
Developing a Professional Vision of Classroom Events

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Imagine that you are standing at the site of an archeological dig. On your left, you see a large rock with a dent in the middle. Next to it you see a pile of smaller stones. Aside from this, all you see is sand. An archeologist soon appears at the site. What looked like just a rock to you, he recognizes as the base of a column; the small stones, a set of architectural fragments. And where you saw only sand, he begins to visualize the structure that stood here years before.

What is this ability to see and interpret a landscape that distinguishes the archeologist from the layman? To answer this, anthropologist Charles Goodwin introduces the term *professional vision*. According to Goodwin (1994), professional vision involves "socially organized ways of seeing and understanding events that are answerable to the distinctive interests of a particular social group," (p. 606). The idea is that, as we become part of a professional discipline, we are trained to look at and see a certain set of phenomena in a particular way. In the example just cited, the archeologist has learned to notice variations in the color, texture, and consistency of sand and to see collections of stones as possible elements of a larger structure. This then is part of the archeologist's professional vision.

Just as we say that archeologists develop professional vision, I believe that it makes sense to say that teachers develop professional vision. As teachers move from novice to expert pedagogue, they

form expertise in a number of areas. For example, experienced teachers are able to implement classroom routines fluidly, and they respond flexibly when something unexpected occurs in a lesson (Berliner, 1994; Leinhardt & Greeno, 1986). Here, I examine one area of teachers' expertise, the ways in which teachers learn to interpret classroom events. For unlike the archeologist who examines stones and sand, teachers look at classrooms. It is this professional vision concerning classrooms in action that is this focus of this chapter.

In addition to teachers, there are other groups that develop professional vision of classroom events. Educational researchers are one such group. In my own experience as a researcher, over time I have learned to look for and identify various aspects of the interactions that occur during mathematics classes. This perspective has been shaped primarily by observing in and watching videotapes of mathematics classrooms, and by studying the ways that teachers' understanding of mathematics affects their own actions in these classrooms. There are of course differences between the professional vision of teachers and researchers. Geologists, archeologists, and construction workers can all look at the same site, but see very different things. The same is true of teachers and researchers. My goal in this chapter is to examine some of the components of researchers' and teachers' professional vision. In addition, I explore the possibility that a shift in teachers' professional vision toward some aspects of what researchers attend to may help to support teachers' efforts to implement mathematics education reform.

To investigate the issues surrounding teachers' and researchers' professional vision, I present two personal stories. Both of these stories concern the development of professional vision specifically with respect to mathematics classrooms. I first explore the development of my own professional vision, and describe the key experiences that shaped how I have come to interpret classroom events. The second story is that of David Louis, a mathematics teacher with whom I have been collaborating for the past 4 years. In presenting David's story, I focus on the ways in which his interpretations of classroom events have changed during our collaboration. Before concluding, I identify three factors that contribute to the development of one's professional vision of classroom events that can further help to explain some of the distinctions between teachers' and researchers' professional vision.

HOW I LEARNED TO INTERPRET CLASSROOM PRACTICE

Analysis of video had always been an important feature of my graduate training at the University of California, Berkeley. However, a central experience for me came in 1992 when I joined the Video Portfolio Project (Frederiksen, Sipusic, Sherin, & Wolfe, 1998). The goal of the Video Portfolio Project was to design a performance assessment of mathematics teaching. A key component of the assessment was a "video portfolio" consisting of a set of videotapes along with background information and brief reflections. My role was to train those who would score the video portfolios.

The basis for the training was the idea that, when watching a videotape of a classroom, one first identified *callouts*, those episodes in the video that were noteworthy. Upon identifying a callout, one catalogued it according to the aspect of classroom practice about which it was noteworthy. After months of discussion and testing, we chose four areas that we hoped captured the essence of classroom practice: management, pedagogy, mathematical thinking, and climate. The idea then was to train scorers to catalogue each callout with respect to these four categories (Frederiksen, 1992).

I began, of course, by training myself. I had been a mathematics teacher prior to coming to graduate school, and I relied heavily on those experiences in order to understand the different activities that took place within a classroom. In addition, my previous experience analyzing video as a graduate student helped me to feel comfortable using a given analytic framework to view the classroom video. I found that it soon became relatively easy to identify callouts in a video and that, for the most part, my callouts and corresponding codings agreed with those of the other researchers involved. With time, I found that I could watch a videotape of a class period in its entirety, without stopping, and identify and catalogue the callouts. In a sense, identifying callouts can be thought of as a component of professional vision of classroom events. Given the length of a class period and the variety of activities and potential highlights, deciding where to focus attention is a critical step.

The following year, I began to focus on my dissertation research, which explored the role of teachers' content knowledge in the implementation of mathematics education reform (Sherin, 1996). I decided to use observations and videotapes of mathematics classrooms to study the ways in which teachers' content knowledge

training with two key changes. First, I identified new criteria for the callouts. Rather than looking for callouts in the areas of management, pedagogy, mathematical thinking, and climate, I now focused on those areas where teachers' content knowledge was likely to come into play (Leinhardt, Putnam, Stein, & Baxter, 1991). This included looking at the ideas and methods that students raised in class and how the teacher responded, the explanations given by the teacher, their choice of representation, and the teachers' responses to students' questions. Second, I did not rely exclusively on videotapes in order to analyze the classroom practice. Instead, I began to make my assessments on-line, during live classroom observations. Analysis continued after the observation, and was greatly aided by the videotape data. However, I found that I was able to identify most of the callouts during the original classroom observation.

What I want to emphasize here is that, through this process, I developed a professional vision of classroom events. I attended to specific kinds of events that occurred in the mathematics classroom and, in my case, these were events that involved the discussion of mathematical ideas. Furthermore, my professional vision was tuned not only to notice and catalogue these events as noteworthy; in addition, my goal was to interpret what the teacher or student had said and to determine what this implied about his or her understanding of mathematics.

At the same time, I began to meet regularly in video club meetings with the teachers I was observing. In these meetings, we watched and discussed excerpts of videotapes from the teachers' classrooms. Although I had originally hoped that the teachers would select the excerpts for us to watch, they felt that they did not have the time, and we decided instead that I would prepare the video excerpts for us to view together. In choosing these excerpts, I selected from those moments that I had noted already as callouts. Thus, I had essentially done part of the work of "seeing" for the teachers. Nevertheless, through our discussions I found that what the teachers noticed in these excerpts was often very different from what I had noticed. It was as if the teachers were using a different lens to interpret classroom practice (Gamoran, 1994). As a postdoctoral fellow at Stanford University, I continued my work with video clubs and explored the relationship between teachers' interpretation of video and their classroom instruction. It is in this context that I met David Louis.

DAVID LOUIS' STORY: CHANGING PERCEPTIONS OF CLASSROOM PRACTICE

My collaboration with David Louis began in January of 1996. I had just received a grant from the McDonnell Foundation to study mathematics teachers' efforts to implement the pedagogical reform Community of Learners (Brown & Campione, 1996; Shulman & Shulman, 1994). David had been teaching mathematics for 5 years, and for the previous 1 ½ years, he had been working to design and implement curricular units that he thought supported the Community of Learners principles. As part of our work together, I observed and videotaped, along with my colleague Edith Prentice Mendez, in David's classroom on a regular basis. In addition, the three of us met weekly to watch excerpts of video from David's classroom and, once a month, we participated in a video club with other mathematics teachers at David's school.

David's initial reaction to watching excerpts of video from his classroom was to question the pedagogical strategies that he had used, or failed to use. David would ask, "What could I have done here?" "How should I have responded to that question?" "What else might I have wanted to do then?" David's professional vision of classroom events focused on pedagogy, and in particular, on considering alternate pedagogical strategies that he, as the teacher, might have used.

For example, in May of 1996, David selected two video excerpts from a recent class to share with Edie and me. In this lesson, the students were using Cuisenaire Rods to create figures of different sizes that were shaped like people (Fig. 5.1). Students were asked to devise a method to find the surface area of the figure they had created. In the first video excerpt, a student, Amy, demonstrates her solution strategy for David. Amy's method involved finding the surface area of the limbs, the head, and the body, and then subtracting two for each point on the figure where two rods meet. The second excerpt came from later in the same class period. Here, David asks Amy to share her method with the class. Amy gives a brief explanation of her strategy, asks for questions from the class, but receives none. David then calls on the next presenter.

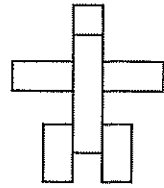


FIG. 5.1. The figure Amy had created out of Cuisenaire Rods.

In our meeting, David explained that he was frustrated because he believed that he had let a “teachable moment” slip away in not promoting discussion of Amy’s method. He asked “What could I have done at that point to maybe start some discussion on what she did and why that was useful?” David suggested that perhaps he should have pointed out to the class that Amy’s method of dealing with the contact points would work for any number of contact points. David also wondered how he might have used Amy’s method as a way of moving the class from an arithmetic representation of surface area to one that was more algebraic. In addition, David was concerned because he felt that, as the teacher, he needed to provide guidance for those students who would be presenting their work in class. David wondered how he might do this more effectively.

A few weeks later, David chose this lesson as the topic for a narrative case that he was asked to write. In the case, he explains

This situation created many questions for me. How could I have helped Amy better explain her method? What could I have done to assess and possibly enhance [the students’] understanding? I was excited earlier in the class because Amy’s solution seemed as though it could develop into a “teachable moment.” . . . It often depends on the teacher, though, to facilitate a discussion about the students’ ideas and the mathematical content. (Louis, 1996a, p. 3)

This example illustrates the ways in which David’s professional vision of classroom events emphasized the role that the teacher played in orchestrating classroom interactions. During instruction, David was constantly weighing a variety of options for the teacher, and he brought this perspective to viewing video of classrooms as well. In particular, when David looked at a video, he noticed what the teacher was or was not doing and considered what the teacher might have done. I found that this focus on pedagogy when watching video was not unique to David. The other teachers

participating in the video club had similar tendencies and often offered suggestions concerning what the teacher in the video might have done.

A Shift in Professional Vision

This focus on alternate pedagogical strategies was quite different from the usual stance I took in looking at classroom video. I tended to focus on interpreting the mathematical ideas that arose in class, while David seemed more focused on considering what action he should have taken in the given situation. Part of this difference, I believe, came from our two different points of view; David, as a teacher, was naturally concerned with what the teacher should do, while I, as a researcher, had the luxury to concentrate (sometimes at great length) on interpretation rather than on action.

Yet, it seemed to me that a focus on interpretation might also be valuable for David. In implementing the Community of Learners pedagogy, David had begun to open up his classes to mathematical discourse, and in particular to discussion and comparison of the ideas that students raised (Sherin, Mendez, & Louis, 2000). One of David’s primary roles then, was to interpret the students’ ideas as they came up in class and to help the class as a whole understand and build on these ideas. I hypothesized that because David’s attention when watching video was immediately drawn to pedagogical issues, he was unlikely to engage in a detailed examination of what had happened in the class and why this had happened. Therefore, I encouraged David to shift away from this focus on pedagogy and on *what might have happened* and move toward the goal of trying to make sense of *what did happen*. As a result, David began to analyze video in new ways, focusing on what were for him different aspects of classroom interaction. In particular, rather than focusing on the teaching that was evident, two other issues became central to David’s analysis of video. He began to closely examine the student ideas that arose as well as to consider the mathematics that was discussed.

This new perspective can be seen in the following example from the September, 1996, video club. At this meeting, David and two other teachers from his school, Ron Martin and John Yee, watched an excerpt from Ron’s classroom. Ron had recently joined the video club and was enthusiastic about sharing an excerpt from his classroom at the meeting. In the video, two students are talking with Ron about an assignment in which they are supposed to interpret the graph of a swim race. The graph represents the position of three swimmers with

respect to the time elapsed (Fig. 5.2). The students are discussing the first question given in the assignment: "Who jumps out of the blocks the fastest?" "The slowest?" The two students quickly agree that swimmer B jumps out of the blocks the slowest. However, the students are unclear as to whether swimmer A or swimmer C jumps out the fastest and they discuss this with the teacher.

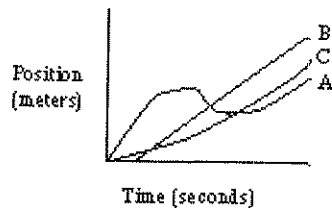


FIG. 5.2. The swim race: Who jumps out of the blocks the fastest? The slowest?

Jason: The slowest is C.

Barry: Yes C.

Jason: No, it's not. It's B. He jumps off after a couple of seconds.

Barry: Oh yeah.

Jason: I have a question.

Barry: The slowest is B.

Jason: Mr. Martin . . . his guy obviously jumps off the slowest because he is here (indicating swimmer B's position). These guys (pointing to swimmers A and C), don't they jump off basically at the same time?

Mr. Martin: Yes, when the race starts.

Jason: But why does it say the slowest and fastest? The slowest is this guy. But the fastest are both of them. Because even though this one is going faster . . .

Mr. Martin: I want, (pause) hold on.

Jason: But this one is going faster in the water. They both jump off at the same time.

Mr. Martin: Okay, so then say that.

No longer focused solely on pedagogy, David's initial response to the video concerns the content of Jason's comment. "That's a good point, that's a really good point. This (pointing to the graph) is their swim time." David is highlighting a contrast that he sees between the question asked in the assignment and the question that the students are trying to answer. David suggests that the assignment intends for the students to identify which swimmer has the fastest and which swimmer has the slowest initial speed. But, he claims that the students are trying to figure out which swimmer has the quickest reaction time. Furthermore, David argues that the swimmers' reaction time cannot be determined from the given graph. Ron and John disagree with David's claim. They point out that time elapsed is represented on the graph in seconds, therefore swimmer A can be considered as having the fastest reaction time.

After this initial discussion of mathematics and of the students' ideas, Ron turns the group's attention toward pedagogical issues and asks about his own interaction with the two students. Ron explains that he wanted the students to discuss the issue of initial speed among themselves. Ron knew that he did not want to answer their questions directly, yet at the same time, he was unsure of how to facilitate a discussion among the students. This was Ron's first video club meeting, and his comments are reminiscent of the types of questions and issues that David had raised in the past. In contrast, David's response to Ron at this point indicates a very different perspective. Rather than responding to Ron's pedagogical concerns, David continues to pursue a discussion of student ideas. Because the group had not yet come to consensus concerning the meaning of Jason's comment, David wished to investigate this further, and he asked the group to watch the video excerpt once again with this in mind.

David's response illustrates the depth to which he had begun to value understanding of what had happened during a small segment of classroom interaction that he watched on video. Much like a researcher, David tried to piece together comments from the video into a coherent story about what had occurred. Furthermore, David did this with a particular goal in mind, making sense of student ideas

that appeared on video as well as the mathematics under discussion. Although it is possible that David was more interested in focusing on student thinking than on pedagogy because the excerpt came from Ron's classroom instead of David's own, additional data show that this is not the case. In looking across the video club data, it is clear that David's primary interest was no longer on pedagogy—whether or not he was the teacher being viewed. In its place, David had become comfortable looking closely at excerpts of video to try to understand what had occurred, to find the meaning in students' comments, and to understand the mathematics that had been discussed.

Over time, David himself became quite aware of this shift in his professional vision of classroom video. In the spring of 1998, he wrote a summary of our collaboration up to that point. On his own initiative, David discussed this change in perspective as a critical part of his experience.

When I first started reviewing video, my perspective was "How could I have done that differently?" or "What could I do next time to make that a better lesson?" With this lens, I had difficulty understanding the mathematics, the interactions among the students and between me and the students. My colleagues taught me to view the tapes with a different lens. They taught me to separate myself as teacher from myself as viewer. They taught me to try to understand the mathematics and the interactions because that is what was interesting (Louis, 1998, p. 8).

I claim that this new stance on interpreting video of classroom events reflects an important element of a researcher's approach—an orientation toward viewing video as an observer rather than from the perspective of one who must act on what is seen. Furthermore, within this perspective, David was being analytic about specific issues that are of great importance today in mathematics education research. To be clear, I do not mean to imply that teachers' professional vision is any less professional or less analytic than researchers' professional vision. On the contrary, teachers' standard focus on pedagogy can be quite analytical—it is just that the categories of this analysis differ between researchers and teachers. Then why encourage David Louis to take on the perspective of a researcher when watching video? Why not let teachers be teachers and researchers be researchers, each analytic in their own way? In the next section, I try to answer these questions by showing that this shift in professional vision with respect to video influenced David's teaching practice in valuable ways.

Impact on David's Teaching

Thus far, I have illustrated a shift in David's professional vision of classroom events by describing new ways that David began to look at video. However, this shift in professional vision was not limited to David's reaction to watching videotapes of classrooms. David also began to look at classroom events somewhat differently during his own teaching. In particular, as he had done with video, David now began to look more closely at the mathematics and at the student ideas that arose during instruction. In doing so, David developed new teaching practices that aligned with a central goal of recent mathematics education reform efforts.

When asked how his experience in the video club had influenced his teaching, David offered two examples. First, David explained that in the video club, he began to focus in a detailed manner on the ideas and comments that students raised. Somewhat surprising to him, David found that this new focus on student thinking also permeated his classroom instruction. Specifically, David said that he spent more time during instruction trying to understand the flow of ideas in the classroom. For example, in some instances, David slowed down the pace of whole-class discussions so that he could follow the different ideas that came up and could decide how to proceed with the lesson. In addition, he implemented several new instructional strategies including asking probing questions, rephrasing students' ideas, and introducing graphical or pictorial representations in order to make sense of and elaborate on student thinking. This emphasis on understanding the ideas that students offer is one of the hallmarks of mathematics education reform. In David's case, he first learned to engage in such analysis via video, yet he soon came to apply this perspective in his teaching as well.

Here's what [the video club has] done for me . . . it's enabled me to consciously, really listen and to try to understand what students are saying. Cause so often I find myself . . . almost saying something before a student's even done. I'm not even listening to what they're saying. And so it's helped me to slow down my own thinking and the classroom discussion, so I feel like the kids are actually listening to other kids, and I'm actually listening to what they're saying and responding to what they're saying, not to what I want to respond to . . . I think it's helped . . . to make me more aware of the specific things that are being said in discussions.

Second, David explained that he had developed a somewhat different technique for reflecting on his teaching. When watching video, David was often drawn to particular moments within the video that seemed to require analysis. He later found himself doing the same during instruction. For instance, while teaching, David would identify what was essentially a callout, a noteworthy moment of instruction that he planned to reflect on further after the lesson. David kept a journal in which he would write about these moments, and he found that doing so helped him to learn even more about his students' thinking.

For example, one day in November of 1996, David and his students were exploring the relationship between fractions and ratios. A student suggested that "you could build $\frac{2}{5}$ into $\frac{4}{10}$ " because if you "divided $\frac{4}{10}$ by 2, it was the same as $\frac{2}{5}$." David understood that one actually needed to divide $\frac{4}{10}$ by 1, which could be represented as $\frac{2}{2}$, in order to reduce $\frac{4}{10}$ into the fraction $\frac{2}{5}$. Therefore, he asked the class, "Is this dividing by 2?" The students then engaged in a lively discussion of the relationship between the fractions $\frac{2}{5}$ and $\frac{4}{10}$. In writing about the discussion after class, David reflected on what the students understood about the mathematics involved. In addition, he considered why they held certain beliefs and how their experiences with mathematics thus far might have influenced their understanding of simplifying fractions.

I don't think any of them had any idea that it was dividing the ratio by a form of one, $\frac{2}{2}$. Why should they? Their use of simplifying so far this year has been to reduce the ratio of a . . . geometric figure, [and to create a new geometric figure with the same shape but] a smaller size. Simplifying the ratio would actually [involve] dividing each of the two lengths by the same number . . . so they would see it as two division problems . . . Julie even commented that it doesn't make sense to divide the number by one. She said that if you divided it by one, then you would not actually be changing the value at all. The reason she said this, I'm hypothesizing, is that it seems like dividing by one, would not change the size of the [geometric figure]. (Louis, 1996b, p. 6)

This example illustrates how David had begun to use what he recognized during instruction as a callout as the basis for reflection and analysis after instruction. Furthermore, his reflection is again focused on understanding and interpreting the student ideas and the mathematics that were discussed during class.

In sum, although the shift in David's professional vision of classroom events began in the context of watching videotapes, David

also developed a new way of "seeing" classroom practice during instruction. Rather than focusing exclusively on the teacher's role, David spent time during class trying to understand students' comments and ideas about the mathematics under discussion. In addition, an important part of reflecting on his teaching came to involve writing about critical moments of instruction, trying further to make sense of what had happened and why.

Over the last 10 years, those involved in mathematics education reform have come to recognize the critical role that teachers play in the implementation of reform and that, for many teachers, implementing reform involves making changes in their teaching practices. As a result, mathematics educators have been exploring a variety of ways to help teachers make these changes and move toward mathematics teaching that is based on the goals of reform. I claim that for David Louis, the process described in this chapter provided that support. As David came to interpret classroom events in new ways, his teaching changed as well. In particular, David developed teaching practices designed to support a key aspect of mathematics education reform—a classroom in which student ideas are at the center.

ISSUES IN THE ANALYSIS OF PROFESSIONAL VISION

In the stories that I have presented, I contrast the professional vision of a researcher with that of a teacher. However, I believe that it would be a mistake to limit ourselves to such a simple characterization of the issues involved here. As a first step toward exploring this more deeply, I introduce three factors that contribute to the development of professional vision of classroom events: (1) our role in the classroom, (2) the medium through which we observe a class, and (3) the strategies we use to interpret the practice.

Interpreter's Role in the Classroom

One's role in the classroom clearly influences one's perspective on classroom practice. For example, as shown here and as documented by other research (Copeland, Birmingham, D'Emidio-Caston, & Natal, 1994), teachers tend to respond to instances of classroom interactions in terms of pedagogy. And this makes sense—a teacher's job is to make pedagogical decisions, hence the focus on pedagogy. Similarly, we would expect a curriculum designer working on

revisions to have a particular focus and an administrator evaluating a teacher to have a different focus. Each of these people comes to the classroom with his or her own professional identity and related to this, his or her own understanding of the key features of classroom practice. My point here is that our professional vision is tuned to helping us perform the tasks that we do.

Medium Through Which Classroom is Interpreted

A second key influence on our professional vision is the medium through which a classroom is viewed. Clearly, observing a class live is different from watching it on video or reading a written transcript of the lesson. These media present the viewer with different kinds of information and therefore focus the viewer's attention in different ways. For instance, when observing a classroom live, one can decide where and how to pay attention to the variety of activities taking place. In contrast, a viewer cannot change what is presented on a video of a classroom—if a student's initial comment is of interest, but the student then moves "off camera," there is nothing the viewer can do but to look elsewhere on the video. Similarly, a transcript can provide the viewer with the comments of all participants, but other key contextual features of the interaction may not be available. It is interesting to note that, in some cases, a video of a classroom can provide access to conversations that would otherwise be inaccessible to an observer. Through the use of a wireless microphone, a videotape can capture conversations that the teacher has with individual or groups of students even when they are not in earshot. And although there is no way to observe two groups simultaneously using multiple cameras, video can record the work of more than one group of students on the same activity.

Another important medium I want to consider is teaching. I claim that not only does a teacher have a specific job to do in the classroom (this has just been mentioned above in discussing the interpreter's role), but in addition the act of teaching provides its own set of cues for interpreting classroom practice. Thus, while both observing and teaching are live, I find that the information one receives as a teacher is very different from the information presented to a classroom observer. For example, in interpreting classroom events, a teacher takes into account a great deal of background information about the students, the lesson, and the school. An observer would simply be unaware of much of this. In sum, different media such as observing,

teaching, and viewing video affect what one sees and hears and, as a result, where one focuses attention in the classroom.

Strategies for Interpretation

The third factor I want to introduce concerns the strategies we use to focus our interpretation. For example, consider the following two such strategies. We can begin by identifying callouts, and can then identify the aspect of classroom practice for which the callout is noteworthy. In this case, we may find that two people identify the same callout, but for different reasons. In contrast, a second strategy would be to first narrow the lens through which we plan to view the classroom practice. It is then through this lens that we would identify callouts. Thus, if your purpose is to catalog student conceptions, then that is precisely what you look for.

So how do these three factors help us to untangle the differences between the professional vision of teachers and researchers? First, consider the interpreter's role. A teacher's role in a classroom is very different from the role of a researcher and our professional vision will reflect this. In other words, because teachers and researchers have set out to do different jobs, they inevitably pay attention to different things in the classroom. Second, the medium of interpretation is an issue. Professional vision in relation to video is simply not the same as professional vision in relation to teaching. And in general, researchers' professional vision is for observing and for watching video, whereas teachers' professional vision is for teaching. Therefore, researchers' and teachers' professional vision are by their nature two very different perspectives.¹ With respect to the third factor, interpretation strategy, there are also distinctions worth noting. For example, researchers often choose a specific focus for their examination and then look for callouts within that area. In contrast, teachers tend to look at classroom practice on a broader scale, keeping track of multiple issues and decisions at the same time and assessing classroom practice as a whole.

Thus far, I have discussed each of these three factors individually. Yet I do not mean to imply that they are distinct influences on our

¹ There are a growing number of cases in which the teacher acts as both teacher and researcher (for example, see Ball, 1993; Heaton, 1994; and Lampert, 1989). It would be interesting to explore the ways such teacher researchers use different media to interpret classroom practice and how their interpretations differ in these varied contexts.

professional vision. Much the opposite, these three factors most likely interact throughout the development of one's professional vision. For example, it is partly because teachers interpret classroom practice through the medium of teaching that they tend to adopt a particular focus and strategy. Nevertheless, I have considered them separately up to this point in order to highlight some of their distinct contributions to one's professional vision.

Before concluding this section, I want to review the story of David Louis in light of the three factors that I have introduced here. I believe that doing so can provide further insight concerning why and how David's professional vision was transformed. In particular, I claim that the medium of interpretation played a significant role in the initial change that occurred in David's perspective. Watching video prompted David to both take on a new role for himself and to use a different kind of interpretation strategy.

When David began to view classroom practice via video, it was not only the medium of interpretation that changed. David also accepted a new role for himself in this context—the role of an observer. In a conversation with a fellow teacher, David explained that when he watched video of his own classroom, he felt much more like an observer than a teacher. He simply did not need to respond to the video in the ways that he was used to doing as teacher. In particular, when teaching, David needed to attend simultaneously to multiple aspects of classroom practice. In contrast, when watching video, David was able (and willing) to take a much narrower view of classroom interactions, and, for example, to disregard management issues. As an observer, David felt more in control of which issues he choose to explore.

In addition to adopting a different role for himself, David also developed a new interpretation strategy. Again, I claim that video was a key factor here. Video simply lends itself to a different kind of analysis than is possible during teaching. In David's case, he began to recognize moments of instruction that appeared on video that he did not fully understand.

In addition, he found that he could use the video as a resource in pursuing an investigation of what had happened. This shift in interpretation strategy went hand in hand with David's new focus on student thinking and mathematics. Being more of an observer and having video as a resource allowed David to explore new avenues for interpreting classroom practice.

What I find particularly interesting in David's story is that this shift in perspective affected not only the way in which David viewed

video of classroom practice, but also affected his teaching. Thus, even when he returned to his standard medium for interpreting classroom practice—the classroom, he brought with him this new interpretation strategy. And in addition, he maintained part of the stance that he had acquired as an observer of classroom practice. David began to mold his instruction and his interactions within the classroom so that they supported this new professional vision. Examples include "slowing down discussion" and taking time to "understand students' ideas." David also brought the notion of callouts to his teaching; he began to notice, while teaching, moments of instruction that he found interesting and wanted to consider further after class.

CONCLUSIONS

In this chapter, I argued that both teachers and researchers develop professional vision of classroom events. In particular, we examined the case of one teacher, David Louis, who moved from an initial emphasis on pedagogy to a more critical stance toward student thinking. I claimed that in making this shift in perspective, David turned toward some aspects of what researchers typically attend to, and perhaps beyond the standard trajectory of most teachers' professional vision.²

I want to be clear, however, that I do not mean to dismiss teachers' focus on pedagogy as unimportant or not valuable. Thus, my point is not that David's initial focus on pedagogy was any less valid than his later focus on student thinking, nor am I suggesting that our goal should be to encourage teachers to stop thinking in terms of pedagogy.

Instead, I offer David's story as one possible trajectory in the development of teachers' professional vision of classroom events. Moreover, this was a trajectory that David believed contributed positively to his teaching and that aided his efforts to implement mathematics education reform. I claim that profitable changes can occur in teachers' practices when they see as their goal the

² It may also be the case that participating in video clubs with teachers influences the trajectory of researchers' professional vision of classroom events. In other work, I describe how the complementary character of the expertise brought by the teachers and the researcher in a video club influenced the ways that all participants learned to interpret classroom videos (Gamoran, 1994).

understanding of classroom practice as it unfolds. Furthermore, I find that reflecting on video can be a key catalyst in supporting the development of teachers' professional vision in this area.

Finally, I want to make one strong claim about video clubs: I believe that when teachers look at video, as in video clubs, it is essential that they learn to adopt a focus on interpretation before commenting on pedagogy. That is, before exploring pedagogical alternatives, teachers should examine what has happened, what student ideas arose, where the class is making progress, and what difficulties have come up. It is this shift in perspective then, in professional vision, that teachers carry back to their classrooms, and that affects the stance through which they interpret mathematics teaching and learning.

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REFERENCES

- Ball, D. L. (1993). With an eye on the mathematical horizon: Dilemmas of teaching elementary school mathematics. *Elementary School Journal*, 93, 373-397.
- Berliner, D. C. (1994). Expertise: The wonder of exemplary performances. In J. M. Mangier & C. C. Block (Eds.), *Creating powerful thinking in teachers and students: Diverse perspectives* (pp. 161-186). Fort Worth, TX: Holt, Reinhart & Winston.
- Brown, A. L., & Campione, J. C. (1996). Psychological learning theory and the design of innovative environments: On procedures, principles, and systems. In L. Schauble & R. Glaser (Eds.), *Contributions of instructional innovation to understanding learning*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Copeland, W., Birmingham, L. D., D'Emidio-Caston, M., & Natal, D. (1994). Making meaning in classrooms: An investigation of cognitive processes in aspiring teachers and their peers. *American Educational Research Journal*, 31, 166-196.
- Frederiksen, J. R. (1992, April). *Scoring video portfolios*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco.
- Frederiksen, J. R., Sipusic, M., Sherin, M. G., & Wolfe, E. (1998). Video portfolio assessment: Creating a framework for viewing the functions of teaching. *Educational Assessment*, 5 (4), 225-297.

- Gamoran, M. (1994, April). *Informing researchers and teachers through video clubs*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.
- Goodwin, C. (1994). Professional vision. *American Anthropologist*, 96, 606-633.
- Hammer, D. (1999). *Teacher inquiry*. Newton, MA: Center for the Development of Teaching, Education Development Center, Inc.
- Heaton, R. M. (1994). *Creating and studying a practice of teaching: Elementary mathematics for understanding*. Unpublished doctoral dissertation, Michigan State University, Lansing.
- Lampert, M. (1989). Choosing and using mathematical tools in classroom discourse. In J. Brophy (Ed.), *Advances in research on teaching* (pp. 223-264). Greenwich, CT: JAI Press.
- Leinhardt, G., & Greeno, J. G. (1986). The cognitive skill of teaching. *Journal of Educational Psychology*, 78, 75-95.
- Leinhardt, G., Putnam, R. T., Stein, M. K., & Baxter, J. (1991). Where subject knowledge matters. In J. Brophy (Ed.), *Advances in research on teaching: Vol. 2* (pp. 87-113). Greenwich, CT: JAI Press.
- Louis, D. A. (1996a, July). *Amy's baby: A case study*. Paper presented at the FCTL Case Writing Conference, Stanford University.
- Louis, D. A. (1996b). *Reflections on building a community of learners in a mathematics class: A teacher's journal*. Unpublished manuscript, Stanford University.
- Louis, D. A. (1998). *Understanding communities of learners in a mathematics classroom: Summary report to the Spencer Foundation*. Unpublished manuscript.
- Sherin, M. G. (1996). *The nature and dynamics of teachers' content knowledge*. Unpublished doctoral dissertation, University of California, Berkeley.
- Sherin, M. G., Mendez, E. P., & Louis, D. A. (2000). Talking about math talk. In M. Burke (Ed.), *Learning mathematics for a new century, 2000 Yearbook of the NCTM* (pp. 188-196). Reston, VA: National Council of Teachers of Mathematics.
- Shulman, L. S., & Shulman, J. H. (1994). *Fostering a community of teachers: A proposal submitted to the Andrew W. Mellon Foundation*. Unpublished manuscript, Stanford University.