, and Melinda commented on watching classroom video excerpts, conducting a sort of "meta-analysis" of her thinking that was coded as "other." Thus, as on the dimension on Agent, the Wells Park teachers adopted new perspectives for analyzing video when considering the dimension of Topic. To be clear, these perspectives differed from teacher to teacher, yet in each case, they appeared to broaden in their analyses as they attended to new aspects of the video excerpts that were shown.

Finally, on the dimension of Stance, the Wells Park participants used a variety of positions in the pre-interview. Three of the six teachers had a Broad perspective, describing, evaluating, and interpreting what they noticed. Furthermore, the relative ranking of these three categories differed among these teachers. The remaining three teachers had a Narrow perspective, all of which emphasized interpretations of what took place on the video. In the post-interview, a similar variety was apparent. Of the three teachers who began with a Broad perspective in terms of Stance, two remained Broad and one switched to a Narrow perspective with an emphasis on description. In addition, two of the three teachers who began with a Narrow perspective shifted to a Broad approach, with the remaining teacher moving from a Narrow perspective that emphasized interpretation to a Narrow perspective that emphasized descriptions of what was viewed on the video.

In sum, we find that the Wells Park participants shifted along the three dimensions from the pre-interviews to the post-interviews. More specifically, in those cases in which a teacher maintained a Narrow point of view, the predominant category shifted. Further, in those cases in which a teacher maintained a Broad perspective from the pre- to the post-interview, the relative frequency of the categories within the dimension generally changed. This suggests that the teachers developed new ways to comment on what they noticed in the video excerpts over time.

In addition, we found a variety of perspectives within the Wells Park group in the post-interviews, across the three dimensions. For example, on each dimension, some teachers were Narrow and others were Broad. Furthermore, even among those teachers who shared a Broad perspective, there were typically differences in the relative rankings of the different categories within a given dimension. This stands in sharp contrast with

the Mapleton Video Club, in which the participants generally developed a uniform approach to commenting on the video excerpts in the post-interview. Moreover, despite the fact that some Wells Park participants narrowed in each dimension, in comparison with the Mapleton Video Club, the Wells Park group had a much broader perspective for commenting on the video segments.

Discussion and Implications

The results described in the previous section illustrate that participants in both video clubs came to discuss classroom video segments in new ways over time. This suggests that video clubs can be a productive environment for helping teachers to develop novel approaches to examining and reflecting on classroom interactions. This is a noteworthy result given the importance that current educational reforms place on teacher learning and increased reflection (Knapp, 2003; Putnam & Borko, 2000; Rodgers, 2002a).

In addition to finding that the participating teachers discussed the video excerpts in new ways from the pre- to the post-interviews, we identified fundamental differences between the changes that occurred in the Mapleton and Wells Park Video Clubs. Specifically, in the Mapleton Video Club group, the teachers' noticing became more focused, as they attempted to interpret students' mathematical thinking. In contrast, the Wells Park teachers adopted diverse perspectives to discussing the video segments, which were, overall, broader in scope than the perspective taken on by the Mapleton participants in the post-interviews. We claim that both kinds of changes are noteworthy. The narrowing of perspective that was apparent in the Mapleton participants reflects a key goal of mathematics education reform that teachers should pay close attention to students' ideas about mathematics (Arvola, Turner, & Cooney, 1996; Ball, 1997; National Council of Teachers of Mathematics, 2000). At the same time, other researchers emphasize the importance of having teachers attend to multiple perspectives on teaching and learning, as did the participants in the Wells Park Video Club (Thomas, Wineburg, Grossman, Oddmund, & Woolworth, 1998). This approach can help teachers make connections across various aspects of their practice (Seago, 2002). In sum, although the teachers in the two video clubs adopted different perspectives for video analysis, both approaches are valued by current research.⁷

Before examining the design features that may have influenced learning, we want to address an important issue with respect to the results of the teachers who participated in the Mapleton Video Club. One may argue that it is not surprising that the teachers in the Mapleton Video Club came to attend to students' mathematical thinking, as the meetings were designed to help them do just that. However, previous research shows that teachers do not always respond to the goals of professional development and that it is difficult for teachers to maintain changes over time (Cohen, 1990). Thus, our findings are important as they reveal that professional development can influence teachers' thinking. An essential question to consider is what about the design features may have influenced teachers in adopting new ways of analyzing classroom interactions. We now turn to consider this issue.

The Influence of the Video Club Design

In examining the differences in teacher learning between the two video clubs, it seems that the particular video club designs likely played a significant role in influencing the changes that took place. Here, we consider three aspects of the designs as a way to investigate this issue. Specifically, we will discuss (a) the artifacts used in each video club, (b) the role of the facilitator, and (c) the program format.

⁶ In both the pre- and the post-interview, Brad also commented on his views concerning watching classroom videos. These comments were coded as "Other." For this reason, the sums of the percents provided do not add up to 100. See Appendix B for more information.

⁷ Although it might seem like a contradiction that research advocates both a narrowing and a broadening of what teachers notice in classroom interactions, we claim that this is not the case. Instead, there are a variety of components of teacher expertise, including both the ability to focus closely on a specific event as well as the ability to notice significant features across a range of interactions.

First, we consider the artifacts used in the video clubs. By artifacts we refer to the materials available to the teachers. Prior research argues that such tools can have a strong influence on the interactions within a group of people (Cole & Engestrom, 1993). In the case of a video club, a central artifact is the video segments shown in the meetings. Yet the clips shown in the Mapleton and Wells Park video clubs differed in fundamental ways. Specifically, all of the clips selected for viewing in the Mapleton Video Club shared a common focus on student mathematical thinking. Though the clips illustrated students discussing their ideas in both whole class and small group formats, mathematics was the relevant subject matter in all the clips and each clip illustrated one or more students explaining their ideas about this subject.

In contrast, the clips selected for viewing in the Wells Park Video Club varied greatly from clip to clip. Not only were the subject matters of the clips different (e.g., music, language arts, mathematics, physical education), the role of the students differed from clip to clip. In some cases, students were sharing ideas as they did in the clips shown in the Mapleton Video Club meetings. In other cases, however, student thinking was less central and the clips focused instead on a specific pedagogical technique, such as conducting a brainstorming session with the class. To be clear, although the focus of the clips in the Wells Park meetings was not on students' mathematical thinking, they did embody substantive issues of teaching and learning.

Not surprisingly, we hypothesize that the salience of the students and the mathematics in the Mapleton clips was a key factor in prompting teachers to focus on this Agent and Topic. Similarly, the fact that the Wells Park group viewed diverse clips may have helped these teachers to maintain a range of approaches for analyzing classroom interactions, particularly in terms of the Agent and Topic of focus.

Another artifact to consider is the transcripts of the video segments. Unlike the Wells Park Club, the Mapleton teachers had transcripts of the clips they viewed available during the meetings. The teachers often referred to these transcripts to review precise comments made by the teacher or students in the video. It seems possible, then, that the transcripts facilitated the teachers' ability to closely explore the interactions that appeared on the video. Future research is needed to examine the extent to which a transcript mediates the ways that teachers examine video over time and, in particular, whether being able to refer to a transcript helps teachers to narrow in their video analyses.

Second, we consider the role of the participants in the video club. Research has shown that members of a social group typically do not all participate in the same way, and that instead, individuals often take on a range of roles and duties within a given group (Lave & Wenger, 1991). Along these lines, research also illustrates that specific key roles can have a strong effect on the interaction of the group as whole (Cohen, 1994). In the case of a video club, we consider the role of the facilitator to be such a position. This is of particular interest in this study because the Mapleton and Wells Park video clubs utilized different types of facilitation.

In the Mapleton Video Club, a researcher served as facilitator and encouraged the participants to comment on the students' ideas and to interpret, in a detailed way, the mathematics that were apparent in the video segments. In doing so, the facilitator may have directly fostered the narrowing of the teachers' perspective toward a particular Agent, Topic, and Stance. The Wells Park Video Club, in contrast, did not have a single facilitator who used a consistent approach to elicit participants' comments. Instead, each teacher took a turn as facilitator for one meeting, setting the agenda for that meeting and guiding the discussion that ensued. For example, one teacher asked the group to look at whether students in the video were working cooperatively or not. Another teacher asked the group

for feedback concerning how she might have improved the videotaped lesson on editing stories. Both of these teachers repeatedly prompted the other participants to respond to these topics. There were other instances, however, when a teacher who was serving as facilitator allowed the conversation to veer from his or her intended topic so that the group could explore a range of issues. We suspect that the diverse array of goals put forth by the Wells Park facilitators, as well as the different facilitation styles, were critical to maintaining the variety of approaches that were apparent in these teachers' responses during the post-interview.

Third, we discuss the format of the two video clubs. Prior research has shown that a variety of contextual and organizational features of teachers' professional development can influence the effectiveness of such programs (Gamoran et al., 2003). For that reason, here we explore whether differences in program format may have influenced how the teachers came to analyze video in the post-interviews.

Along several aspects, the structure of the two video clubs looked quite similar. Both groups were comprised of teachers from a single school, and in both cases, the video clubs were initiated by school administrators rather than by the teachers themselves. Furthermore, both sets of meetings generally lasted approximately one hour. In addition, the length of the video clips viewed during the meetings was also about the same, typically five minutes in length.

A key difference, however, was in the total time span of the two video clubs. The Mapleton Video Club occurred over seven months, while the Wells Park group met over a six-week period. Moreover, the Mapleton group met for a total of 10 times, while the Wells Park teachers had only six meetings together. It seems possible that it simply takes more time for a group of teachers to develop a uniform focus for viewing video. In other research, however, we studied a video club similar to the Mapleton Club in that it focused on students' mathematical thinking, yet it took place over the course of two months for a total of eight meetings (Sherin, 1996). We found that the teachers in that video club exhibited changes similar to that of the Mapleton participants. Therefore, we do not believe that the difference in the length of time or number of meetings between the two clubs was the cause for the differences we report.

In this paper, we sought to understand how teachers came to discuss video segments after participating in one of two video clubs. We then considered key aspects of the design of the two groups in order to explore what might have influenced differences that we observed. In particular, we suggest that the types of artifacts used in the video clubs, as well as, the role of the facilitator may serve as key catalysts for changes in teachers' noticing. Additional research is needed to investigate these issues more carefully.

Three Caveats

Before concluding, we want to address three concerns that readers may have. Although we established previously that the Mapleton and Wells Park participants commented on video in similar ways during the pre-interviews, one might expect that differences in the teachers' knowledge and experiences would influence how their comments change over time. For instance, one might predict that whether a teacher is a novice or veteran would influence how that teacher came to analyze videos in the video club and subsequently, in the video interview. In fact, our analysis shows that veteran teachers in both groups adopted a more narrow and focused perspective to their video analyses in the post-interview than they did in the pre-interview.⁸ Interestingly, however, the novice teachers in the Mapleton Video Club also became more focused in their analyses, though this was not the case for the novice teachers in the Wells Park Video

⁸ We acknowledge that the veteran teachers in the Wells Park Video Club had more than 50% of their segments in one category within a dimension, suggesting they had a Narrow perspective. However, these veteran teachers generally switched the categories on which they focused, illustrating a new approach to analyzing video in the post-interview setting.

Club. This suggests that it might be less difficult for veteran teachers, on average, to narrow in their analyses, though it is also possible for novice teachers to do so given the appropriate context.

Similarly, one might expect that whether a teacher typically taught mathematics would influence his or her comments in the interviews, as all of the video segments shown in the interviews were from mathematics classes. In particular, we might assume that one who teaches mathematics has greater knowledge of the subject matter or at the very least, greater familiarity with methods of teaching mathematics. Yet in examining how the three "specials" teachers from the Wells Park Video Club (who taught Spanish, physical education, and music exclusively) analyzed the video segments, we did not find differences from their peers' analyses. Specifically, the classroom teachers in the Wells Park Video Club maintained a broad perspective to analyzing video in the post-interview, as did those who did not teach mathematics. This suggests that the teachers' experiences in the club meetings may have had a strong influence on the ways the teachers analyzed video in the post-interview context, more so than the particular subject matter that they typically taught.

Second, an important issue to consider is the feasibility of the two video club approaches. As described here, the Mapleton Video Club depended on outsiders to videotape instruction, select video clips, prepare transcripts, and facilitate the meetings. Such reliance on outside resources is likely not a realistic model if a school wants to maintain a video club over a long period of time. In contrast, the Wells Park Video Club was sustained by the participants themselves. Clearly, there is also a cost to this insider approach. In particular, participating teachers have to videotape their instruction and select clips to show their colleagues prior to the meetings. However, with the advent of portable digital video cameras, the videotaping process itself is not overly burdensome. In addition, the ability to easily digitize videotaped lessons allows teachers easy access to any point in the video. This access can greatly simplify the time and effort needed to select a particular clip to share. Thus, advances in technology appear to support the feasibility of the Wells Park Video Club model.

Finally, the results of this study are drawn solely from the interview data. However, to make claims that the teachers changed in what they noticed in classroom interactions, it is important to also examine the ways in which the teachers discuss the video excerpts *during the video club meetings*. Such research would investigate how the teachers came to examine video in new ways over time and would identify critical moments in the clubs that influenced the shifts observed in both groups of teachers. These results would then be used to inform the design of various models of video-based professional development that are meaningful and productive for teachers. Similarly, future research is needed to examine the influence that learning to notice classroom interactions in new ways in the video club has on teachers' classroom practices. In particular, it would be interesting to investigate the relationship between the video club design and resulting changes in teachers' instruction. We believe that the research reported here takes an important first step by introducing key dimensions along which teachers discuss video excerpts, by comparing changes observed in the interview setting, and by examining how the two different video club designs may have influenced these changes.

Acknowledgements

This research is supported by the National Science Foundation under Grant No. REC-0133900. The opinions expressed are those of the authors and do not necessarily reflect the views of the supporting agency. The authors wish to thank Eli Tucker-Raymond and the teachers who participated in this study.

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Elizabeth van Es is a postdoctoral fellow at Northwestern University. Her research interests include teacher thinking and learning and the design of professional development. Specifically, she investigates how teachers learn to examine classroom interactions in new ways through viewing and discussing video records of practice. In addition, she studies how professional development contexts influence teacher learning. As of July 1, 2006, Elizabeth will be an assistant professor in the Department of Education at the University of California—Irvine.

Elizabeth A. van Es
Annenberg Hall, Room 335
2120 Campus Drive
Evanston, IL 60208
Phone: 847.467.2352
van-es@northwestern.edu

After July 1, 2006:
Elizabeth A. van Es
UCIrvine Department of Education
2001 Berkeley Place
Irvine, CA 92697-5500
Phone: 949.824.5117

Miriam Gamoran Sherin is an associate professor in the School of Education and Social Policy at Northwestern University. Her research interests include mathematics teaching and learning, teacher cognition, and the role of video in supporting teacher learning. At Northwestern, she teaches courses in teacher cognition, action research, and methods of teaching mathematics and science.

Miriam Gamoran Sherin
Annenberg Hall
Room 313
2120 Campus Drive
Evanston, IL 60208-0001
Phone: (847.467.3990
Fax: 847.491.8999
msherin@northwestern.edu

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Appendix A: Mapleton Video Club - Individual Teachers' Comments in the Pre- and Post-Interview

Teacher	Agent	Pre	Post	Topic	Pre	Post	Stance	Pre	Post
Linda	Student	(6) 38%	(14) 67%	Math Thinking	(6) 38%	(14) 67%	Describe	(5) 31%	(5) 24%
	Teacher	(10) 62%	(7) 33%	Pedagogy	(5) 31%	(3) 14%	Evaluate	(8) 50%	(5) 24%
	Other	(0) 0%	(0) 0%	Climate	(5) 31%	(3) 14%	Interpret	(3) 19%	(11) 52%
				Management	(0) 0%	(0) 0%			
				Other	(0) 0%	(1) 5%			
Elena	Student	(14) 78%	(12) 80%	Math Thinking	(5) 28%	(7) 47%	Describe	(7) 39%	(6) 40%
	Teacher	(4) 22%	(3) 20%	Pedagogy	(4) 22%	(3) 20%	Evaluate	(3) 17%	(1) 7%
	Other	(0) 0%	(0) 0%	Climate	(9) 50%	(5) 33%	Interpret	(8) 44%	(8) 53%
				Management	(0) 0%	(0) 0%			
				Other	(0) 0%	(0) 0%			
Wanda	Student	(10) 63%	(9) 75%	Math Thinking	(5) 31%	(9) 75%	Describe	(5) 31%	(2) 17%
	Teacher	(5) 31%	(3) 25%	Pedagogy	(5) 31%	(1) 8%	Evaluate	(6) 38%	(2) 17%
	Other	(1) 6%	(0) 0%	Climate	(5) 31%	(2) 17%	Interpret	(5) 31%	(8) 66%
				Management	(0) 0%	(0) 0%			
				Other	(1) 7%	(0) 0%			
Daniel	Student	(22) 48%	(19) 73%	Math Thinking	(8) 17%	(22) 85%	Describe	(25) 54%	(8) 31%
	Teacher	(21) 46%	(7) 27%	Pedagogy	(8) 17%	(2) 7%	Evaluate	(11) 24%	(7) 27%
	Other	(3) 6%	(0) 0%	Climate	(23) 50%	(1) 4%	Interpret	(10) 22%	(11) 42%
				Management	(3) 7%	(0) 0%			
				Other	(4) 9%	(1) 4%			
Frances	Student	(7) 54%	(12) 60%	Math Thinking	(3) 23%	(13) 65%	Describe	(5) 38%	(7) 35%
	Teacher	(6) 46%	(7) 35%	Pedagogy	(4) 31%	(3) 15%	Evaluate	(5) 38%	(5) 25%
	Other	(0) 0%	(1) 5%	Climate	(5) 38%	(4) 20%	Interpret	(3) 24%	(8) 40%
				Management	(0) 0%	(0) 0%			
				Other	(1) 8%	(0) 0%			
Yvonne	Student	(17) 74%	(20) 80%	Math Thinking	(5) 22%	(17) 68%	Describe	(10) 44%	(6) 24%
	Teacher	(5) 22%	(2) 8%	Pedagogy	(4) 17%	(3) 12%	Evaluate	(4) 17%	(3) 12%
	Other	(1) 4%	(3) 12%	Climate	(13) 57%	(5) 20%	Interpret	(9) 39%	(13) 64%
				Management	(0) 0%	(0) 0%			
				Other	(1) 4%	(0) 0%			
Drew	Student	(12) 63%	(18) 72%	Math Thinking	(9) 47%	(18) 72%	Describe	(12) 63%	(12) 48%
	Teacher	(7) 37%	(6) 24%	Pedagogy	(3) 16%	(2) 8%	Evaluate	(5) 26%	(2) 8%
	Other	(0) 0%	(1) 4%	Climate	(7) 37%	(4) 16%	Interpret	(2) 11%	(11) 44%
				Management	(0) 0%	(0) 0%			
				Other	(0) 0%	(1) 4%			

Note: Values in parenthesis indicate the number of comments made in a particular category. The percentages follow.

Appendix B: Wells Park Video Club - Individual Teachers' Comments in the Pre- and Post-Interview

Teacher	Agent	Pre	Post	Topic	Pre	Post	Stance	Pre	Post
Braci	Student	(7) 39%	(6) 46%	Math Thinking	(9) 50%	(2) 16%	Describe	(9) 50%	(6) 46%
	Teacher	(10) 55%	(6) 46%	Pedagogy	(5) 28%	(4) 30%	Evaluate	(2) 11%	(2) 16%
	Other	(1) 6%	(1) 8%	Climate	(2) 11%	(6) 46%	Interpret	(7) 39%	(5) 38%
				Management	(0) 0%	(0) 0%			
				Other	(2) 11%	(1) 8%			
Brerda	Student	(15) 58%	(5) 31%	Math Thinking	(8) 31%	(4) 25%	Describe	(6) 23%	(9) 56%
	Teacher	(11) 42%	(11) 69%	Pedagogy	(3) 12%	(1) 6%	Evaluate	(4) 15%	(2) 13%
	Other	(0) 0%	(0) 0%	Climate	(13) 50%	(5) 31%	Interpret	(16) 61%	(5) 31%
				Management	(0) 0%	(0) 0%			
				Other	(2) 7%	(6) 38%			
Carol	Student	(6) 38%	(8) 57%	Math Thinking	(6) 38%	(0) 0%	Describe	(2) 13%	(7) 50%
	Teacher	(10) 62%	(5) 36%	Pedagogy	(4) 25%	(3) 22%	Evaluate	(5) 31%	(5) 36%
	Other	(0) 0%	(1) 7%	Climate	(5) 31%	(8) 57%	Interpret	(9) 56%	(2) 14%
				Management	(0) 0%	(1) 7%			
				Other	(1) 6%	(2) 14%			
Don	Student	(9) 64%	(9) 53%	Math Thinking	(3) 21%	(7) 41%	Describe	(6) 43%	(10) 59%
	Teacher	(5) 36%	(8) 47%	Pedagogy	(5) 36%	(3) 18%	Evaluate	(2) 14%	(1) 6%
	Other	(0) 0%	(0) 0%	Climate	(6) 43%	(7) 41%	Interpret	(6) 43%	(6) 35%
				Management	(0) 0%	(0) 0%			
				Other	(0) 0%	(0) 0%			
Melinda	Student	(11) 55%	(5) 46%	Math Thinking	(5) 25%	(1) 9%	Describe	(7) 35%	(4) 36%
	Teacher	(8) 40%	(2) 18%	Pedagogy	(3) 15%	(0) 0%	Evaluate	(2) 10%	(2) 18%
	Other	(1) 5%	(4) 36%	Climate	(10) 50%	(6) 55%	Interpret	(11) 55%	(5) 46%
				Management	(1) 5%	(0) 0%			
				Other	(1) 5%	(4) 36%			
Sandra	Student	(8) 56%	(8) 50%	Math Thinking	(4) 29%	(6) 38%	Describe	(7) 50%	(7) 39%
	Teacher	(3) 22%	(5) 31%	Pedagogy	(0) 0%	(3) 19%	Evaluate	(0) 0%	(6) 33%
	Other	(3) 22%	(3) 19%	Climate	(7) 50%	(5) 31%	Interpret	(7) 50%	(5) 28%
				Management	(1) 7%	(0) 0%			
				Other	(2) 14%	(2) 12%			

Note: Values in parenthesis indicate the number of comments made in a particular category. The percentages follow.