Examining the development of a teacher learning community: The case of a video club

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ARTICLE INFO

ABSTRACT

Learning communities have become a widespread model for teacher development. However, simply bringing teachers together does not ensure community development. This study offers a framework for the development of a teacher learning community in a video club. Qualitative coding of video data resulted in characterizing the evolution of the video club group as they collaboratively explored issues of teaching and learning that arose in each other's classrooms. The relationship between dimensions of the framework and how development on one feature interacts with development on another is discussed. The results inform the design of video-based learning environments for examining teaching practice.

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The last two decades in teacher education have seen an increasing emphasis for schools to create and sustain teacher learning communities (Hord, 1997; McLaughlin & Talbert, 2006). The idea is for teachers to come together for sustained periods of time to engage in collaborative inquiry around problems of practice and to jointly plan and reflect on teaching all in the service of improving student learning (Nelson, 2009; Servage, 2008). But many questions remain about how to create and sustain a professional community in which *learning* is the goal. Some of these concern how to organize and motivate groups of teachers to meet on a regular basis, how to define shared goals, how to facilitate teacher collaboration and who is responsible for this task, and how to focus teacher learning efforts on instruction and student learning. Other questions include what constitutes a learning community, how teacher, school and district leaders know when community has been established, and how to sustain the community's efforts for continued improvement over time. A decade ago, Grossman, Wineburg, and Woolworth (2001) argued that the term *community* was being used to describe all sorts of teacher groups, but there was little clarity on whether or not they developed into a community where learning was the goal. Ten years later, this problem remains. Terms like *teacher community* and *professional learning communities* (PLCs) are used so widely but it is unclear whether or not a community does in fact exist. Thus, more clarity is needed to understand what constitutes a learning

community, how members participate in these contexts, and how these groups develop over time.

The central purpose of this paper is to construct a framework for the development of a teacher learning community, using a video club as the context for the study. A video club is a professional development setting in which teachers come together for a sustained period of time to view and discuss video segments from participating teachers' classrooms (Sherin, 2007), similar to a *teacher study group* (Arbaugh, 2003) or *teacher inquiry group* (Hammerman, 1999). Viewing video with colleagues from each other's classrooms raises several issues related to the development of a learning community, such as establishing norms for substantive collaborative inquiry and ensuring that teachers feel safe sharing images of their work. With video being used widely in professional development (Sherin, 2004; Towers, 2007), it is important to examine how these contexts promote teachers jointly engaging in sustained analysis of teaching and learning. Thus, a framework is developed to characterize the evolution of a teacher learning community in this context and then used to illustrate the development of the video club group as they explored together issues of teaching and learning that arose in their classrooms.

1. Learning communities for professional development

There is international agreement that teacher learning communities promote individual and collective capacity and can lead to improved student learning (Borko, 2004; Scheerens, 2010; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006; Verbiest, 2011).

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Teacher learning communities provide an environment for long-term collaboration with colleagues, focusing on issues related to the day-to-day practice of teaching (Cochran-Smith & Lytle, 1999; Darling-Hammond & Sykes, 1999). Moreover, teacher participation in learning communities can impact both teacher and student learning, resulting in instructional improvement and success in school reform (Little, 2002; Louis & Marks, 1998). Moreover, Goddard, Goddard, and Tschannen-Moran (2007) found evidence that schools with greater levels of teacher collaboration can lead to gains in student achievement.

However, this model for teacher learning runs counter to more dominant forms of professional development. In both US and European contexts, for instance, professional development has typically come in the form of one-day workshops or short-term courses with an outside provider giving teachers information on a particular aspect of their practice (Sandholtz & Scribner, 2006; Verbiest, 2011; Villegas-Reimers, 2003; Webster-Wright, 2009). Teachers then return to the isolation of their classrooms and attempt to employ new techniques, often with little success (Cohen, 1990). Furthermore, this model does not encourage building relationships with colleagues to look in-depth and inquire into each other's practice (Wood, 2007). The question becomes how to design environments to bring teachers together on a regular basis to examine the particulars of their practice and how these settings support the development of a learning community for the participants.

Teacher learning communities can consist of small groups of teachers from the same grade level or department or across grade levels or departments, as well as larger groups of teachers within and across school districts or in online settings (Barab, MaKinster, & Scheckler, 2003; Grossman et al., 2001; Horn & Little, 2010; Little, 2002; McLaughlin & Talbert, 2001; Rosenholtz, 1989a; Wood, 2007). They can also have different goals for their work, such as developing pedagogical knowledge, learning content more deeply, or analyzing student work or district or state-wide assessment data (McLaughlin & Talbert, 2006). The group that is the focus of this study consisted of elementary teachers from the same school in the context of an after-school video club that sought to develop teachers' analysis of student thinking. Putnam and Borko (2000) explain the value of teachers "breaking set" (p. 6) of their daily teaching routines to explore their teaching together from different perspectives. This study focuses on the development of a teacher community where participants' own work was the object of analysis, yet took place outside the bounds of the regular school day.

To begin to examine the development of community, a review of the literature resulted in identifying three central features of teacher learning communities: Collegial and Collaborative Interactions, Participation and Discourse Norms for Productive Collaboration, and Focus of Activity on Teaching and Student Learning (see Table 1).

1.1. Collegial and collaborative interactions

The first feature is that interactions in learning communities are collegial and collaborative in nature (Servage, 2008; Wheelan & Tilin, 1999). Group members take responsibility for each other's growth and coordinate individual knowledge and expertise to advance the collective work of the group, what Lord (1994) refers to as "collective generativity" (p. 193). Drawing on group members' expertise, learning communities distribute the social and intellectual work and have a commitment to helping each other grow in their practice (Koellner-Clark & Borko, 2004). Through collaboration, relationships among members of the group are formed to develop and sustain the community (Stoll & Louis, 2007). Moreover, teachers recognize that there are differences in members' beliefs, knowledge, and practices, and they become resources for learning and a means to foster relationships among the group (Grossman et al., 2001). At the same time, members understand that they all have a role in raising questions and concerns for the group to explore and they need to work together to define a common mission for their work (Rosenholtz, 1989b). Ultimately, the community develops a group identity, with shared goals and interests, while at the same time supporting individual growth and development (Grossman et al., 2001; Rogoff, 1994; Rosenholtz, 1989a).

1.2. Participation and discourse norms for productive collaboration

A second feature is that participation and discourse norms are created and sustained for productive collaboration. Teacher learning communities develop a joint understanding of the norms of interaction. They learn to listen carefully to each other's ideas, rather than focusing solely on their own perspectives (Koellner-Clark & Borko, 2004). In addition, because differences exist among members, they develop strategies for navigating conflict among the group (Grossman et al., 2001). Just as differences in beliefs, knowledge, and practices become resources for learning, group members learn to be sensitive to these differences and develop inclusive norms for participation. Furthermore, discourse norms are established to foster inquiry into teaching for "productive conversations" (Borko, Jacobs, Eiteljorg, & Pittman, 2008, p. 421). Such conversations focus on issues of teaching and student learning, with teachers critically examining classroom interactions, collectively exploring ways to improve teaching, and supporting each other to change their practice (Skerrett, 2010). Lord (1994) refers to this type of conversation as "critical colleagueship" (p. 184), with teachers posing questions related to each other's teaching, probing each other's thinking, and using evidence to make claims about teaching and student learning. This research also emphasizes the need for creating safe social environments so that teachers can learn from constructive criticism and engage in productive *disequilibrium* through self-reflection, collegial dialogue, and on-going analysis of teaching practice and student learning (Lord, 1994; Skerrett, 2010). Additionally, Sztajn, Hackenberg, White, and Allexsaht-Snider (2007) discuss the importance of developing trust among group members, particularly between facilitators and participants of the professional development. Teachers feel vulnerable sharing their work (Rosenholtz, 1989b). Thus, participation and discourse norms need

Table 1
Central features of teacher learning communities.

Collegial and collaborative interactions	Participants develop sustained relationships and have a shared commitment to support each other's development.
	Conversations engage a wide range of participants, with leadership shifting among members of the group.
	Participants listen carefully to each other to understand each other's thinking.
Participation and discourse norms for productive collaboration	Conversations consist of participants raising questions and concerns and constructively pressing each other to explain and elaborate thinking, ideas, and perspectives. Discourse norms center on inquiry and evidence-based reasoning.
Focus of activity on teaching and learning	Activity is centered on sustained inquiry around teachers' practice that they make public to the group.
	The focus is on examining the particulars of teaching and student learning as it arises in their contexts.

to be created to help members become comfortable making their practice public and analyzing each other's teaching (Lieberman & Pointer Mace, 2010; Skerrett, 2010).

1.3. Focus of activity on teaching and student learning

The third theme is that the focus of activity is on teaching practice and student learning (Grossman et al., 2001; McLaughlin & Talbert, 2006; Rosenholtz, 1989a). In particular, the interactions center on inquiry and reflection with evidence from teacher practice used to draw conclusions about the impact of teaching on student learning (Jaworski, 2006; Nelson, Slavit, Perkins, & Hathorn, 2008; Rodgers, 2002). Additionally, the site for investigation is teachers' classroom practice, the authentic contexts of their work (Servage, 2008). Student outcome data, such as district or school-wide data, as well as data from teachers' daily practice, including samples of student work or video segments of classroom interactions, afford the analysis of the impact of teaching on student learning (Goldsmith & Seago, 2007; Hiebert, Morris, & Glass, 2003; Kazemi & Franke, 2004; Lord, 1994). Finally, a goal of teacher learning communities is teachers' intellectual growth (Grossman et al., 2001). Teacher learning communities do not function to work solely on the pragmatics of teaching or to focus on learning new skills and strategies. Rather, they seek to contribute to a knowledge base of teaching (Hiebert, Gallimore, & Stigler, 2002; Wood, 2007) and to improve teaching beyond one's own classroom.

2. Development of teacher learning communities

Research on group development shows that groups undergo changes over time and that they develop in different stages (Cissna, 1984; Tuckman, 1965; Tuckman & Jensen, 1977; Worchel & Coutant, 2001). Mennecke, Hoffer, and Wynne (1992) review different models of group development and classify them in three types: *progressive models* exhibit an increasing degree of maturity and performance over time (e.g. Bales, 1970; Tuckman & Jensen, 1977), *cyclical models* reflect a linear or recurring sequence of events (e.g. Mann, Gibbard, & Hartman, 1967), and *nonsequential models* imply that the events that occur result from factors that change the focus of the group's activities (e.g. Poole, 1983). While different in form, these models consist of similar features. These include an initial phase of group members experiencing uncertainty, being tentative in their participation and expressing conflict as they seek to meet their personal needs. The group then shifts to negotiate difference and articulate shared goals, followed by adopting roles to achieve those goals before disengaging from the group as they experience the completion of their activity (Moreland & Levine, 1988; Wheelan, 1994).

Similarly, studies of teacher learning communities identify different levels of development, reflecting periods of getting acquainted, learning to work together, and deeper collaboration. Grossman et al.'s (2001) study of two high school departments' collaborative efforts identifies three stages of development — beginning, evolving, and mature community — related to four dimensions, developing norms for working together, establishing a commitment to the larger group, supporting one another's intellectual growth, and maintaining and respecting diverse perspectives. McLaughlin and Talbert (2006) offer a framework of three stages of community as groups of teachers make progress on inquiry-based reform. Their model also identifies both the intellectual and social demands of designing collaborative working groups that are worthwhile for teachers. Likewise, Eaker, DuFour, and DuFour (2002) propose a four-stage model for the development of professional learning communities, moving from pre-initiation to sustaining community. While these developmental

models are appealing for locating professional communities at a particular level, there are potentially two shortcomings (Verbiest, 2011). One is that they may not capture the complexity of the development of a community and the other is that movement through discrete stages across each dimension is not likely. It may be the case that movement along some dimensions may be more difficult than others or that the group may move back and forth between levels over time. Additionally, groups of teachers working together do not always ensure community development. This study seeks to extend prior research by examining how the three central features of teacher learning community are realized in a video club context and by considering the relationship between the three features and how development on one interacts with development on another. Attention to these issues provides insight into the complexity of achieving a vision of learning communities for teachers.

3. Influence of video on the development of community

The use of video in professional development raises several issues that may influence the potential of such environments developing into a learning community. Video has been promoted as a tool for enabling teachers to make their practice public and to facilitate sustained examination of practice (Miller & Zhou, 2007; Sherin, 2004). However, it offers challenges for groups to develop into communities as well. If the video comes from non-participating teachers' classrooms, it can seem too distant from their practice, making it difficult to delve into the particulars of practice represented in the clips or to take away important principles from the clips they view (Hatch & Grossman, 2009). On the other hand, if the clips come from the participating teachers' classrooms, some teachers may be uncomfortable sharing images of their practice because they are accustomed to the isolated nature of teaching. Additionally, when teachers view video from their classrooms, they may struggle to engage in a critical inquiry of teaching, for fear of criticism (Rosenholtz, 1989b), and thus, continue to promote a discourse that is cordial and harmonious (Levine & Marcus, 2007). Grossman et al. (2001) refer to this as developing a "pseudocommunity" (p. 955), maintaining a surface friendliness and suppressing conflict, without probing the complexities of the interactions between teaching practices and student learning. In terms of developing community, both approaches afford different kinds of analysis that can influence the extent to which groups makes progress in developing on the three central features of community. For a video club specifically, attention needs to be paid to how norms are constructed that enable colleagues to safely share their practice, while also pressing participants to engage in substantive analysis of teaching and learning.

The main goal of the video club that is the focus of this study was to understand how video might help teachers learn to attend to and interpret students' mathematical thinking, what is referred to as "noticing" (van Es & Sherin, 2008). Mathematics education research reveals that attending to student thinking can result in both teacher and student learning (Borko et al., 2008; Franke, Carpenter, Levi, & Fennema, 2001) and can lead to improved student achievement (Sowder, 2007). Noticing has been defined as consisting of three parts: identifying what is important in a classroom interaction, interpreting the meaning of those interactions, and deciding what to do next (van Es & Sherin, 2008; Jacobs, Lamb, & Philipp, 2010). This is similar to research on teacher reflection (Putnam & Borko, 2000; Rodgers, 2002). For instance, Rodgers' (2002) *reflective cycle* involves describing selected noteworthy classroom situations in great detail, ascribing meaning to those events, and then deciding a course of action to take. Noticing is an important

dimension of teacher reflection as it captures the abilities of honing in on particular events and making sense of these interactions. Additionally, the construct of noticing intends to capture the in-the-moment analysis teachers engage in *while* they teach. However, given the structure and isolated nature of teaching, it is challenging to develop this skill during instruction. Thus, video is used as a tool to help teachers learn to identify noteworthy interactions, and the club environment provides a context for teachers to develop a shared discourse for inquiring into these interactions together.

4. Research design

4.1. The Mapleton Video Club context

The Mapleton Video Club took place over the course of one school year, meeting one or two times a month from October to May, for a total of ten meetings. The club consisted of seven fourth and fifth-grade elementary teachers, ranging in teaching experience from one to 19 years (see Table 2). Five of the teachers taught fourth grade and two of the teachers taught fifth grade. Pseudonyms are used to protect the school site and teachers' identities. Two teachers, one from each grade level, declined to participate, one for personal reasons and the other because she was not comfortable being videotaped.

The video club was brought together as part of a university-school district partnership. A district-level administrator, the elementary mathematics curriculum coordinator, was enthusiastic about the idea of running a video club with a group of teachers. She identified Mapleton School as a site for the project because the students demonstrated low levels of mathematics proficiency. Additionally, the lead researcher provided professional development to the teachers in grades 1–3 the previous year, so the curriculum coordinator wanted to target grades 4–5 for this program. The teachers were paid for their participation, and they could earn professional development credit required by the district. Moreover, the district was in the third year of adopting a reform-based mathematics curriculum, and the participating teachers had various levels of experience using the curriculum (see Table 2). Some of them expressed concern that district administrators would use the videos to assess their fidelity of implementation. Given this concern, the research team asked the administrators not to attend the video club meetings so that the teachers would be comfortable sharing video from their classrooms.

The group viewed and discussed 19 clips from the participating teachers' classrooms across the ten meetings. Table 3 provides a summary of the participants' clips that were viewed by meeting, as well as who was in attendance at each meeting.

The same process was used to select clips for each meeting. Before each meeting, a researcher videotaped mathematics lessons that were 50–60 min long in two participating teachers' classrooms. While videotaping, the researcher noted interesting

mathematical ideas students raised and identified potential segments for the group to view. After the observation, the researcher reviewed the notes and identified either a continuous 5–7 min long segment or edited shorter segments together to create a 5–7 min long segment for the group to view. The selected segments were then digitized and recorded on to a videotape. A corresponding transcript was prepared for the participants to reference in the meetings.

The meetings lasted between 60 and 75 min. Two facilitators were present at each meeting. The author was the primary facilitator for seven of the ten meetings and the lead researcher for the project participated in this role at the other three meetings. Another researcher attended the meetings as well, primarily to videotape the session. This researcher also participated in the discussions, but to a lesser extent than the main facilitator. The facilitators focused on helping teachers identify and analyze student thinking by prompting teachers to attend to student ideas, to use evidence to support claims they made about student thinking, and to interpret student understanding about the mathematics. The facilitator often probed for evidence by asking what events in the video segment or which particular statements from the transcript supported an idea or interpretation. Teachers were also encouraged to interpret the events that stood out to them, rather than judging what was good or bad or could or should have been done differently. Other norms were established as well, including challenging one another's interpretations, offering alternative explanations, and supporting colleagues in their practice.

4.2. Data collection

Data for this study include videotapes and transcripts of each of the 10 video club meetings. The meetings took place at the school site, in a participating teacher's classroom. The desks were arranged in a semi-circle and a television monitor with a VCR was placed in front of the desks for all members to view. 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 participants' voices. After each meeting, the videotapes were digitized and transcribed.

4.3. Data analysis

Qualitative methods were used to examine first, if there is evidence that the group developed into a learning community and second, to characterize how the group evolved into a community over time (Erickson, 2006). Analysis consisted of four phases.

In the first phase, the three central features represented in Table 1 were used to review the data for evidence of community. Analytic memos were written for two early and two late meetings, identifying confirming and disconfirming evidence related to each of the three central features (Miles & Huberman, 1994). These memos highlighted disconfirming evidence for each of the features in the early meetings and confirming evidence for each feature in the final two meetings. This pointed to differences in the ways the group coordinated their activity over time.

The second phase of analysis involved a more fine-grained examination of the central features to construct a framework to capture the observed differences between the early and late meetings. A further review of the two early and two late meetings was conducted to determine ways to characterize each of the features at different levels of development. To examine Collaborative and Collegial Interactions, three characteristics were considered: who initiated and participated in the discussions, the extent to which multiple group members discussed the clips, and the extent to which the group demonstrated a commitment to learning with and from the group (Goffman, 1981; Goodwin, 1981). This involved, for

Table 2
Subject information.

Teacher pseudonym	Grade level	Years teaching	Years using reform-curriculum
Daniel	4	2	2
Drew	4	1	1
Elena	4 (Special education)	8	3
Frances	5	19	3
Linda	4 (Special education)	10	1
Wanda	5	6	3
Yvette	4	14	1

Table 3
Participants' video clips shown in the Mapleton Video Club meetings.

Meeting #	Teacher	Mathematical topic	Attending participants
1	Wanda	Sum of angles of a polygon	Daniel, Drew, Frances, Wanda, Yvette
	Yvette	Ratios & scale factors	
2	Frances	Comparing fractions & Equivalent decimals & fractions	Daniel, Frances, Wanda, Yvette
	Daniel	Equivalent decimals & fractions	
3	Drew	Adding decimals & Writing decimals (from spoken values)	Daniel, Drew, Elena, Frances, Linda, Wanda, Yvette
4	Yvette	Multiplying #s up to 10	Daniel, Drew, Elena, Frances, Linda, Wanda, Yvette
	Daniel	Multiplying by multiples of 10	
5	Wanda	Positive & negative #s	Daniel, Drew, Elena, Frances, Wanda, Yvette
6	Linda	Multi-digit multiplication	Daniel, Drew, Elena, Frances, Linda, Wanda
	Elena	Division algorithm	
7	Drew	Equivalent fractions	Daniel, Drew, Elena, Linda, Yvette
8	Frances	Multiplying fractions & multiplying improper fractions	Daniel, Drew, Elena, Frances, Linda, Wanda, Yvette
	Drew	Ratios & scale factors	
	Daniel	Ratios & scale factors	
9	Frances	Area & perimeter	Daniel, Drew, Elena, Frances, Linda, Wanda, Yvette
	Linda	Equivalent fractions & %s	
10	Wanda	Combinations	Daniel, Drew, Elena, Frances, Linda, Wanda, Yvette
	Yvette	Equivalent fractions, decimals, & %s	
	Daniel	Multiplying decimals	

Note: In some instances, two different segments from the same lesson were viewed from one teachers' classroom. For example, in the third meeting, the group viewed two segments from Drew's class, one on adding decimals and another on writing decimals.

example, examining the number of participants who participated in the discussions of each clip and if one or two members dominated the discussion or if participation was equally shared among the group. Shifts in the use of pronouns from "I" and "me" to "us" and "we" were analyzed to gain insight into the collective nature of their work. Finally, who introduced particular topics of conversation, if those ideas were taken up by different members (particularly by the facilitator or by the teachers) and then who shifted the focus of the discussions were also examined.

To characterize Participation and Discourse Norms for Productive Collaboration, the extent to which the group developed discourse practices for analyzing classroom interactions that was reflective and inquiry-focused in nature was investigated (Borko et al., 2008; Davis, 2006). In particular, the following issues were considered: whether a single or multiple ideas and perspectives were raised and discussed by the group; if the group members used evidence to build claims and interpretations; and if they elaborated on ideas or probed one another to expand their thinking, and if so, who elaborated and probed ideas, whether it was a teacher or facilitator.

Finally, to capture the development of the third feature, Focus of Activity on Teaching and Learning, the extent to which the topics of discussion were peripheral or specific to the teaching and student learning that was represented in the video segments the group viewed was examined. For instance, if the group discussed the particular mathematics task students in the clip solved or particular solution strategies, then it was characterized as connected to the mathematics in the clip. If participants discussed how the mathematics topic is treated more generally across the curriculum or on district or state mandated assessments, then it was considered peripheral to mathematics instruction viewed in the video segments. Moreover, the specificity of participants' talk was considered — whether they talked generally about the issues they raised (e.g. "All students have trouble with fractions") and drew on personal experiences to inform their comments (e.g. "My students always play with the rulers when we use them.") or if they were focused on the particulars of student learning and teaching as captured in the video segments (e.g. "Theo seems to be confusing two methods, the traditional algorithm and partial products method. Do you teach both of

Table 4
Framework for development of teacher learning community in a video club.

	Beginning	Intermediate	High-Functioning
Collegial and collaborative interactions	Participants have little or no commitment to each other's development, and one or two members dominate group activities and conversations.	Participants begin to collaborate to support each other's work, the group's activities become more distributed among the participants, and they begin to listen to understand each other's ideas and perspectives.	Participants develop sustained relationships and have a shared commitment to support each other's development. Conversations engage a wide range of participants, with leadership shifting among members of the group. Participants listen carefully to each other to understand each other's thinking.
Participation and discourse norms for productive collaboration	Conversations are one-sided and lack elaboration, explanation, and constructive inquiry.	Conversations begin to become multi-dimensional, with different perspectives and interpretations raised for discussion. Participants begin to probe one another's thinking, calling for evidence to support inquiry into practice, while also providing limited explanations.	Conversations consist of participants raising questions and concerns and constructively pressing each other to explain and elaborate thinking, ideas, and perspectives. Discourse norms center on inquiry and evidence-based reasoning.
Focus of activity on teaching and learning	Activity focuses on exploring broad, general issues of teaching and learning, with teachers' personal experiences and intuitions guiding discussion.	Activity begins to focus on attending to particular participants' teaching practices and student learning, with both shared images of practice and experiences and intuition guiding inquiry.	Activity is centered on sustained inquiry around teachers' practice that they make public to the group. The focus is on examining the particulars of teaching and student learning as it arises in their contexts.

Table 5
Evolution of a teacher learning community in a video club.

	Meeting 1	Meeting 2	Meeting 3	Meeting 4	Meeting 5	Meeting 6	Meeting 7	Meeting 8	Meeting 9	Meeting 10
Collaborative & collegial interactions	Beginning		Intermediate	High-Functioning	Intermediate	High-Functioning				
Participation & discourse norms	Beginning		Intermediate			High-Functioning	Intermediate		High-Functioning	
Focus on teaching & learning	Beginning		Intermediate	High-Functioning	Intermediate		High-Functioning			

those strategies?"). Appendix A provides details on the elements to characterize the three features.

Through an iterative process (Saldaña, 2009), a trajectory to represent shifts in the development of community in the video club context was created: Beginning, Intermediate, and High-Functioning (see Table 4).

In the third phase of analysis, the coding framework was applied to each of the discussions for each of the clips the group viewed over the course of the 10 video club meetings. Again, analytic memos were created, noting confirming and disconfirming evidence for each feature for each discussion across the ten meetings. See Appendix B for the scoring of each video clip discussion for each meeting for all three dimensions. To ensure reliability in the application of the framework, a subset of the discussions were coded by several researchers. Five video segments and discussions were randomly selected from the beginning, middle, and end of the series of meetings. Four researchers were given the *Framework for Development of Teacher Learning Community in a Video Club* (Table 4), with the details for coding each level for each feature (Appendix A). For each of the randomly selected segments, all of the researchers viewed the video segment that the video club members watched together. They then individually viewed the subsequent discussions of these clips via video. After viewing the discussions, each researcher individually coded the discussion along each of the three central features, assigning a score of Beginning, Intermediate, or High-Functioning. Upon coding each discussion, the four researchers reported the scores they assigned to each dimension. Overall, inter-rater reliability was 85%. There were no cases in which the researchers' scores differed by two levels (i.e. Beginning and High-Functioning). Where disagreement occurred, the group discussed the coding until consensus was reached.

Finally, in the fourth phase, using the scores for each clip, an overall characterization for the group's level of community along each of the three features for all ten meetings was created. To identify the overall score, the higher score, by feature, across the clips viewed per meeting was selected. For example, in Meeting 6, the group viewed two clips. The first clip was scored as Intermediate on Participation and Discourse Norms and the second clip was scored as High-Functioning on this same feature. Thus, the overall characterization on this feature was High-Functioning for this meeting. In two meetings, the group viewed three video segments. In these cases, the feature with the greater number of scores was used for the overall characterization. For instance, in Meeting 8, for Participation and Discourse Norms, two clips were scored as Intermediate and one as High-Functioning, so the overall characterization was Intermediate.

5. Results

5.1. The development of a learning community in a video club

Table 5 represents the development of the group on the three dimensions of the *Framework for Development of Teacher Learning Community in a Video Club*.

The group's development can be thought of as occurring in three phases, Meetings 1 and 2 at the Beginning phase, Meetings 3 through 8 at the Intermediate phase, and Meetings 9 and 10 at the High-Functioning level, with participants collaborating together to inquire into teaching and learning represented in the videos to advance the knowledge of the group. The following vignettes illustrate this evolution.

5.2. Phase 1: beginning level of a teacher learning community

Analysis of the first two meetings suggests that the group started off at a beginning level of community. Typically, one or two group members directed the discussions. They expressed their own ideas, rather than attending to each other's, and provided limited detail. Moreover, the participants shared broad, general explanations of what they observed and used their personal experiences and intuitions to inform the analysis.

The following exchange from Meeting 2 illustrates a typical conversation at the beginning level of community. The group viewed a segment from one of the participant's classroom, Frances, in which the class compared fractions. Frances placed a grid on the overhead representing different fraction segments and the students were asked to identify and compare different pairs of fractions. The grid consisted of ten rows, numbered 1—10, with each row divided into the number of segments corresponding to the row number. In the clip, Frances asked the students to compare five-eighths and six-tenths. The students first identified the rows divided into 8 and 10 segments. Frances then walked students through the process of shading in both fractions and asked individual students to explain how they found six-tenths and then five-eighths on the chart. Once both fractions were shaded, she asked the class which fraction was greater. After viewing this clip in the meeting, the following discussion ensued:

Facilitator:	So what did you notice about the student thinking?
Frances:	Well, my kids have been having a hard time with fractions. They know the basic ones, like 1/2, 1/3, 1/4, but when you mix up denominators or numerators, they don't have a clue. So that's why I pulled out the chart, to show them graphically.
Facilitator:	What did you see in the video about the students' thinking about fractions?
Frances:	Well, they seem to understand that it's pieces. Because they could go from 1/10 to 6/10. And it was visual… [The chart] seemed to have really helped. It seemed to have really caught on, which you don't see in the video, but later on in the week…
Wanda:	One thing I don't like about the fractions [chart] is that it's rather arbitrary. It's not concrete. I would stay away from it. I use it, but I don't use it that much because it's just so busy.
Daniel:	Do they know to cross multiply?
Frances:	Not yet…
Daniel:	That came up once in the 4th grade book…
Frances:	I knew my kids were having trouble and I knew this was right in the book. So I thought, let's just do it… And at least it teaches them how to use the chart, because there is an exercise where they have to use the chart. So I thought I could kill two birds with one stone.
Yvette:	And I'm wondering if there's an assumption they're coming to you with some understanding of what a fraction is, what a whole is…
Wanda:	I don't think so.
Yvette:	Like our [4th grade] decimal unit…made an assumption that they had huge conceptual background.

In terms of Collaborative and Collegial Interactions, the participants' comments are focused on individual interests. When Wanda followed Frances's remark, she offered her opinion about the problem with the fraction grid (e.g. "it's just so busy") but did not explore with the group how the chart might promote student learning. Daniel then introduced a new topic, whether students know how to cross multiply, and Yvette initiated an additional issue concerning assumptions made by the curriculum about what students know as they entered the lesson. Regarding Participation and Discourse Norms, events that occurred outside of the clips drove the analysis with limited exchange to explore each other's ideas. For example, when the facilitator asked what the group saw in the video about students' understanding of fractions, Frances used evidence from later in the week to claim they understood how to compare fractions. Additionally, while Wanda suggested that the fraction chart is not effective from her perspective, the teachers did not examine this issue even though Frances argued previously that it helped her students. Finally, in terms of Focus on Teaching and Learning, the group discussed student thinking as a whole and more generally: "My kids have been having a hard time…" and "They seemed to understand it's pieces…" Rodgers (2002) cautions that this focus on the class can be problematic, "because students understand and learn as individuals, not as a group" (p. 240). Furthermore, the teachers raised issues peripheral to those represented in the clip (e.g. assumptions of student understanding in the curriculum materials) that were informed from their personal experiences. Without the shared referent, the group was not able to explore these issues in meaningful ways.

5.3. Phase 2: intermediate level of a learning community

In Meeting 3 the group's conversations evolve on all three dimensions. The group begins to collaborate to understand and support each other's analyses and the conversations become more distributed among the group. They also begin to raise different perspectives focused on student thinking, press the group to explain their analyses in more detail, and use evidence from the video to support their interpretations. As an intermediate stage, however, the teachers continue to pursue their own interests, draw on their personal experiences that are peripheral to the events represented in the clips to guide their commentary, and provide limited elaboration of their thinking. The following exchange illustrates this phase.

In Meeting 5, the group viewed a clip from Wanda's classroom on positive and negative numbers on a number line. The students were given a scenario about selling raffle tickets. The goal for each student was $50 in ticket sales. Students were given a table representing how well five students did in selling the tickets, with one meeting the goal exactly, two falling short of the goal, and two exceeding the goal. They were asked to complete the table by solving the amount that the students were above or below the goal and then to plot the number above or below the goal on a number line with end points of negative and positive ten. For example, in the scenario, Student B met the goal exactly so students would record Student B at 0 on the number line. Student C exceeded the goal by $1.75 so the students would indicate this amount between positive 1 and 2 on the number line.

In the clip, the camera focused on a group of four students seated together. As they completed the table and plotted the numbers, several students had questions about the meaning of "met goal exactly" and "exceeded goal." One student, Kandace, continued questioning another group member, Shawna, about where she placed her answer for Student B on the number line. At one point, Wanda approached the group and talked with another group member about the difference between meeting the goal exactly and either falling

short of or exceeding the goal. The students had little conversation about their reasoning for their answers.

As the group viewed the clip, the facilitator noticed two teachers talking, paused the video, and asked the group to share what they were discussing. The teachers explained:

Frances:	We're trying to figure out how she got $5.00. She's saying B is $5.00.
Daniel:	She says B is 5 times 10.
Facilitator:	Tell me where you are.
Daniel:	Where it says "met goal exactly." I think they were saying that was 10. (Participants look through transcript.) There we go! It says five students. They read from the directions and picked out a couple of key words… So they're trying to get from five students to $50.
Yvette:	Or they missed the word "each," that the goal for each student was $50.
Daniel:	They're just trying to find a way for the answer to fit some kind of guess.
Wanda:	That's because they don't bother to read the chart. They don't listen. And I think the other ones are on target… Brittany probably has the right answer.
Elena:	I wonder if they understood what "exceeded" meant or what "met goal" meant. Did anybody ask?
Facilitator:	(referring to the transcript) On the second page, [Shawna] asked, "What does exceed goal by fifty mean?"
Elena:	But nobody answered that question though. It was asked and that's it.
Facilitator:	Do you think Kandace really thinks the answer is 10?
Wanda:	She was just looking for an answer. When she was saying, "It's ten, it's ten," she wanted someone to say, "yes, you're right."
Elena:	So the whole group didn't necessarily come up with these answers? I was just wondering if there was more conversation about it.
Wanda:	Yeah, it was a group discussion. I called them up and they plotted this on the board. And there were a couple that plotted them wrong and as a group they discussed if they agree or disagree and why.
Elena:	But that's not what I'm asking. I was just wondering what [Kandace] was thinking in the group, if there was any more conversation about why she thought what she did… if they came up with it in a group or if it went to whole group right away. And it sounds like it went to whole group, right?
Wanda:	Yes, it went to whole group.

This excerpt is typical of those in this intermediate level. First, in relation to Collegial and Collaborative Interactions, the teachers initiated analysis of student thinking as they tried to understand how Kandace arrived at an answer of 10. This is in contrast to the earlier phase when the facilitator prompted them to focus on the events in the clip. They also worked together to analyze the clip, as illustrated by Frances' initial comment, "We're trying to figure out…," followed by several speaking turns in which the participants generated an explanation for Kandace's thinking. At the same time, there is evidence of participants pursuing a particular issue and not collaborating to understand each other's thinking. Elena, for instance, did not engage in analysis of the student's thinking initiated by Frances and Daniel and instead focused on how students worked together and if they had any discussion as a group about their thinking. Later, the facilitator shifted the conversation back to focus on Kandace's thinking and after Wanda proposed her interpretation, Elena redirected the conversation again to the nature of student collaboration. Thus, participants began to listen to each other and work together but they also continued to pursue their individual ideas.

In terms of Participation and Discourse Norms, they referred to the transcript to investigate how the student arrived at 10 (e.g. "where it says 'met goal exactly'") and they offered different interpretations of her thinking: Daniel proposed the students are trying to get from five students to $50 by selecting key words from the problem; Yvette replied that they missed an important word in the problem; and Wanda proposed they were confused because they did not read the chart and do not listen. However, indicative of

this stage is that some of the explanations intend to make sense of the student thinking, in this case Daniel's idea, and others are less mathematically substantive, such as Wanda's interpretation. Also, Yvette offered an explanation but no one probed her to understand what she might be thinking. As the conversation continued, Elena probed Wanda to explain her teaching strategies. For instance, Wanda claimed that the students were "on target," a simplistic interpretation. Elena did not accept this response, and she pressed on this claim by asking if the students understood the meaning of "exceeded" and "met goal exactly" and probing if they in fact discussed their thinking together. Thus, the group began to offer different interpretations of what they observed, and they began to probe each other to explain their thinking but they did not adopt these norms consistently in the conversations.

Related to Focus on Teaching and Learning, the participants commented on the particulars represented in the clip, as they explored Kandace's thinking and how she arrived at 10. However, they continued to refer to the students as a whole, with comments like, "They're not understanding what's being asked of them…" The participants also continued to offer superficial explanations of student thinking (e.g. "They don't listen") and drew on their intuitions and personal experiences to inform their commentary (e.g. "Brittany probably has the right answer"). They moved back and forth between focusing on what students said and did in the clip to investigate their thinking, and talked more generally about their teaching and how the curriculum influenced student learning.

5.4. Phase 3: high-functioning community: collaborating to engage in substantive analysis of teaching and learning

The final two meetings are characterized as High-Functioning, with most participants contributing to the conversation, listening to each other and supporting each other's ideas, while also probing each other and elaborating one another's thinking. Additionally, the group sought to understand the student thinking in the clip and then used this analysis to draw inferences about the implication of what they learned for their teaching.

In Meeting 9, the group analyzed another clip from Frances's class, in which students solved several area and perimeter
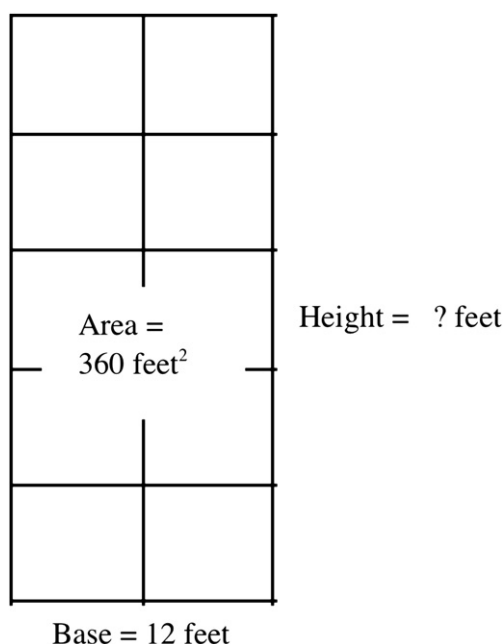

Fig. 1. What is the height of a rectangle with base 12 feet and area 360 feet^2?

problems. They were given a figure with the base and height and needed to determine the overall area, or they were provided with the overall area with the value of the base or height and needed to find the value for the other side. For the problem in Fig. 1, several students divided the area by the value of one side, in this case 360 by 12.[1] One student, Micaela, was exploring if the height could be determined by using the squares that comprised the rectangle in the figure. She was unclear, however, as to the value of the height and base of these squares. Moreover, she appeared to draw on a strategy that another student, Jason, used to solve a previous problem, counting the length of each square and adding them together to determine the length of a side.

After viewing the clip, the facilitator asked the group, "So what did you notice?" The teachers responded:

Yvette:	I didn't understand when [Micaela said], "Since there's five going down, you can just put one up and over, and then since there's five, just put one up…"
Frances:	She was wanting to count the boxes.
Wanda:	She was wanting to count, to figure out one [box] and then just add it again to find the next one [box].
Facilitator:	Can you draw what you mean? (Wanda draws her interpretation of Micaela's thinking)
Frances:	Well, when [the curriculum] starts teaching area, they have them just count the squares.
Elena:	That's what Tiffany did, right?
Frances:	Yes.
Wanda:	So, [Micaela] wanted to (pointing to each box in her drawing as she counted)…it's one, two, three, four, five. She wanted to [count] five [in one column] and then just double it to find the area…
Facilitator:	What does she mean, "Can you just put a one up over that?"
Yvette:	It looked like carrying to me. (Reading from the transcript) "Since there's five down, you can just put one up over that. And then, since there's five just put one up under the five…"
Linda:	(Continuing to read from the transcript) "…and do that number twice…."
Facilitator:	Well, I'm wondering if maybe she's using what Jason said earlier to help her try to figure this out. So, if we look on the page before…
Daniel:	He said something about 3 times 5…

The group proceeded to examine the figure from the previous problem, a 3×5 figure with an area of 375 and a height of 25. The teachers have an extended discussion about how to determine the length of each side of the individual boxes, how to find the area of each square in the figure, and different strategies to solve for the overall area of the figure. After discussing this issue, the facilitator returned the conversation to the student thinking in the video:

Facilitator:	Does Micaela seem to understand that each square is worth 36?
Wanda:	No, she's just counting one, two, three, four, five.
Frances:	She doesn't understand that the squares [in the figures] have different values.
Wanda:	Were you meaning that she was thinking this? (pointing to the boxes in the drawing) There's one, two… The one under the five blocks. The one under the other five…
Yvette:	Because it's five plus five…

This excerpt is typical of the High-Functioning level of community. The group supported each other in a sustained exploration of Micaela's mathematical thinking, with a wide range of participants listening to each other to understand one another's

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[1] Because the base of the rectangle is given as 12 feet, one can determine that each square has a height and base of 6 feet. Therefore, the height of the rectangle is 30 feet.

thinking. In this excerpt, six of the eight participants in attendance explored the students' thinking, and both the teachers and facilitator initiated exploring student thinking. Wanda's comment, "Were you meaning that she was thinking this?" demonstrates that she was listening to the group to understand what they proposed about the student's thinking. This is in contrast to earlier meetings – when a teacher proposed an idea, it was followed by one or two brief responses and then a new idea was raised. Additionally, participants used evidence-based reasoning to generate ideas, referring to the transcript in multiple speaking turns to investigate what the student said and using that to inform their interpretations. They also pressed on and considered different substantive interpretations of Micaela's thinking. The group did not settle with just one explanation. Instead, the participants proposed that she was counting the number of boxes and then examined the possibility that she was counting the value of the sides of the squares. Finally, they were focused on a sustained inquiry of the intersection of their teaching practice and particular student learning. They offered substantive, mathematically-based explanations of student thinking (e.g. "It looked like she was carrying to me."), rather than oversimplified generalizations of student behavior (e.g. "They just don't listen."). Moreover, they drew on the particulars from the video segment to engage in sustained explorations of the mathematical task, how to represent the mathematics in different forms, and how different representations influence student thinking and learning. Thus, in the context of the video club, the group developed discourse and participation norms that enabled them to engage in collaborative inquiry of teaching and learning.

6. Discussion & conclusion

This study sought to develop a framework to characterize the evolution of a group of teachers into a teacher learning community as they participated in a video club. One of the main contributions of this work is the *Framework for the Development of a Teacher Learning Community in a Video Club* (Table 4) that articulates the particular dimensions for moving from Beginning to High-Functioning across the three central features as they are realized in the video club setting. This framework captures the development of the video club group as they adopted norms and practices for collaboratively examining teaching and learning represented in video. As video becomes used more widely for teacher learning (Hatch & Grossman, 2009; Sherin, 2007), teacher educators can use this framework as a guide to design experiences to help teachers develop into learning communities, as well as to gauge their progress as they move toward this vision.

While the analysis suggests that this group shifted to inquire into teaching and learning together, a community does not just come to be and then sustain itself over time. Instead, it takes time to develop into a learning community and it is a work in progress (Cissna, 1984). Early research on the development of learning communities offers different stage models of becoming a community (e.g. Eaker et al., 2002; Grossman et al., 2001). However, such models do not investigate the relationships between stages, nor do they account for the fact that some groups may make progress on some stages and not others or that they may make progress at a differential pace across stages (Verbiest, 2011). Examining how the group evolved over the course of the ten meetings, it is clear that it did not develop on all dimensions at the same time (see Table 5). Instead, it shifted from Beginning to Intermediate in Meeting 3, but as the meetings progressed, it was characterized as Intermediate on some dimensions and High-Functioning on others. For instance, in Meeting 4, the group was scored as High-Functioning on the dimensions of Collaborative and Collegial Interactions and Focus on Teaching and Learning but Intermediate on

Participation and Discourse Norms. It may be that an important element in building community is first learning to collaborate – feeling comfortable initiating ideas, listening to one another, and supporting one another's analyses. Once the video club participants developed these practices, they appeared to adopt a more narrow focus on the particulars of teaching and learning represented in the clips, becoming High-Functioning on this dimension in Meetings 7 and 8. This suggests that the group first needed to learn norms for interacting with one another before it could focus on analyzing the events in the clip. Table 5 also shows only one meeting between Meetings 3 and 8 in which the group was scored as High-Functioning on the dimension of Participation and Discourse Norms. It may be that learning to adopt practices for engaging in in-depth evidence-based analysis of teaching, while also probing and pressing each other's ideas, is more challenging than the other dimensions. This is consistent with research that discusses the difficulties teachers encounter working together to dig deeply into their practice (Grossman et al., 2001; Horn & Little, 2010). For teachers who are less accustomed to sharing their practice and analyzing it together, it may seem that this feature is in conflict with being collegial and collaborative. Thus, learning to focus on the specifics of student thinking may have been a catalyst for helping the group adopt discourse norms for engaging in substantive and meaningful analysis of teaching that were also supportive and collegial in nature.

This study also has important implications for practice. Several programs designed to help teachers work together to improve teaching, such as lesson study and school-based inquiry groups (Gallimore, Ermeling, Saunders, & Goldenberg, 2009; Lewis, 2002; Perry & Lewis, 2009), articulate essential features for sustained, inquiry-focused professional development to take hold in schools. In designing video clubs for developing teacher learning communities, two important issues arise. One concerns videotaping and selecting clips for the group to view. To focus the group's attention on student thinking, it was essential to capture moments of interesting mathematical thinking as it unfolded in the teachers' classroom, such as a student explaining a strategy or expressing an interesting idea. In addition, because teachers do not typically focus on the particulars in classroom interactions (Miller & Zhou, 2007), the facilitator is central to the group's development. Facilitation involves knowing the content deeply (Elliott & Kazemi, 2007), highlighting worthwhile mathematical moments (Mumme & Seago, 2003) and modeling evidence-based reasoning of student thinking (van Es, 2010). Facilitators also need to manage the social interactions in these settings, deciding whose ideas to pursue, while also providing space for teachers to voice different perspectives. For video clubs to become a viable setting for the type of sustained, supportive inquiry characteristic of learning communities, teachers need assistance capturing video, identifying interesting interactions to discuss, and learning how to talk about these segments. It may be that as teachers develop ways of noticing with guidance from a designated facilitator, they can take on roles that will enable them to facilitate meaningful analysis of video (see van Es, 2009). Understanding how different video club designs maintain the integrity of this approach is an important area of future inquiry.

This study extends prior research on the development of teacher learning communities, but additional questions remain. First, unlike teachers who volunteer to participate in off-site professional development (e.g. National Writing Project), district leadership targeted teachers from particular grade levels from a specific school to join the video club, and they were paid for their participation. Thus, they did not have a shared interest from the start, an important feature of a learning community (Rosenholtz, 1989a). Taking time for the teachers and facilitators to learn about each other's goals and to develop norms for interaction was essential for

this group's development. Moreover, this group was incentivized to participate. Questions concern how to motivate teachers to want to videotape and share footage from their classrooms with their colleagues, particularly given the autonomous nature of their work. Finally, this study focused solely on the development of community in an after-school video club. However, teachers are nested in schools and districts, as members of grade-level teams or subject matter departments. Research points to the challenges inherent in school contexts for supporting the development and sustenance of teacher learning communities (McLaughlin & Talbert, 2001, 2006; Rosenholtz, 1989a; Wood, 2007). Understanding how development of a learning community in an after-school professional development setting intersects with teachers' collaborative inquiry in the context of their workday and broader school settings is an important area for future research.

This study sought to construct a framework for the development of a learning community when video from participants' classrooms is used to investigate and inquire into teaching practice. With the increased use of video for teacher learning, it is important to understand how teachers can collaborate to learn from analyzing one another's practice via video. The results of this study suggest that teachers can develop supportive, collegial interactions to engage in substantive analysis of teaching and learning as they view video of one another's teaching. However, just as it takes time to learn new content and skills for teaching, it also takes time for groups of teachers to learn skills for collaboratively inquiring into teaching via video in order to develop into a community that is focused on learning in and from practice.

Acknowledgments

Appendix. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.tate.2011.09.005.

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