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Noticing Noticing: How Does Investigation Of Video Cases Change How Teachers Reflect On Their Experiences?

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Abstract

This study investigated the following question: *To what extent and in what ways might using video help interns reflect on their discussion-based teaching in a more complex manner than when they use memory-based written reflection?* Three elementary interns participated in the study. Findings suggest that video-supported reflection enabled interns to: write more specific (versus general) comments about their teaching than writing from memory; shift the content of the reflections from a focus on classroom management in memory-based reflections to a focus on instruction when video was available; and focus less on themselves and more on children when they reflected on video clips of their teaching. We discuss the power of video-based reflection to help interns revisit, notice, and investigate how they facilitate classroom discussions.

"*All we ever do is reflect!*" is a typical refrain heard by those of us who teach interns and student teachers to write about their teaching. Indeed, "reflection" is such a common practice in teacher education that although our students may question its value, we rarely do (Fendler, 2003). A standard assignment intended to help pre-service teachers learn from their teaching is to ask them to write a reflection from memory after they have taught a lesson. The format of this reflection may be disputed, but the idea of learning from reflecting on one's memory of teaching a lesson is rarely questioned.

Since Dewey's (1938) seminal writing on the complexity of learning from experience, teacher educators have wrestled with the challenge of supporting pre-service teachers to go beyond just having experiences to actually learning from them (Feiman-Nemser & Buchmann, 1985; Munby & Russell, 1994). Many teacher educators are exploring technology for its potential to help pre-service teachers learn from their experience in facilitating discussions. However, although we may assume that reflections using video are superior to written or verbal reflections that rely solely on memory, this assumption is based largely on impressions rather than systematic inquiry. Thus, this study investigated the following question: *To what extent and in what ways might using video help interns reflect on their discussion-based teaching in a more complex manner than when they use memory-based written reflection?* This article discusses findings from an investigation of three pre-service elementary intern teachers' memory-based and video-based reflections on their facilitation of discussions.

We begin with an explanation of how we conceptualize teacher change, and why we chose classroom discussions as a site for studying pre-service teacher learning. Next, we elaborate on our research questions and describe the study's methodology. Then we report three major findings: video-supported reflection helped interns to: write more specific (versus

general) comments about their teaching than writing from memory; shift the content of the reflections from a focus on classroom management in memory-based reflections to a focus on instruction when video was available; and focus less on themselves and more on children when they reflected on video clips of their teaching. Finally, we discuss the power of video-based reflection to help interns revisit, notice, and investigate how they facilitate classroom discussions.

Theoretical Perspective

Defining Teacher Change

Teacher change is made possible when practitioners value uncertainties and disruptions as rich sites for learning, and when they make connections between their experiences and practical knowledge (Britzman, 1991, Field & Latta 2001). Dewey (1938) pointed out that participating in classroom life is not necessarily "educative" unless it is oriented to purpose and guided with curricular ends in view. Almost 50 years later, Paley (1986) noted that, "real change comes about only through the painful recognition of one's own vulnerability" (p.123). Her influential study established the importance of that era's technology—the tape recorder—in capturing vulnerability. More recently, Field and Latta argued that, "the possibility of becoming more experienced arises only when something happens to us beyond what we anticipate" (p. 887). This study investigated if reflection on facilitating classroom discussions with the aid of video is a better tool for creating the dissonance that fosters learning than reflecting based on one's memory of events.

This research intersects with Kennedy's (2005) study of the development of practicing teachers' craft knowledge (e.g., concerns with lesson flow, content coverage, student learning). The study showed that even the use of non-evaluative questions to guide teachers in selecting

video clips highlighting their "moment-to-moment" decisions produced mostly "evaluative judgments of their practices" (p. 209). Moreover, even when teachers are dissatisfied with their performances, "less than half of all such experiences lead to explicit statement of new ideas" (p. 212). Although our study focused on pre-service teacher interns, Kennedy's study is of interest because of its focus on teachers' decisions about extraction of video clips of their teaching. Additionally, teacher change with respect to the facilitation of classroom discussions may broadly be understood as what Kennedy refers to as 'craft'.

Van Es & Sherin (2002) and Sherin & van Es (2005), who studied what teachers learn to "notice" when they use video as a tool, concluded that teachers need to: (a) learn to pay attention to what is important; (b) make connections between specific classroom interactions and the broader concepts and principles of teaching and learning they represent; and (c) use what they know about their own teaching context to reason about a given situation. Thus, what teachers notice and how they interpret classroom events are key aspects of teacher change.

Classroom Discussions as Key Sites for Studying Learning From Experience

We selected classroom discussions as the context for studying teacher change for several reasons. Since discussions are a particularly complex aspect of teachers' lived experience, they provide a rich site for studying whether teachers make a transition from 'having' experiences to learning from them (Feiman-Nemser & Buchmann, 1985; Munby & Russell, 1994). Moreover, many educators claim that highly interactive discussions that engage students in the production of knowledge can broaden and deepen students' conceptual understandings in all disciplines (Almassi, 1996; Applebee, Langer, Nystrand & Gamoran, 2003; Au, 1993; Gambrell & Almasi, 1996; Barnes, Britton & Torbe, 1990; Johnston, 1999; Nystrand, Wu, Gamoran, Zeiser & Long, 2001; Palincsar, M., Anderson, C., & David, Y., 1993; Sawyer, 2004). Learning to facilitate

effective classroom discussions is an important area of expertise that all teachers need to develop, and thus an important goal for supporting the learning of beginning teachers.

Given the complex dynamics of classroom discussions, it is difficult to document them for further analysis and reflection. Studying video records may shift interns' attention from the exploration of vague perceptions about what transpired (Ball & Cohen, 1999; Kennedy, 2002) to a more complex and evidence-based analysis of whether and how classroom interaction in discussions promotes student learning in literacy and other content areas. Kennedy's (2002, 2005) research on what teachers learn from viewing videotapes of their teaching found that many teachers seem to learn only from negative experiences. We investigated this matter further, following the arguments offered by several researchers (Borko, 2004; Davis, Sumara & Luce-Kappler, 2000; Mason, 2002; Ollerton, 2000; Sherin & van Es, 2005; van Es & Sherin, 2002), that explicit noticing is critical to change since if you do not notice, you cannot choose to act differently. Clearly, research also indicates that the intersection of technology and pre-service teacher education might lead to increased literacy achievement (Alvermann, 2002; Ferdig, Rohler & Pearson, 2002; Hughes, Packard & Pearson, 1998; Labbo, Kinzer, Leu & Teal, 2004; Meyers, Hammet & McKillop, 1998).

Some researchers have noted that video technology has the potential to help teachers examine their ability to facilitate discussions by slowing down the fast pace of classroom life so that explicit noticing of aspects of the discussion can be further analyzed. (Sherin & van Es, 2005; van Es & Sherin, 2002). That same 'slowing it down' capability of video technology also facilitates what we notice as researchers: interns' video reflections provide windows through which we may view and understand teacher change.

To pursue our main research question, *To what extent and in what ways might using*

video help interns reflect on their discussion-based teaching in a more complex manner than when they use memory-based written reflection?, we asked four subsidiary questions:

- What is the nature of the observations interns make in each condition? How specific or general are their observations?
- What topics are mentioned and how frequently are they mentioned (e.g., classroom management, instruction)?
- What, specifically, do interns notice about each topic (e.g., about themselves, children, student achievement, teacher moves)?
- What do interns learn from writing a reflection? Are they taking an analytical or evaluative stance toward their teaching, or are they mostly describing what happened? Do they have any important insights about their teaching?

Research Methods

Participants and Setting

Three elementary interns who took part in a year-long internship at a Midwestern university volunteered to participate in the study.[1] At the time of the study, the interns were engaged in the second half of their internship where they taught five days per week for eight weeks. Allie taught first grade in an urban school where she was trying out a new approach—using a story dictated by a student in the class to discuss possible ways to edit it. Both videotaped lessons included in the study focused on editing a piece of writing. Kim taught first grade in a suburban school where she videotaped herself teaching a literature-based lesson featuring the use of the children's own questioning while reading, and a science lesson

1 After earning a baccalaureate degree, interns participate in a year-long internship while taking two Master's courses per semester to earn teacher certification. During data collection (spring semester) interns were taking a course in literacy methods and math methods.

discussing whether a substance—oobleck—is considered to be a liquid or a solid. Martha taught third grade in a suburban school. One video-taped lesson featured a discussion of a fairy tale. Her video-taped science lesson was not included in the study because of technical problems.

Data sources

Initially, the interns were interviewed for approximately 30-45 minutes regarding their beliefs about discussions and the role of discussions in teaching language arts and science lessons. Subjects then led (and videotaped) two classroom discussions and emailed reflections about the lesson to the research team. Next, interns reviewed videotapes of their classroom discussions, used a multimedia editor to select excerpts for analysis, and provided written commentary on the excerpts. Finally, the interns were interviewed and they were asked to explain their choice of video excerpts and talk about the value of using video to reflect on their teaching as compared with basing reflections on memory only. All interviews were audio taped and transcribed.

Data Analysis

A cross-case analysis was used, comparing data from interns' written reflections immediately following the teaching of their lessons with video-supported written commentaries where interns explained their reasoning for selecting particular video excerpts. Transcripts of interviews were used to gain insights into interns' perceptions of their teaching and whether they value the two types of reflective activities.

Subdividing reflections in chunks and segments. The reflections based on memory were typically written in paragraph form where interns described what happened, shared impressions, and made comments about what stood out to them in the lesson. The reflections based on video excerpts were written either as separate paragraphs in complete sentences, or were notes and

ideas jotted down without attention to paragraph and sentence structure. All texts were subdivided into smaller sections for coding purposes.

A “chunk” represented a section of prose that was centered around one idea or topic. Written responses were subdivided into 46 chunks for the video reflection and 44 chunks for the reflection from memory. For example, the following passage was considered a chunk: "I liked how I asked Jordan if he had an idea. I was trying to follow through with the thought that everyone needed to have an idea and keeping the students accountable." The intern referred to a specific instance and then elaborated on the same topic.

Chunks were further subdivided into “segments” that represented a specific, bounded thought. There were 143 segments from the memory condition and 136 segments from the video condition. For example, the chunk referred to earlier was subdivided into two segments: (1) "I liked how I asked Jordan if he had an idea"; and (2) "I was trying to follow through with the thought that everyone needed to have an idea and keeping the students accountable." Below we will discuss how these two ways of subdividing the texts facilitated the coding process.

Developing coding categories. Each intern’s reflections were read several times to identify categories. These were later refined and relationships among them were articulated. For instance, we noticed that interns focused on classroom management when reflecting on lessons from memory. We asked if the same focus occurred using videotape, and found that there were more statements focused on their instruction. These two broad categories—management and instruction—became major organizers for looking more specifically at what details the interns noticed.

Two main codes emerged in relation to the nature of the observations interns made in each condition. A comment was considered to be general if it was a global observation, or

referred to a general idea, concept, theory, or principle. For example, Martha commented, "Overall, I feel that the discussion went okay." A comment was considered to be specific if it referred to a particular moment in the lesson or a specific child, or if the intern discussed a pattern or grounded a comment in a specific theory. For example, Allie said, "I also noticed how we would get stuck on one suggestion about editing the text."

We also looked at the topics interns mentioned, their frequency, and what specifically they noticed about each topic. Consistently, interns' ideas reflected two broad topics: classroom management and instruction. Comments related to classroom management focused on two main sub-topics: self or the children. Comments related to instruction discussed three main sub-topics: self, children, or teacher moves (listening, probing). When speaking of children, interns sometimes referred specifically to student achievement, and at other times their comments were about how their instruction affected children on a more general level. Table 1 provides definitions of the 7 codes and examples from the written texts.

--Insert Table 1: Codes Related to Topics Discussed--

Finally, we looked at what interns learned from writing a reflection, whether they took an analytical or evaluative stance versus only describing what happened, and identified insights about teaching. These ideas were coded as insights about either management or instruction when interns made statements that showed they recognized what they could or should have done in a specific situation. For instance, in relation to instruction, Allie commented, "Therefore, I need to realize when to provide instruction and direction during a discussion to keep it moving." Martha explained how her management and instruction were connected, "Again, having to stop and remind students to stop blurting and to focus (basically just addressing behavioral issues) really took away from a large amount of learning time."

Assigning codes to chunks and segments. A numerical value (1) was assigned each time a chunk or segment was given a code. The categories "specific observation" and "general observation" were coded by chunks rather than segments since we wanted to get a more global sense of the intern's stance. In a few cases, a chunk was marked both "specific observation" and "general observation" when the intern offered both types of reflection within a chunk. For example, in this chunk the intern made a general observation, "Hands on lessons with materials like this are often difficult to manage and get through" and followed up with a specific observation about the lesson, "I am amazed at what a great job they did with it" (Kim, video 2).

The remaining categories were coded by segments. Most segments received two or three codes as multiple categories frequently applied to a given segment. In the video condition, 76 segments were coded two or three times, 21 segments received only one code, and the remaining received four, five, or six codes. In the memory condition, 83 segments were coded two or three times, 36 were single coded, and the others received four, five, or six codes. Frequently, the multiple coding occurred in the instruction and management categories since the intern often commented on issues that involved the interplay of management with instruction. For example, one of the interns explained, "I wanted them to raise their hand and tell the class." In this statement, she was referring to a management technique for facilitating classroom discussions and how her management directly contributed to learning.

Investigating patterns in the written reflections. Percentages of the frequency of codes were calculated on Excel by dividing the number of times each category was indicated by the total number of segments in the applicable condition (video or memory). Although these figures provide a helpful lens for pointing to patterns and for understanding the relative frequency of each category, they cannot be considered precise numerical representations of the data since

many segments were coded multiple times. The frequency that each category appeared in the video condition was compared with the memory condition. The difference in percentages was considered meaningful if there was at least a 5% difference between the video and memory conditions.

Interviews. Transcribed interviews were reviewed to gain access to interns' thinking about their experiences with reflecting on their teaching, and to find out which condition they valued more and why. We also used the interviews for triangulation purposes. For instance, we looked for whether interns' comments about their own learning during interviews matched ideas in their written reflections that we coded as "insights."

Results: Noticing Specifics About Instruction and Children with Video

There were three main differences in the reflection facilitated by video-based reflection as compared with memory-based reflection. First, interns tended to make more specific observations in the video condition. Second, interns discussed instructional elements of their teaching more than behavior management when using video. Third, in the video condition interns paid more attention to the children in terms of instruction, student achievement, and listening to the students, thus moving the focus away from self and onto the children. In order to present a more comprehensive view of what happened under the memory condition and the video condition, the examples given in the sections below will feature Kim's two lessons, but as we will illustrate later, these patterns hold for the other interns as well.

Kim's Literacy and Science Lessons

Kim's language arts lesson was part of a unit that featured the teaching of reading comprehension strategies during read-alouds. The lesson focused on the "asking questions" strategy based on Raphael's (1984) research. For her internship course work, Kim adapted five

of the anchor lessons on the questioning strategy from a professional resource (Miller, 2002). She introduced the lesson by reminding the children that “good readers ask questions before, during and after the story." She explained that she would begin reading the book *An Angel for Solomon Singer* by Cynthia Rylant, but would stop and write down student questions as they emerged. The first question she fielded was from a boy who complained that repeated pauses (to write down questions) spoiled the story. While acknowledging his complaint, Kim followed her lesson according to plan, and proceeded to field and record questions. About mid-way through the lesson the children shared ideas with partners. She stopped the lesson half way through the story, since the number of questions became cumbersome and slowed the pace.

Kim's second lesson was part of a unit on states of matter, and included a demonstration and discussion of the colloid “oobleck” (a combination of cornstarch and water that possesses traits of both a solid and a liquid). This lesson was located in the tradition of ‘hands-on,’ inquiry-based science instruction. It demonstrates how developing the literacy skill of discussion is fundamental to learning across the curriculum. Steele (1998), for example, discussed the value of speech as a means by which learners attach meaning to concepts, thereby constructing knowledge. Kim had students sit on a rug in a circle, a departure from her typical arrangement of having students sit at their desks. First, she showed the students the substance and asked them to determine whether it is a solid or a liquid. The oobleck piqued the students’ curiosity and they participated actively in the discussion. As the children proposed ideas, Kim encouraged them to explain the reasoning behind their assertions and to use scientific language. After the discussion, Kim allowed the children to touch the oobleck themselves.

Nature of the Observations: Specific vs. General

What kinds of observations did the interns make about their classroom teaching? Interns

produced almost twice as many specific observations (51.4%) in the video condition as compared with their memory recollection (26.8%). In the video condition, interns referred to specific children, calling them by name, whereas in their reflections from memory, this happened only one time. In the video condition, interns made 8% more specific observations than in the written condition (35.3% vs. 26.6%). Moreover, interns were far less likely (3% vs. 19%) to make vague, general comments in their video reflections than when prompted only by memory.

In her memory-based reflection about her science lesson Kim made the following generalization, "I am really surprised at how well the children conducted themselves for the lesson" (written reflection 2). Kim noticed something significant about a possible relationship between the nature of the lesson and student behavior. However, she did not provide supporting evidence for her statement or go beyond this general reference. In contrast, in her video-supported reflection Kim made a specific reference to an individual student, "He did not necessarily know how to say it was both [a liquid and a solid] because up until this point we have always talked about a liquid being only a liquid and a solid being only a solid." Video allowed Kim to pay close attention to this student's talk and use that to assess his understanding. She made similar specific references in her literature-based lesson.

Phrases such as "I think . . .," "I feel . . .," or "I guess . . ." were common in the memory-based reflection, pointing to the element of uncertainty that seems inherent in relying on memory. Interns seemed to recognize that their reflections were based on impressions, which may or may not be completely accurate. For instance, in her memory-based reflection about the science lesson Kim said, “I think the children did a great job being able to reiterate the vocabulary we have learned.” In contrast, the following example illustrates how video facilitated more focused and detailed engagement with the lesson. Kim wrote,

> In this clip, I had the children tell me about what they talked about yesterday when I was not there for science. This was important because it brought our minds back to the idea of properties of solids and liquids. It refreshed their minds to some of the terms like transparent, opaque, definite shape and color that would play a part in the lesson we were going to do. (Video Reflection 2)

Kim referenced the content of the lesson, the children's responses to her teaching, and the instructional purpose of the teaching moment under analysis.

Broad Topics Discussed: Instruction vs. Management

In the memory condition, interns wrote more about management, whereas in the video condition they focused more on instruction in their comments on children. Interns noticed specific instructional or management decisions that they could or should have made while they were teaching the class. Video prompted about 17% more insights into their instruction, as compared to their analysis from memory. Not only did the amount of instructional insights increase in the video condition, but the insights were more specific and focused on the children. In the memory condition, interns expressed similar types of concerns about pedagogical moves they could have made. However, instead of being grounded in particular moments from the lesson, the comments in the memory-based reflections were based largely on feelings and impressions.

Kim, for example, made a general statement about her reading lesson in her memory-based reflection, "Discussions are a difficult thing to manage. . ." A comment like this seems less likely to promote change in specific practices than her comment from her video-based reflection. She wrote, "In thinking that this lesson is supposed to be discussion based, I just shut out the discussion with that comment. If I would have let the children say their comments and try

to answer the questions when they are asked, it would more accurately depict a discussion." Here she is referring to her plan to write down questions children asked while they were reading, but not to answer them until the end of the book. Kim honed in on a particular moment in the lesson and evaluated her performance while focusing on her interactions with the children. Rather than just sensing a general frustration, she was able to see how her imposed structure interacted with her instructional goals.

In the video condition, interns were markedly more apt to focus on instructional strategies whether that was in reference to themselves or to the children. There was an 8% increase in incidents of both instructional insights and comments focusing on listening to students in the video condition than in the memory condition. The contrast is even greater in the categories of student achievement (13% more in video), and focus on children – instruction (17%). The most prominent difference is in the focus on self – instruction where interns made 19% more comments on this topic in their video reflections than in their memory-based reflections.

For example, in the memory-based commentary Kim reflected on her decision to have the students sit in a circle, a management move, whereas in the video reflection she did not mention the seating arrangement. Instead the video refreshed her memory of a number of instructional moves she made. She isolated a clip that highlighted her use of the strategy of accessing prior knowledge, and another clip that showed how she listened carefully to students' answers. Moreover, she used video replay to show how the strategy of probing students' answers allowed her to focus on their growing understanding. None of these instructional insights was present in the written condition, where she made general comments such as, "They were able to maintain a lot of self-control." She also commented on how the students responded to seeing the substance they were investigating, and her surprise that the experiment was messier than she had

anticipated. By contrast, in the video condition, she expanded upon her more general observation. She said, "It [oobleck] sparked interesting dialogue with the children about what it could be specifically." She then noted her interaction with one child and how she probed for more detail, which in turn allowed her to have a better understanding of the child's achievement.

Specific Topics Discussed: More Focus on Children

Three categories reveal particular attention to children's learning: focus on children - instruction, student achievement, and listening. There were 17% more comments about instruction focused on children in the video condition than the memory, 13% more on student achievement, and 8% more comments indicating listening to students in the video-based reflections. When we compared the two broad categories—focus on instruction versus focus on management—in both cases, interns were more attentive to the children than to themselves when reflecting based on video. There was a smaller difference in management references, with 5% more comments focused on the children than to self in the video condition. The distinction was more pronounced in the instruction category. Here, interns focused on children 18% more often than in the memory condition.

Consistent with the other findings, references to children tended to be more specific and grounded in evidence with video-based reflections than those in the memory-based reflections. For example, as part of her reading lesson, Kim prompted the children to ask questions based on the story they were reading. To her surprise, the children offered numerous questions, which proved to be disruptive to their enjoyment of the story. In her memory-based reflection Kim wrote, "One thing I noticed was that the children had a lot of questions initially about the book." However, she expanded on this observation in her video-based reflection in a more critical way. She wrote, "I never thought about it being annoying or frustrating for the children when we read

stories together with the comprehension strategy of questioning, that stopping to record a question would possibly hinder them and their thinking about what was happening or what they were going to say." The video commentary helped Kim be more aware of how the children were actually experiencing the lesson rather than simply noticing that they had more questions than she had anticipated. The video also pushed Kim to question whether her plans were working counter to student learning.

What the Interns Valued: Personal Connections, Evidence, and New Perspectives

Thus far, we have seen that interns' video-based reflections were more specific, more complex and more focused on instruction and children than their memory-based reflections. Interviews with the interns provided information regarding what they valued about each form of reflection. All three participants rated reflection and analysis of their practice based on video records as being more accurate and useful than written reflection based solely on memory. However, they also identified a role for memory-based reflection suggesting that the interns gleaned different types of understanding from the two approaches to reflection. For instance, Martha preferred doing the video reflection (she said written ones were "getting old"), but at the same time, she felt writing from memory facilitated "getting lost in a thought and look[ing] back at what you've already said . . . you could just really develop and mature your thoughts." Kim felt that written reflections were valuable, in that they offered a different opportunity to learn than video did. About memory reflection she said, ". . . in terms of your thinking . . . your strategy and what you were thinking and why . . . I think written could be better." Memory reflection helped both of them make sense of their practice in a personal way.

Allie was the most vigorous proponent of video reflection as a superior tool to written reflection because it provides concrete evidence. She explained, ". . . when I've seen the video, I

realized that my written response isn't as valid as I thought it was…I've written things that aren't necessarily true when I watched the video…it's [memory-based reflection] just more of a feeling…the video gives me…evidence…to look at my teaching.. . ." Martha and Kim also appreciated the strong benefits of video-based reflection for similar reasons. The sense that video provides a more tangible view of their teaching is revealed in the following comments. Martha said, "I think it was good to actually see things in the physical aspect…in the visualization as proof it was there and you're not just going over your memory."

Kim also explained that video gave her a different perspective on the lesson, suggesting she was able to step outside herself in productive ways:

> And then looking at in on video, you see other things...'oh, that was really important' or 'I'm surprised I didn't do this or this...' like that, because then you can objectively look at it from an outside view. When you're writing it you didn't do that...[Y]ou're thinking from your mind and stuff and reflecting and with video, it's sort of like...watching a movie. (Final Interview)

To summarize the interns' overall evaluation of video versus memory reflection, perhaps Kim said it best. "So, it kind of depends on what you're targeting . . . your thinking [memory reflection], or how (what you are doing) is influencing the children [video reflection]." Clearly, the participants found that video–supported reflection was more powerful in focusing on instruction than reflections based solely on memory.

The Promise of Video Investigation to Support Learning to Conduct Discussions

We now return to our earlier argument that highly interactive discussions that engage students in the production of knowledge can broaden and deepen students' conceptual understandings in all disciplines. Researchers who study classroom discussions identify

interactivity, knowledge production and conceptual understanding as three critical facets of discussions. What is it in particular about video analysis that moves interns along in their ability to facilitate discussion-based teaching?

Our findings show that by using video, interns were more able to notice, revisit, and investigate the interactive aspects of their discussions. They did so by focusing on social interaction, knowledge production, and students' conceptual understandings. Moreover, by reviewing their videos, the interns used noticing, revisiting and investigation to unpack some of the complexity of discussion-based teaching, and to embrace the dissonance that was created (Britzman, 1991; Field & Latta, 2001; Paley 1986). Below we highlight the ways in which using video records interrupted the expected, helped all three interns question things they previously had taken for granted (Field & Latta, 2001), and positioned them to grow and change.

Using Video to Investigate Social Interaction in the Classroom

Earlier we cited research that documents the potential of video in helping novices make connections between specific classroom interactions and broader concepts and principles of teaching and learning (Sherin & Van Es, 2005; Van Es & Sherin, 2002). In our study, video became a tool for the interns to make note of and ponder discrepancies, and in some cases affirm theory to practice connections. To illustrate, during her reading comprehension lesson, Kim's attention was drawn to a disconnect between her theory that a good discussion involved a dialogic interplay among students and the practice she engaged in to scaffold students' understanding of a questioning strategy. During the lesson she asked a question of one child and when another child started to answer it, she said, "Remember we are not answering these yet, we will do that later." Seeing this incident replayed in the video prompted the insight discussed earlier, that she "shut out the discussion with that comment." This revisiting opened a space for

reflection and challenged her reliance on the curriculum materials after which she patterned her lesson.

As noted earlier, Kim questioned whether the comprehension strategy of questioning was actually interfering with children's' understanding. The fact that she returned to the issue in her final interview shows that she was continuing to think about this dilemma and, in the future "might do it a little differently." Moreover, she identified another problem with the questioning strategy and reported:

> …they asked the question and I write it down and we don't answer it until the end and it…usually when someone asks a question, you'd write it and address it right away, so it might make more sense in doing that lesson, if I were going to do it again to go ahead and answer it and ask them "what are you all thinking could be an answer?" for that individual question and then move on to a different question… (Final Interview)

Here we see that Kim continued to challenge the strategy she was taught in ways that pushed her to construct her personal knowledge of teaching. The fact that she was interested at that point in trying something new—based upon her own video analysis—shows that she was not merely having experiences (Munby & Russell, 1994) of discussion-centered teaching, but learning from them.

Martha, by contrast, affirmed her practice/theory connection through video analysis. In Martha's memory-based reflection she referred to her belief in 'wait time' and the way her instructional strategies either facilitated or blocked children's responses: "But I still feel I could do a lot better at waiting longer before I talked so that students would be more likely to respond." Using the revisiting capacity of video, Martha noticed: "I was just about to give this answer away

but this [video evidence] proves that when I waited the students had many more ideas." Here we see that dissonance that promotes learning does not need to be negative; it just needs to interrupt the expected (Field & Latta, 2001). This example offers some challenge to Kennedy's findings (2002, 2005) that many teachers seem only to learn from negative experiences.

Using Video to Value Discussion as a Vehicle for Deepening Students' Conceptual Understandings

The interns' work with video allowed them to think about how classroom interactions impact students' conceptual understandings. For example, Allie's two literacy lessons featured discussion of how to edit a piece of writing. During the video review of her lesson she noticed instances where she listened to her first graders and probed their answers to encourage more detail. Her purpose in listening and probing was to understand their thinking. She explained, "I like how I said things like, 'What do you mean by that?' Or, 'would you like to put that in your own words?'" This form of noticing enabled her to recognize her use of teacher moves that would enhance her instruction and help her work toward promoting student learning. Allie also noticed student actions that she thought contributed to the discussion. She commented, "I thought it was great that one of my students said 'Can I add to that?'" and in doing so pointed out how students, as well as the teacher, can help move discussions along in substantive ways.

In addition, Allie revisited particular moments in her lessons and made plans for future teaching based on that new knowledge. For instance, after hearing one child give an incorrect response, Allie realized that she should have addressed the misunderstanding, and noted, "I can address that with her at a different time now that I saw the video." She also caught behavior that went unnoticed in the act of teaching: "2 students [were] totally consumed in something else, [I] should have actually asked them a question…" In the eleven segments of Allie's video

commentary, she quoted herself twice, and quoted students' actual words four times. By having an audio record of their own and their students' words, interns could 'make a case' regarding some aspect of their teaching and back up their assertions with evidence.

Kim's focus on students' conceptual knowledge in the science lesson was clear in the video-based commentary. The video replay of the science lesson illuminated particular aspects of students' understanding she was only generally aware of before. She noted: "Throughout the lesson I can really see that they know and understand the content and terminology from our science unit. I am really surprised listening through the lesson again just how observant and specific the children are being."

Martha also used the video analysis to focus on conceptual understanding. Martha's video comments seemed to serve as 'points to ponder' students' understanding. She said, for example, " [The] student [is] using his prior knowledge about culture—but is it the correct knowledge?" In addition, Martha noticed how her own questioning of a student's response caused him to ponder and raise his hand again when she wrote, "asking why forced the student to prove that he knew what he was talking about—after he thought about it, he re-raised his hand."

Conclusion

Throughout this article, we have made visible how the use of video to reflect on teaching slows performance down and thus facilitates specific and detailed noticing—or what others have called 'explicit' noticing (Ollerton, 2000; Van Es & Sherin, 2002). As Van Es & Sherin (2002) found, teacher change is promoted when teachers pay attention to what is important, make theory to practice connections, and use what they know about their own teaching context to reason about a given situation. Our findings build on these notions and go further to support our contention that video offers unique opportunities for promoting teacher growth in the context of

learning to conduct interactive classroom discussions. The ‘slowing-down’ effect allows continual replay, which enables the intern to capture what was missed the first time, either orally and/or visually. Moreover, the technology not only slows, but allows moments to be frozen in time through the isolation of specific clips that can be extracted from the whole lesson for further analysis. These functions of video have a compelling impact: the dissonance created between what they recall from memory and what they see upon close analysis is hard to ignore. As we explained above, dissonance does not need to be negative to lead to learning. It just needs to jar complacency.

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Table 1: Codes Related to Topics Discussed

Coding Category	Definition	Example
Focus on Self - management	managing behavior, teacher's role in organizing for a smooth flow to the lesson	Kim: "I wanted them to raise their hand tell the class."
Focus on Self – instruction	instructional strategy that facilitates the cognitive and social interaction around the goals of the lesson; focuses on the teacher's role	Allie: "I need to be more clear in my objectives."
Focus on Children – management	managing behavior, organizing for a smooth flow to the lesson; focuses on the children's behavior or attitudes	Martha: "And behavior is a huge problem for these students."
Focus on Children – instruction	instructional strategy that facilitates the cognitive and social interaction around the goals of the lesson; focuses on	Allie: "For example, I am specifically thinking of the time when some students thought a period should go in a place."

	how the children responded to the instruction.	
Student Achievement	intern indicates attention to student learning and achievement; intern assesses student learning	Martha: “Looking over these they actually did fairly well, but there were still some students that they did not grasp the concepts.”
Teacher move – listening	intern gains insights by listening to what the students say	Allie: “I thought it was great that one of my students said, ‘Can I add to that?’”
Teacher move – probing	intern seeks to gain insights into student understanding and pushes students to deeper understanding by probing them to explain their answers and think more deeply	Allie: "I like how I said things like, ‘What do you mean by that?’ Or, ‘would you like to put that in your own words?’”