

Using Video to Support Teachers' Ability to Interpret Classroom Interactions

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Abstract: This paper examines how video can be used to help pre-service and in-service teachers learn to *notice* what is happening in their classrooms. Data from two related studies are presented. In the first study, middle-school mathematics teachers met monthly in a video club in which they shared and discussed excerpts of videos from their classrooms. In the second study, a group of pre-service high-school mathematics and science teachers used a new video analysis support tool called VAST to examine excerpts of video from their own and others' classrooms. In both cases, we found changes over time in *what* the teachers noticed and in *how* they interpreted these events. This research adds to our theoretical understanding of the role of video in teacher education and also provides direction for the development of new forms of video-based professional development activities.

Introduction

Video has become an important tool for working with both novice and veteran teachers. This is particularly true in mathematics and science education, where many new video-based and multimedia programs have recently been developed. In some cases, video is used to demonstrate new ways that teachers can explore specific content areas with students (e.g., Hatfield & Bitter, 1994). In other cases, video is used to illustrate particular classroom processes such as discourse or problem-solving (e.g., Corwin, Price, & Storeygard, 1996). Common to both of these approaches is an emphasis on helping teachers learn what to *do* in the classroom.

In contrast, we are examining how video can help teachers learn to *notice*, that is, to develop new ways of “seeing” what is happening in their classrooms. We claim that this ability to notice is critical in the context of current reforms that require teachers to make pedagogical decisions in the midst of instruction. For example, teachers are supposed to pay close attention to the ideas that students raise and then use these ideas as the basis for the lesson-in-progress. This adaptive style of instruction calls for teachers to be skilled at noticing and interpreting classroom interactions. Even veteran teachers who may already be experienced at seeing what is happening in their classrooms need to find ways to focus their attention on new aspects of classroom interactions.

In this paper, we report on two related studies that used video to support teachers' ability to notice and interpret classroom interactions. In both cases, we found changes in *what* the teachers noticed and in *how* they interpreted these events. This research adds to our theoretical understanding of the role of video in teacher education and also provides direction for the development of new forms of video-based professional development activities.

Theoretical Perspectives

A great deal of research has explored experts' ability to recognize the complexities within the situations that they examine (e.g., Goodwin, 1994). In van Es and Sherin (2002) we synthesize such work and propose three key components of teachers' ability to notice. First, noticing involves identifying what is important in a teaching situation (Frederiksen, 1992; Leinhardt, Putnam, Stein, & Baxter, 1991). The classroom is a complex environment with multiple interactions occurring at the same time. A teacher cannot possibly pay attention to all that is happening. Instead, teachers must be selective in determining where to focus their attention.

Second, noticing involves making connections between specific classroom interactions and the broader concepts and principles of teaching and learning that they represent. Experts in many different fields, from chess to physics have been found to represent complex problems in terms of the larger principles that are at stake (e.g., Chi, Glaser, & Farr, 1988). Similarly, we claim that teachers should not only recognize, as described above, that "This is important." In addition, noticing involves considering "What is this a case of?" (Shulman, 1996). Doing so can help teachers to recognize important relationships among events that occur.

Third, noticing involves teachers using what they know about the context to reason about a given situation. Prior research has found that as individuals gain expertise within a domain, they become more adept at making sense of situations that occur within that domain (Chi et al., 1988). For teachers, this means that noticing classroom interactions is tied to the specific context in which one teaches — the particular subject matter, school environment, grade level, and more.

In exploring how to support the development of teachers' ability to notice classroom interactions, prior research suggests that video can be an effective tool (Sherin, 2001). Video offers a permanent record of classroom interactions. Thus teachers do not have to rely only on their memory of what occurred. Instead they can view a video, multiple times if they wish, examining what took place from different perspectives. In addition, researchers have argued that teachers are often constrained by their familiar classroom routines (e.g., Putnam & Borko, 2000). Viewing video, however, provides teachers with a very different kind of experience, one in which the goal is reflection rather than action. By allowing teachers to remove themselves from the demands of the classroom, viewing video may prompt teachers to develop new ways to examine what happens in their classrooms.

Methods

Data for this paper come from two related studies. In the first study, four middle-school mathematics teachers participated in a year-long series of video club meetings. In these meetings, the teachers met monthly for one hour to watch and discuss excerpts of videos from each other's classrooms. A researcher facilitated the meetings using open-ended questions. For example, after the group watched a video excerpt, the facilitator would ask, "What did you notice?" A total of 10 meetings occurred across the year. Each meeting was videotaped.

In the second study, six pre-service teachers working towards certification in secondary mathematics or science participated in three hour-long sessions in which they used VAST (Sherin & van Es, 2001), a Video Analysis Support Tool, to examine video of their own and others' teaching. VAST allows teachers to import digitized video from their own classroom and provides a series of scaffolds to foster teachers' analysis of this video. Specifically, teachers are prompted to analyze three aspects of their videos: student thinking, the teacher's roles, and classroom discourse. Furthermore, within each of these areas, teachers are asked to respond to a series of questions, the first of which is "What do you notice?" Prior to and following participation in these sessions, the pre-service teachers wrote narrative essays in which they discussed videotaped lessons from their classrooms. (See van Es & Sherin, 2002, for a more detailed description of the VAST software.)

The data were analyzed using an iterative and grounded approach. Fine-grained analyses of videotapes (Schoenfeld, Smith, & Arcavi, 1993) formed the basis for much of the work. Furthermore, we used techniques designed by the Video Portfolio Project (Frederiksen, Sipusic, Sherin, & Wolfe, 1998) to analyze the ways that the teachers discussed and reviewed video excerpts in both the video club and VAST sessions. The narrative essays were analyzed for the extent to which the pre-service teachers (a) highlighted particular events that occurred, (b) paid attention to specific or general evidence from the video, and (c) took a descriptive, evaluative, or interpretive stance toward discussing what had occurred. In addition, changes in the essays were compared with changes in the essays of six other teachers in the same teacher education program but who did not participate in the VAST sessions. Together, these two contexts allowed

us to examine different but related ways that video can support teachers' ability to notice and interpret classroom interactions. Furthermore, they compliment each other by differing in the grade level of the participating teachers as well as in their years of prior teaching experience.

Results and Conclusions

Teachers in both studies developed new ways of noticing and interpreting classroom interactions. In particular, two kinds of changes took place. There were changes in *what* the teachers noticed as they discussed the video excerpts, and there were changes in *how* the teachers discussed these events.

There was a shift in what the teachers noticed.

Changes occurred in what the teachers noticed as they examined videos from their classrooms over time. These changes, however, were somewhat different between the two groups. The teachers in the video club began the year by focusing on what the teacher in the video was doing. For example, in the first video club, the teachers initiated a discussion concerning the mathematical topic that the teacher in the video had decided to pursue. "You know, as teachers [we] make decisions right on the spot about explore it or don't explore it." Similarly, the group discussed the ways that the teacher had responded to a group of students that were working together. "I wanted them to discuss it...I wasn't going to answer him. I wanted his group to do it." With time, however, the focus of their attention shifted from the teacher to the student, and, more specifically, to the mathematical thinking of students. For example, in one of the later video club meetings, the teachers compared two different methods that students offered for estimating the number of people in an aerial photograph of a crowd. "[Julie's idea] was kind of the opposite of what [Robert] said, and that is that all dots are uniformly placed. So taking a small sample...wouldn't make you any less accurate than the larger [sample]." This approach to viewing video became quite common for the teachers and they regularly discussed in detail how students talked about and worked with mathematical ideas. In discussing her experiences in the video club, one teacher explicitly commented on this shift. She explained, "[At first I was thinking] 'Oh, I think I should have said that or done this.' As I was watching though, I thought a lot about... just following the ideas of different kids." This shift is particularly important in light of reform recommendations that encourage teachers to pay close attention to the ideas that students raise (NCTM, 2000). Moreover, researchers have shown that examining student thinking can lead to valuable changes in teachers' instruction and can help teachers to effectively implement the goals of reform (Franke, Fenemma, & Carpenter, 1997).

In the VAST study, a different kind of shift occurred in what the teachers noticed. Rather than a change in topic, there was a change in the range of events that were noticed and discussed by the teachers. Specifically, the pre-service teachers' initial analyses consisted largely of describing events as they unfolded in the video. For instance, one essay started as follows, "The morning began with a test and after a 10-minute break, we began to set up for the discussion of 'number families.'" Another essay chronicled a class discussion by listing the order in which members of the class participated and the comments that were made. "I called on a particular student, Ian, instead of waiting for someone to volunteer. I asked Ian what graph his group chose, and he answered that they had chosen Graph D. I asked him why they chose that graph. After a pause and some giggles from his other group members, they admitted that they had not formed their reasons. At that point, a student from another group, Kenny, raised his hand and said that he picked Graph C..." In contrast, later in the year, the teachers' analyses became more organized around particular events that they identified as noteworthy. No longer were their analyses simply chronological. Instead, the pre-service teachers were now able to identify significant features of instruction and focus their analyses in that area. This shift represents the development of a key component of noticing and has been identified by researchers an important aspect of teaching expertise (Berliner, 1994).

There was a shift in how the teachers discussed what they noticed.

Changes occurred not only in the topic of the teachers' comments but also in the ways in which they discussed these ideas. First, in both studies, the teachers began with an evaluative stance toward events that occurred during instruction. In the video clubs, for example, it was common for teachers to ask "What

should I have done?” or to suggest an alternative pedagogical approach that the teacher on the video might have used. Similarly, in the VAST study, early in the year when the pre-service teachers discussed videos from their classes, they focused on what had and had not “worked” and on what they might want to do differently next time. In one essay a teacher wrote “I wish I had handled much of this discussion differently,” and another noted, “I could have ... done a better job of enforcing rules about talking in turn and listening to others.” Later in the year, both groups of teachers focused more on interpreting what occurred rather than simply evaluating the teaching and learning that was evident in the video. Thus, for example, instead of focusing immediately on the effectiveness of a particular pedagogical approach, the teachers tried to understand the influence of that approach on the learning that occurred. And when evaluation of a particular situation did take place, it was preceded by careful interpretation of what had happened. We believe that this is a valuable shift and one that is closely tied to the goals of reform. As other researchers have stated as well, a focus on interpretation allows teachers to understand what has happened and to then use these understandings to inform their decisions of how to proceed (Hammer, 2000; Putnam & Borko, 2000; Sherin, 2001).

In addition to adopting an interpretive stance, the teachers also came to base their interpretations of what had occurred in evidence from the video. Teachers in both studies moved from talking generally about their practice to using specific events in the video as a resource for discussing particular ideas. For example, in the later video clubs, it was not uncommon for a teacher to ask to replay a segment of video so that he or she could more precisely discuss what a student had said. Similarly, the pre-service teachers initially talked broadly about what they saw happening in the classroom, stating, for example, “The students are really thinking in this lesson,” without being explicit about what in the video indicated “thinking” on the part of the students. Over time, however, they began to refer to specific student actions and comments in the video as representing “student thinking” and as illustrations of their claims. This use of evidence is important for several reasons, two of which we mention here. First, as they use evidence, teachers make connections between the events that they see and key ideas of teaching and learning. For example, teachers in the video club found that watching video helped them to develop a concrete vision of what a “community of learners” can look like in practice. “I got to see this culture of kids knowing that you expect them to interact and bounce off each other’s ideas and they aren’t going to just look at you for the answer all the time. That’s [a community of learners.]” Similarly, teachers in the VAST study developed more explicit definitions of discourse and inquiry. Second, basing one’s comments in evidence from the video allows other teachers to offer different interpretations of the same events and can raise the level of discussion and debate among the group. This is particularly valuable as teachers work together to examine and reflect on their teaching practices.

Implications

The results of this paper illustrate different ways that video-based professional development can provide teachers with opportunities to learn. While video has played an important role in teacher education for over three decades, more research is needed to understand the affordances of video for teacher education and those aspects of teacher cognition that are influenced by the viewing of video. In our research, we take an important step in that direction by examining how video can help teachers learn to notice — learn to notice new aspects of classroom interactions and learn to develop new techniques for making sense of these interactions. We found that both the video clubs and the use of VAST helped teachers to develop ways of noticing and interpreting classroom events that are in line with goals of mathematics and science education reform efforts. Furthermore, we believe that the types of changes that were observed in these studies have the potential to influence teachers’ classroom instruction. In ongoing work, we are currently examining the influence of teachers’ ability to notice on their classroom instruction and subsequently on students’ learning.

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