THE VIDEO ANALYSIS TOOL:

ANALYZING, ASSESSING AND ADAPTING PRESERVICE TEACHERS'

INSTRUCTIONAL DECISIONS

by

PETER J. RICH

(Under the Direction of MICHAEL J. HANNAFIN)

ABSTRACT

Instructional decision making, claimed to be the basic or most important teaching skill, has been the subject of much research and debate, yielding decision-making models, expert/novice teacher thinking comparisons and understandings of teacher judgment, among a multitude of other insights. Yet, as important a skill as instructional decision-making was thought to be, most studies failed to account for practical utility, doing little to actually shape the way teachers learn and practice their skill.

Recent developments in video annotation tools, however, have made the process of systematically recording one's own teaching and analyzing instructional decisions available to practitioners. These tools have made possible the collection and analysis of video and other evidence related to specific teaching performances. Video annotation tools provide alternative approaches to analyzing instructional decisions at a time when state and federal agencies are clamoring for increased evidence of teacher quality.

This dissertation is a compilation of journal-ready manuscripts written with the intent of furthering the understanding that can be gained from using the Video Analysis Tool to help

preservice teachers analyze, assess, and adapt their own practices. The first article is a theoretical framework and review of the literature available on the use of video annotation tools in teacher education. The second article is a case study of 3 preservice teachers' first experience in using the video analysis tool during a 4-week internship experience. The third article, also a case study, examines the experience of 4 preservice teachers from the same cohort during a later student teaching experience. Finally, the fourth article is a detailed analysis of the content of the student teachers' Video Analysis Tool comments. The purpose of these studies is to further understand how preservice teachers use evidence-based methods and tools to systematically progress toward professional instructional decisions in their planning, enactment and adaptations of these plans.

INDEX WORDS: preservice teachers, student teachers, video analysis, instructional decisions

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DEDICATION

To Paulina, for helping me to stop and look.

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Last and certainly not least, I would like to thank my family and my God for all that they do for me and for their continued patience.

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CHAPTER 1

INTRODUCTION

Instructional decision making has been called the basic teaching skill (Shavelson, 1973). Instructional decision making (IDM) encapsulates the curriculum related decisions teachers make on a daily and momentary basis. High-level decisions, such as lesson planning, require teachers to synthesize and evaluate their thinking and actions through reflection (Wilen, Ishler, Hutchison, & Kindsvatter, 1999) or other methods of self-analysis.

Phillip Jackson (1968) initially posited the centrality of instructional decision making to effective teaching in his book, "Life in Classrooms." From this research emerged decision-making models, expert/novice teacher thinking comparisons and understandings of teacher judgment, among a multitude of other insights (c.f. Clark & Peterson, 1986). Yet, as important a skill as instructional decision-making was thought to be, most studies were descriptive or experimental, failing to account for practical utility. While research revealed intricacies of teacher thinking, findings did little to actually shape the way teachers learned and practiced their skill.

Teacher educators recognized a disconnect between research and practice (Shulman, 1986). Since Schön (1983) published his work on the reflective practitioner, reflection has been promoted as a means to help educators analyze their instructional decisions and teaching. Despite the wide appeal of reflection in teacher education, researchers have not established compelling relationships between these practices and teachers' decisions [see, for example, AERA's report on the status of research on teacher education (Cochran-Smith & Zeichner, 2005)]. Fred Korthagen and Theo Wubbels (2001) summarize the challenge confronting teacher education

programs in attempting to help teachers analyze, assess, and adapt their own practices: “many studies rely heavily on comments made by student teachers during course evaluations, as well as on self-reports, general observations, and isolated anecdotes.” (p. 89). There is a dearth of evidence delineating how and why teachers examine, assess and make decisions to improve or change their practices. Hence, in addition to self-reports, general observations, and anecdotes, we need to explore alternative methods for monitoring one’s own instructional decisions.

Despite considerable prior research in instructional decision-making, there has not yet emerged a systematic method through which developing teachers can document, measure, and monitor their own instructional decision. Recent developments in video annotation tools, however, have made the process of systematically recording one’s own teaching and analyzing that performance available to practitioners. For example, Recesso et al., (in press) proposed Evidential Reasoning and Decision Making (ERDM[1]) as a systematic method to collect, analyze, interpret and act on an individual’s teaching or other classroom issues. Other researchers have used video annotation tools to help preservice teachers study their own teaching (Beardsley, Cogan-Drew, & Olivero, 2007), collaborate with colleagues (van Es & Sherin, 2002) and mentors (Miller & Carney, 2007; Wright, 2007), and study student thinking (Preston et al.,, 2005). These tools have made possible the collection and analysis of video and other evidence related to specific teaching performances.

Purpose

This dissertation is a compilation of manuscripts written with the intent of furthering the understanding that can be gained from using the Video Analysis Tool to help preservice teachers

[1] Throughout the course of these studies, ERDM was actually called “Evidence-based Decision Support.” For purposes of consistency and to reflect the progress made, the current term, ERDM, will be used throughout the remainder of this dissertation.

analyze, assess, and adapt their own practices. The two studies reported herein were funded by ETEACH, a federal Preparing Teachers to use Technology grant. The tools and methods used in this study are part of an on-going design-based effort to improve teacher assessment based on evidence. In the spirit of design-based research, we harbor a healthy criticism of our own work in the hopes that such criticality leads to improved teacher assessment practices in future teacher education programs.

The dissertation contains a total of four manuscripts, each written in journal-ready format. The collective purpose of these papers is to extend our understanding of how preservice teachers use evidence-based methods and tools as they progress toward professional instructional decisions in their planning, enactment and adaptations of these plans.

The first article is a theoretical framework and review of the literature available on the use of video annotation tools in teacher education. We briefly review the evolution of research on instructional decision-making and subsequently present current implementations of video annotation tools in teacher education, focusing on 6 different video annotation tools. We then compare and contrast different features and note how these might be used to help teachers investigate and alter their instructional decisions.

The second article is a case study of the 3 preservice teachers' first experience in using the video analysis tool during a 4-week internship experience. We examine each participant's experience and note a common thread of dissonance across participants, discussing the role such dissonance might play in similar teacher education experiences.

The third article, also a case study, examines the experience of 4 preservice teachers from the same cohort during a later, 10-week student teaching experience. In addition, participants' cooperating teachers also used the Video Analysis Tool to analyze their protégé's videos. The

study presents principles of inquiry and follows participants through each phase of their own inquiries using Evidence-Based Decision Support. We discuss common findings across participants and report on the role of a mentor in influencing instructional decisions.

Finally, the fourth article is a detailed analysis of the content of the student teachers' Video Analysis Tool comments. This article focuses solely on the video analyses of participants. Through principles of grounded theory, we conduct an inductive analysis that reveals participants' decisions and their associated reasons. We note the relationship between different types of decisions and related reasons, discussing their possible relevance to teacher education.

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CHAPTER 2

LITERATURE REVIEW

VIDEO ANNOTATION TOOLS:

TECHNOLOGIES FOR ASSESSING AND IMPROVING PRESERVICE TEACHERS' INSTRUCTIONAL DECISION MAKING[2]

[2] Rich, P.J., & Hannafin, M.J. Submitted to the *Journal of Teacher Education, 05/08/2007*

Background

From the early 1970s to the mid 1980s, researchers examined and detailed teachers' instructional decision-making. Several important findings emerged from this research, including differences between experts and novices, the emergence of teacher decision-making models, different cues teachers attend to during instruction, and the role different contextual factors play on teachers' decisions. From the early 1990s until the end of the 20th century, however, comparatively little inquiry was reported on the issue. Shulman (1986) speculated that while documenting differences between novice and expert teachers' instructional decisions is of theoretical significance, the findings had little influence on teachers' actual decisions or decision-making processes.

Recently, interest in instructional decision making theory, research and practice has re-emerged (Hewitt, Pedretti, Benczi, Vaillincourt, & Yoon, 2005; Cheek, Steward, Launey, 2004; Sturtevant & Linek, 2003; Jones, Housner, & Cornspan, 1997). Wilen, Ishler, Hutchinson, and Kindsvatter (1999) described instructional decision making as "the most important teaching skill" (p. 137). Advanced technological developments have expanded our ability to capture and interpret classroom evidence important to developing this critical skill. In order to better link instructional decision-making theory, research and practice with emerging technological developments, we briefly review the evolution of research, theory and practice related to instructional decision making[3], assess the potential of new-generation video technology for improving instructional decision-making, and identify both opportunities and challenges for improving the instructional decision-making of prospective teachers.

[3] For a comprehensive review of instructional decision-making literature, refer to Clarke & Peterson (1986).

The Evolution of Instructional Decision-Making Research

To examine differences between teachers' decision-making during controlled experimentation and everyday classrooms, Borko, Cone, Russo, and Shavelson (1979) conducted a series of four studies. Researchers gave experienced teachers classroom scenarios and asked them to: a) report how they would react, b) estimate student performance, c) plan to act on their decisions, and d) anticipate classroom management issues. The results underscored the importance of contextual cues on teachers' preactive and interactive instructional decisions and highlighted the interplay among different cues teachers attend to during instruction. While the importance of recognizing cues has been well documented in everyday classrooms, focusing attention on situational constructs during controlled conditions helped teachers to identify and resolve inconsistencies. The authors suggested that making teachers more aware of their instructional decision-making strategies in different scenarios could improve their professional practices in everyday settings. However, as the authors note, "the major limitations of this approach relate to the extent to which our findings in the laboratory generalize to the actual classroom" (144).

In contrast, Housner and Griffey (1985) conducted research in an authentic setting, examining both the processes of, as well as differences between, experienced and novice teachers' instructional decision-making. Eight experienced and 8 inexperienced elementary physical education teachers were allotted 60 minutes to plan and teach two lessons. After conducting the lessons, participants reviewed videotapes of their teaching, explaining which cues they each attended to during instruction. Whereas experienced teachers changed their instructional strategies often and demonstrated a rich ability to adapt to different situations, novice teachers did neither, suggesting that experts have a greater repertoire of knowledge and

tactics than novices. However, this research did not address how expert teachers gain such knowledge or apply the knowledge they possess.

Following an extensive review of the research on teacher thinking (Clarke & Peterson, 1986), Christopher Clark (1988) questioned the ability of preservice teachers to make critical assessments of their own practices by analyzing the instructional decisions of experienced teachers: “even if these forms of teacher thinking are shown to be desirable for teachers, it remains to be discovered how one might best help start inexperienced teachers moving in these directions” (p. 6). Recently, Hewitt et. al. (2003) suggested instead that preservice teachers should analyze *their own* instructional decision-making processes. Rather than presenting an expert teacher’s practice, the researchers presented an everyday classroom, reasoning that it better typified the situation new teachers will encounter. Researchers showed two classes (n=40) of preservice teachers a video of a first-year teacher giving a 4th grade science lesson comprising 10 minutes of instruction, 20 minutes of hands-on work and 5 minutes of teacher-led discussion. An online video-case provided student work samples, the teacher’s lesson plan, still photos of the event, and related classroom artifacts (e.g., student worksheets). At the end of each segment and prior to discussion with other class members, researchers asked participants to describe how they would react to the situation. After watching the entire teaching case and sharing their reasoning with their peers, candidates were allowed to alter their decisions if warranted. Following discussing their reasons with peers, more than 70% significantly modified their initial responses.

While providing important and potentially useful findings, the impact of research on preservice teachers’ instructional decision making has been limited. Significant differences exist between controlled laboratory studies and everyday classroom settings that influence the range and appropriateness of various options as well as the generalizability of research findings. The

situations or vignettes posed often lack authenticity and fail to adequately or accurately approximate everyday classroom teaching contexts. Finally, preservice teachers rarely analyze, make or actually enact instructional decisions regarding their own classroom teaching-learning needs and are thus unable to assess the wisdom or impact of their decisions.

The Importance of Situating Instructional Decisions

The importance of contextualizing preservice teaching opportunities, and providing opportunities to examine the antecedents and consequences of instructional decision making has both historic and current popular support. According to Dewey (1938/1963), "learning is a process of enculturation. Experience does not occur in a vacuum" (p.39). While socio-cultural theory has become increasingly prominent in education, researchers have advanced few attempts to either situate classroom teaching or examine its influence during preservice education. Novice teachers need realistic teaching-learning contexts that afford the opportunity to examine and improve their own instructional decisions.

In describing the important and complex role context plays in understanding practices, Lampert (2001) noted that "authorities, time, students, and resources occur simultaneously" (p.1). Although the aforementioned studies often account for these constructs, none presents them simultaneously. More importantly, some efforts to understand teaching, such as controlled trials, oversimplify the inherent complexity of teaching "because…several different problems must be addressed by a single action. And a teacher's actions are not taken independently" (p. 3). Engestrom and Meittinen (1999) reinforce this point:

> Actions are not fully predictable, rational, and machine-like. The most well-planned and streamlined actions involve failures, disruptions, and unexpected innovations. These are very difficult to explain if one stays at the level of actions. (p. 32)

Thus, to understand instructional decision-making holistically, we must consider individual decisions in concert with related actions in addition to their effects on learning. In so doing, preservice teachers can make informed instructional decisions and more fully understand their effect on student learning and their classroom community. To this end, recent developments in the use of video to capture, annotate, and assess teaching-learning practices may offer considerable potential.

The Role of Video in Teacher Education

Video has long been used to help teachers observe, assess and confront their own actions. Since the 1960s, researchers have utilized video to help teachers review and improve their own teaching practice (Fuller & Manning, 1973). Teacher education programs routinely employed microteaching activities, wherein preservice teachers taught and recorded brief lessons to peers and received feedback from both peers and supervisors. According to Grossman (2005), "microteaching grew out of the process-product line of research, which identified particular teaching skills that correlated with gains in student achievement and then tried to teach these discrete skills to teachers" (p 429). Typically, this research demonstrated changes in preservice teachers' behaviors and actions (Copeland, 1982; Perlberg, 1987).

With the move toward cognitive models in the late 1980s and 1990s, video-based research refocused to helping teachers use video to examine teacher thinking, decision-making and reflection. Hypermedia databases, often in the form of videodisc cases, provided examples of model teacher practice (Lambdin, Duffy, & Moore, 1997). The use of video cases has become prevalent in preservice teacher education (see, for example, Barnett, 2006; Harris, Pinnegar, & Teemant, 2005; Berg, Jansen, Blijleven, 2004; Trier, 2003; Teale, Leu, & Labboo, 2002), though recent initiatives are digital in nature and available via the World-Wide Web rather than optical

storage media. Sites such as InTime, TeachScape, LessonLab, CaseNext, and TeachFirst, for example, provide online video cases depicting the practices of expert educators (Pea & Hoffert, 2007) for inservice and preservice teachers. While increasingly powerful and versatile, video resources rarely afford the opportunity for novices to observe, analyze or make decisions related to their own teaching.

During recent years, new methods of annotation have emerged that afford even greater power and utility for examining and improving instructional decision making. Video analysis programs such as Transana™ (www.transana.org), Studiocode™ (www.studiocodegroup.com), DIVER™ (diver.stanford.edu), and Constellations™ (orion.njit.edu) provide significant data mining capabilities, management, and fine-grained analysis and reporting. Yet, despite widespread commercial use, few have been implemented in teacher education.

Video annotation tools allow an individual to both capture *and* analyze video of personal teaching practice, allowing preservice teachers to review, analyze and synthesize video of their own teaching in authentic classroom contexts. These tools provide a potentially important method for prospective teachers to closely examine relationships between and among teaching context, practice, and instructional decision-making. In the remainder of this paper, we examine how teacher education programs currently employ video annotation tools, and how these might help preservice teachers analyze and adapt their instructional decisions. We examine six video annotation tools (see Table 2.1): The Video Analysis Support Tool (VAST), Video Interactions for Teaching and Learning (VITAL), the Video Analysis Tool (VAT), VideoTraces, Video Paper, and MediaNotes. We do not present an exhaustive list or analysis, but rather a sample of video annotation tools that have either been developed for or used in the training of preservice teachers to help developing teachers examine their own practices.

Table 1.1. Video annotation tools

Video Annotation Tool	Delivery mode	Annotation Style	Collaboration	Links to related data
VAST* *next version to be called "Video Callout"	Installed on computer	Users select portions of video and associate them with text. Scaffolded writing areas are provided.	No collaboration tools are built into VAST system.	"Lesson Resources" provides visuals of other related data.
VITAL* *Recently redeveloped	Web-based	Users create clips of video and insert them as hyperlinks into a typed paper.	No collaboration tools are built into VITAL system.	No ability to connect to other data sources
VAT* VAT 2.0 currently under development	Web-based	Users select portions of video and associate them with user-created comments. Users can also associate clips with a portion of a rubric.	Others can annotate a video. Can share annotations with others. Can view up to 2 videos with annotations at once.	No ability to link to other data sources.
Video Traces	Installed on computer.	Users select portions of video and speak comments over desired sections. Using a pointer, user can visually highlight portions of video.	Different users can create annotations on same video. Users can respond to annotations, creating a "threaded discussion."	No ability to link to other data sources
VideoPaper	Installed on computer. Export to Web	User selects portion of video and creates a block of text. A hyperlink is created that plays the designated portion of video. Captioning allows the creation of a timed transcript.	No collaboration tools are built into system.	Ability to hyperlink to other text-based sources. Video portions may also be synchronized with images.
MediaNotes* *Prior version named "The Performance Analyst"	Installed on Computer	User selects beginning and end-points on a video then, titles, comments and associates clips with a pre-determined framework.	Multiple users may edit a single video. Advanced searching capabilities may be used to find themes within and across videos.	No ability to connect to other data sources.

Video Analysis Support Tool (VAST) (http://www.professional-vision.org/)

VAST was developed at Northwestern University and has been used in math and science teacher education programs (Van Es & Sherin, 2002) as well as with inservice teachers (Sherin & Van Es, 2005). In VAST, teachers create specific video segments, which researchers upload

and transcribe for access during analysis. As shown in Figure 2.1, VAST scaffolds those practices through “guided noticing” writing panes and tabs sequenced to encourage analytic thinking about pedagogy from different perspectives. Preservice teachers are initially asked, “What do you notice?” to provide evidence of the event, and to interpret the evidence, then encouraged to pose questions about what they noticed or how they would respond during instruction. Each area can then be explored further using the framework of *Student Thinking, Teacher’s Roles, and Discourse*. VAST allows other related non-video resources (e.g., student work, lesson plans) to be displayed while analyzing a video.

Van Es and Sherin (2002) studied how a group of teachers enrolled in an alternative certification program used VAST to analyze their own practices during their teaching internship. Six of the twelve participants were randomly chosen to write pre, mid, and post internship analyses of their teaching using VAST; the remaining teachers reflected without VAST. The researchers reported that participants who used VAST were more likely to improve analyses of their practices than non-VAST candidates. Furthermore, VAST users provided more specific evidence for their arguments than non-VAST users. The ability to both more meaningfully analyze practice and to provide clear evidence for reasoning may improve these teachers’ ability to make informed instructional decisions in the future.

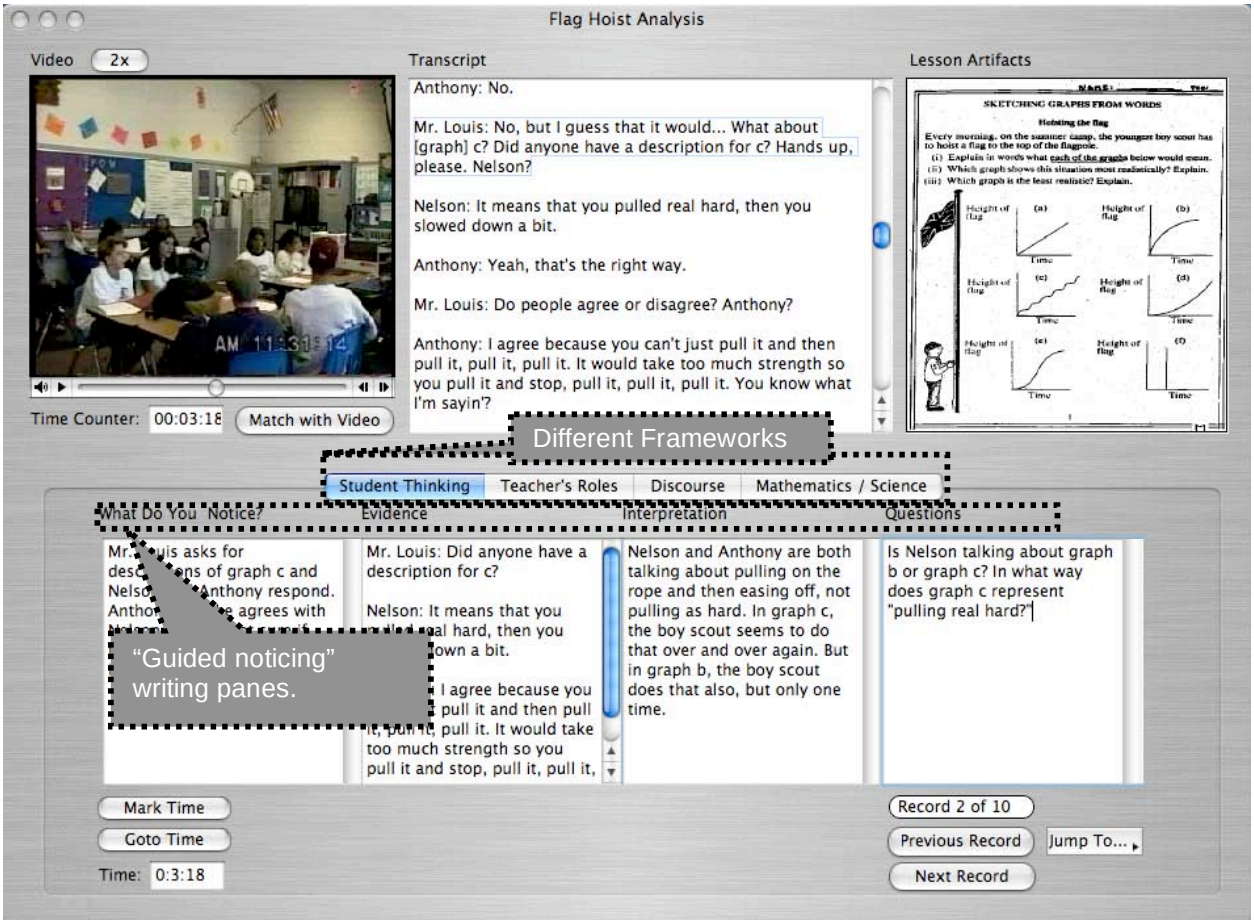

Figure 2.1. Video Analysis Support Tool

Video Interactions for Teaching and Learning (VITAL) (http://vital.ccnmtl.columbia.edu)

The Columbia Center for New Media Teaching and Learning initially developed VITAL to train students (student teachers, psychology students, etc.) to observe children closely and interpret their behavior. It has since been used across a range of courses and disciplines. Like VAST, VITAL allows users to create, annotate, and store video clips in a personal library but is designed to encourage thinking about practice through writing essays that are based on events depicted in their video library. As users view a video from the library, they create anchors to specific sections of the video, which serve as video hyperlink reference points when reading

through their VITAL essay and briefly annotate the identified segment. Teachers are then able to embed hyperlinks within their essays to their individual annotated video clips to associate their descriptive analysis with specific captured events (Figure 2.2). VITAL scaffolds preservice teachers' analyses using a guided thinking process whereby preservice teachers *Observe*, *Think*, *Interpret*, *Ask*, *Transfer*, and *Reflect*.

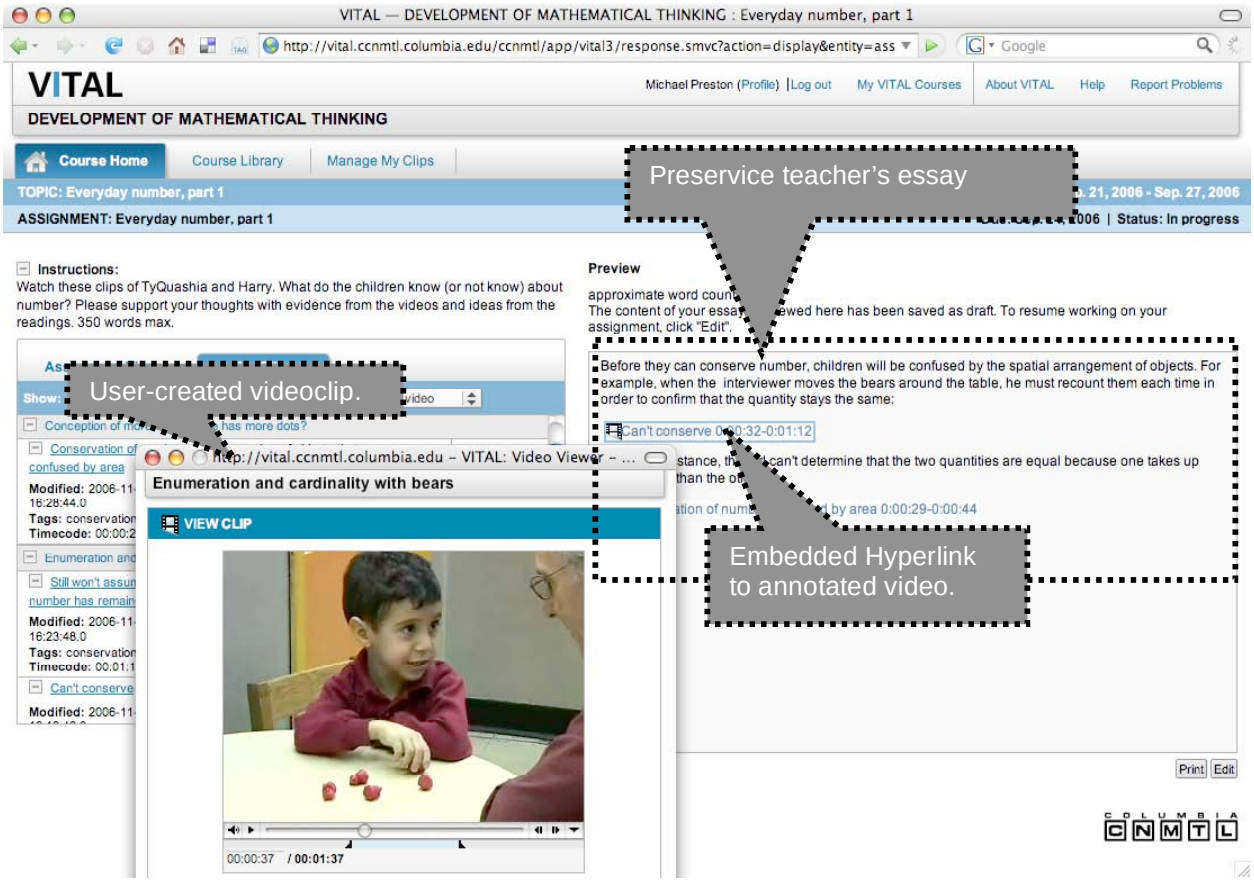

Figure 2.2. VITAL multimedia essay and viewer

Mathematics educators have recently used VITAL to help preservice teachers analyze personal teaching practice (Preston et al., 2005). Once per week for nine weeks, teacher education candidates analyzed and annotated video of elementary students solving math

problems, then synthesized their analyses into a VITAL essay with associated video hyperlinks. At the end of nine weeks, preservice teachers extended and personalized their multimedia essays by analyzing videos of *their own* teaching. They designed and implemented a learning activity based on children's mathematical abilities, documented the experience with digital video, and reflected upon the results in a VITAL essay. Participants reported that VITAL helped them to better connect theory with their own practice—a particularly challenging task for preservice teachers (Maloch et al., 2003).

Video Analysis Tool (VAT) (http://vat.uga.edu)

VAT was developed at the University of Georgia as part of a Preparing Teachers to Use Technology (PT^3) grant, and has been used in social studies, science, and elementary education courses. VAT is a Web-based system that enables teachers to upload, archive, segment, annotate and share videos. The system uses the metaphor of a "lens," frameworks that amplify or suppress specific aspects of teacher practice or student learning, to guide analysis (Figure 2.3). VAT also enables the use of a wide range of lenses or standards, ranging from standards-based teaching practices outlined by national organizations to classroom management, to examine the same captured events multiple times from different perspectives, and enables comparisons between assessors of identical video(s). A peer, teacher educator or supervisor can also access and annotate the captured events, and users may share video clips and comments with the approval of the teacher-owner. A teacher can then view multiple annotated videos individually or side-by-side, as well as collaboratively using either identical or complementary video perspectives of the same events (e.g., teacher's perspective compared with mentor teacher's perspective).

In a sequence of studies, VAT helped preservice teachers identify and confront contradictions between and among their beliefs, instructional decisions and practices. Bryan and

Recesso (2006) studied how student teachers analyzed their beliefs about science. Seven secondary science education student teachers wrote personal belief statements about how students learn science, the role of the teacher in this process, and the role of the learner. Twice during the semester, participants recorded themselves teaching and used a VAT lens to identify resonance or dissonance between their belief statements and their actual teaching practices. The authors found that the VAT helped student teachers identify aspects of their practice that were aligned with their beliefs as well as confront possible contradictions in their teaching.

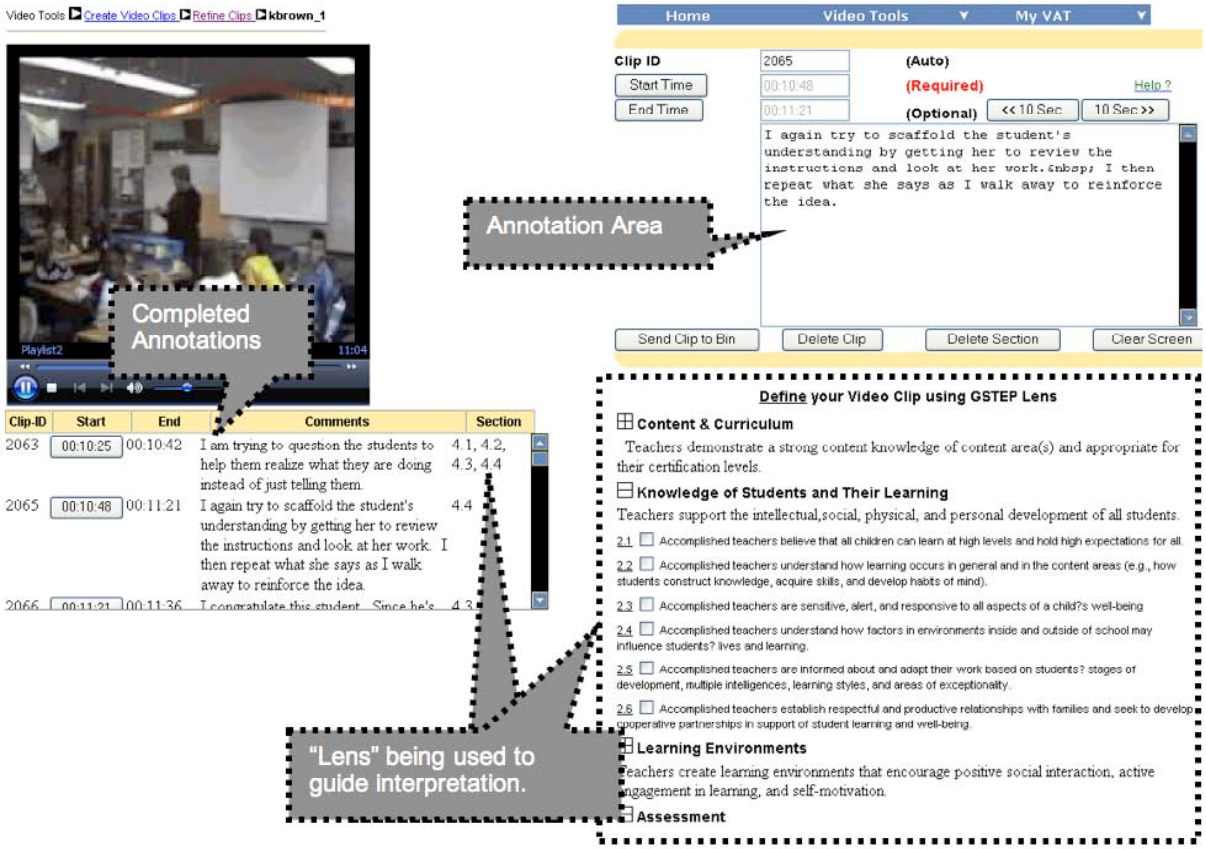

Figure 2.3. Video analysis tool editing view

More recently, AUTHORS (2007) conducted research with 27 preservice elementary education teachers during a month-long field experience. Participants researched 5 articles on a

self-selected aspect of teaching practice and then created a corresponding lens to later analyze and explain their own teaching. Similar to Bryan and Recesso's findings, preservice teachers identified discrepancies between their perceived experiences and their captured teaching practices. Acting on evidence of contradictions, participants documented positive change in their intentions and resultant instructional decisions.

Video Traces (http://depts.washington.edu/pettt/projects/videotraces.html)

Reed Stevens originally conceived Video Traces as a tool to help teachers at Western Washington University analyze student performance. It has since been used by teachers across multiple disciplines. Video Traces allows users to include written annotations to captured video; unlike most annotation tools, it also emphasizes spoken annotations and gesturing (i.e., using a mouse pointer to "point to" and mark a specific portion of a video while speaking). Audio annotation, or voice-over, enables the preservice teacher to listen to feedback synchronized with the actions in the selected video in real-time, as well as to stop the video while listening to feedback. Gesturing with the mouse is akin to drawing on a canvas (Figure 2.4). Together, voice-overs and gestures combine to form "traces" that highlight the exact performance or detail being addressed (Miller & Carney, 2007). Audio annotations are accompanied by short descriptions, providing users with shorthand written annotations. In addition, Video Traces allows for dialog such as a teacher educator providing feedback on a student teacher's video; the student teacher, using the "Respond to Trace" button, can then respond verbally to the teacher educator's original comment.

Video Traces has been studied as a tool for feedback from a student teacher's cooperating teacher, clinical supervisor and university faculty (Miller & Carney, 2007), during a semester-long student teaching experience. Three elementary education student teachers video-recorded

themselves while teaching two different lessons. Two clinical supervisors, two education faculty members and three cooperating teachers then provided verbal and gestural feedback on different aspects of the lesson, using a statewide teacher assessment tool used to measure the effectiveness of teaching. In addition to receiving feedback from others, the three students used Video Traces to analyze their own teaching. Researchers found that Video Traces helped to facilitate student teachers' reflection, , but individual raters analyzed the situation in significantly different ways

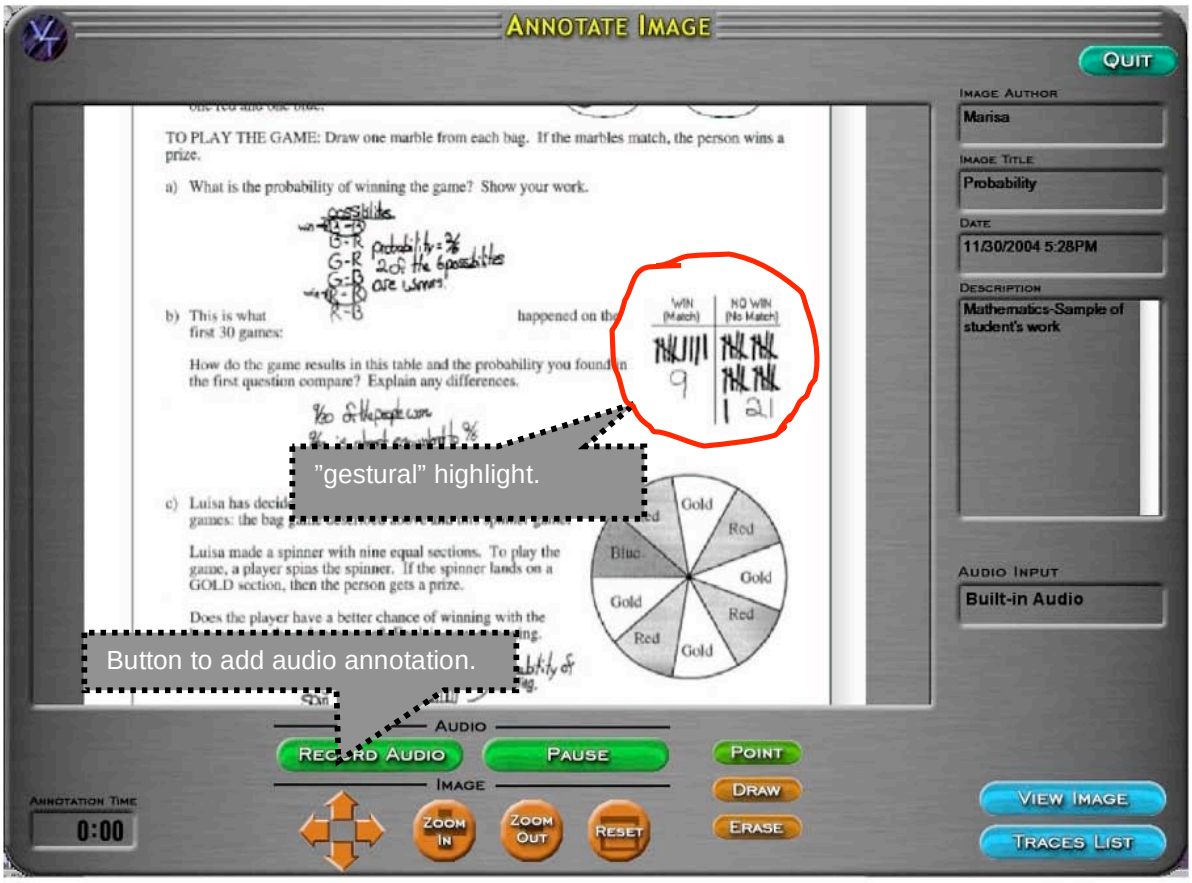

Figure 2.4. Video Traces editing view

when using a state-adopted teacher candidate assessment instrument. Thus, Video Traces aided preservice teachers in reflecting on their instructional decisions, but revealed reliability and validity issues in how state-sponsored assessments were applied by different stakeholders.

VideoPaper (http://vpb.concord.org/)

Developed in 2000, VideoPaper was funded by NSF as part of the *Bridging Research & Practice* project at Technical Education Research Centers (TERC)**.** VideoPaper has been used in a number of national and international settings, with focus ranging from mathematics to teacher education. VideoPaper allows users to associate comments as well as images to captured practice by linking to a specific portion of video. Recent versions support captioning—providing a written transcript or other written elaboration while video is displayed. The user can switch from video or to text comments in real-time by selecting buttons that access the corresponding linked content. Similar to the audio annotation function of Video Traces, VideoPaper allows for linking to images at specific locations in a video segment (Figure 2.5). For example, a video depicting a preservice teacher helping a student with classwork might be accompanied by images of the student working on the problem.

VideoPaper has been used at Tufts University to promote self-reflection. In one study (Beardsely, Cogan-Drew, & Olivero, 2007), teacher educators used the "wild triangle" method (McDonald, 1992), an approach that emphasizes the interplay among the teacher, subject, and students, to help preservice teachers focus on a specific aspect of their teaching through video analysis. Prior to annotating, candidates watched their own video in its entirety, then identified unexpected or puzzling aspects of the wild triangle in their videos, such as one student teacher's response to his student's surprising lack of preparation and the ensuing conversation to get the student back on track. In order to engender depth of analysis over breadth of representation, researchers encouraged participants to select a few "surprise" instances for detailed analysis. Faculty report that by emphasizing the level of contemplation or analysis provided by using VideoPaper over the evidence preservice teachers identified, they were better able to think about

their classrooms. This, in turn, increased the specificity of communication between teacher educators and preservice teachers.

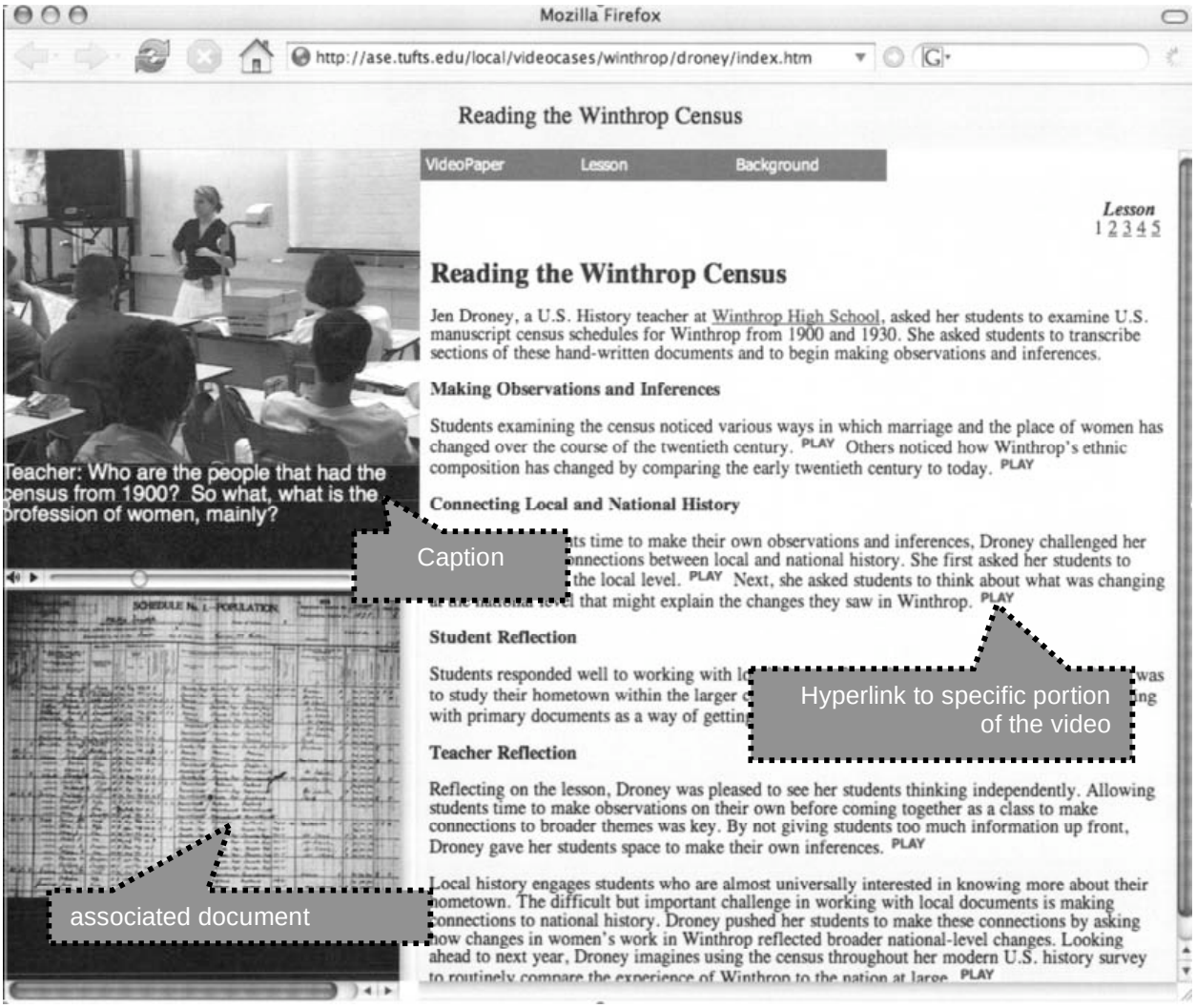

Figure 2.5. Finished videopaper example

MediaNotes (http://www.bluemangolearning.com/products/medianotes)

MediaNotes was originally developed as "The Performance Analyst" at Brigham Young University for use by law school and dance students, but has since been used by faculty and students in business, engineering and teacher education. Teachers can create annotations by naming and segmenting a given video section, as well as commenting and tagging the segment

(Figure 2.6). Tags are pre-defined codes associated with specific video clips. Much like the Video Analysis Tool, codes serves as a lens or framework to guide analysis. Teacher educators create tag sets that preservice teachers then import to code their data. Using meta-data tags, MediaNotes allows the same or different authors to code the identical video multiple times; clips may then be searched using the different tag sets or authors. In addition to searching a single video, MediaNotes allows users to search and filter results across a library of videos, enabling analysis across time, space, or person.

According to Wright (2007), MediaNotes was recently used in a partnership between local schools and Brigham Young University. Six induction teachers: (a) met with their mentors to discuss the purpose of teacher observation and evaluation, (b) chose a goal that was based on available teaching standards, (c) video-recorded themselves while teaching, (d) analyzed video of their teaching using a specific framework (i.e., "tag set"), (e) collaborated with their mentors, and (f) set goals for future teaching. The induction teachers then met again with their mentors and presented their cases to the mentor teacher. The mentor acted as a professional guide and, through dialog, the two negotiated goal(s) for future teaching. The process was then repeated. Based on preliminary findings, induction teachers reported that they gained increased self-understanding which helped them to become more effective teachers. One teacher reported MediaNotes helped to "better understand what I should be doing to be an effective teacher" (Wright, 2007). Perhaps more importantly, initially reluctant administrators reported that MediaNotes increased the meaning of teacher evaluation by clarifying the focus of assessment as a formative process. Thus, using MediaNotes to collaborate with their mentors, both parties agreed on what they would evaluate, the conditions for evaluation, and goals for future action.

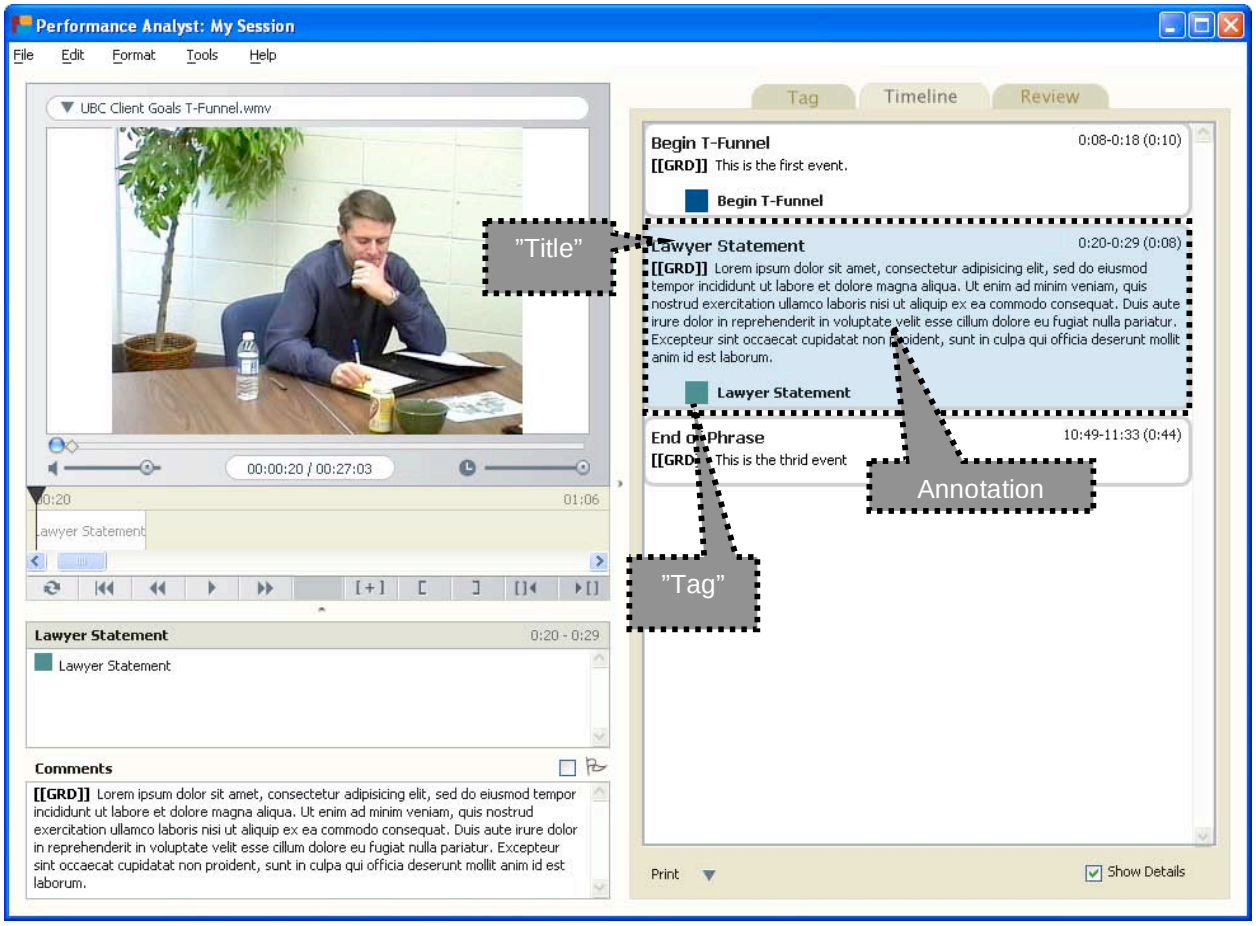

Figure 2.6. MediaNotes example

Affordances and Challenges

Thus far we have presented the different video annotation tools and ways each has been used in teacher education. Next, we compare and contrast the tools to identify how they can help preservice teachers and teacher educators analyze and adapt instructional decisions.

Making Connections

A central assumption of each video system is that a single source of evidence is insufficient to adequately assess teaching practice. While video provides observable evidence of a teacher's instructional decisions, it is necessary to connect "captured practice" to teacher

intents and related evidence related to instructional decision-making. Typically, these systems connect textual annotations of teacher thoughts to specific sections of video. Video annotations may provide a way for preservice teachers to connect their thoughts to evidence of their actions without giving precedence to one over the other (McDonald & Kelly, in press). According to Preston et al., (2005), 73% of preservice teachers reported that simply knowing that video clips would be used as evidence of their thinking in their VITAL essays influenced how they watched videos. Video Traces extends the range of evidence to include aural and gestural events that permit users to listen to feedback embedded at the exact portion of the video-captured practice. Knowledge of intent to annotate and analyze practices may influence engagement with self-assessment or teacher evaluation more than solely watching video.

The method used to upload video for annotation may affect the immediacy with which instructional decisions can be analyzed. Lags between recording and analyzing teaching episodes may influence how teachers analyze their decisions. For most tools, there appears to be an inverse relationship between work required of the teacher and the availability of their captured video for subsequent analysis. VAST and VITAL, for example, require that teachers wait until researchers upload (and transcribe for VAST) their individual videos before they become available for review. With VideoPaper and Video Traces, teachers must first edit their videos using an external editor before they become available, which can result in considerable work and extensive delays before teachers can analyze their practices. While video editing is not required due to the post-annotation export features, MediaNotes and VAT require that teachers first convert their videos to an acceptable format before they can be accessed and analyzed.

VAT provides the option to annotate video in real-time by streaming captured video to servers. VAT's distributed Web-based nature enables educators to annotate video the same day

as recorded regardless of geographic location. Limiting time lags between video capture and analysis becomes especially important when seeking to improve teachers' instructional decision-making: The longer time (and the more effort) required to begin analysis, the longer delay (and potentially less likely) a teacher will use the system to adapt future instructional decisions based on a video-based analysis of practice.

Borko et al.,'s (1979) study of instructional decision-making demonstrated that a teacher's decisions were often affected by several, seemingly contradictory sources of information; that is, multiple inputs were needed to adequately approximate the complexity underlying instructional decision-making. VAST offers a portfolio-like connection to outside resources, such as lesson plans, student work samples, and any other document that can be digitized. Video Paper provides a time-synched connection between documents, and MediaNotes allows advanced data-mining across different videos. The capability to demonstrate the connection among several different sources of evidence may help preservice teachers to understand and explain how "authorities, time, students, and resources occur simultaneously" (Lampert, 2001, p.1) to affect their own instructional decisions.

Analytical Frameworks

Zeichner and Tabachnik (1991) underscored the importance of analytical frameworks in teacher education:

> In some extreme cases, the impression is given that as long as teachers reflect about something, in some manner, whatever they decide to do is all right since they have reflected about it…we do not think that it makes much sense to encourage or to assess reflective practice in general without *establishing clear priorities for the reflections* [emphasis added] that emerge out of a reasoned educational and social philosophy. (p.2)

According to Sherin and van Es (2005), video annotation tools need to direct analysis, implicitly or explicitly, through an appropriate lens or framework to guide interpretation of observed actions.

While differences in tools reviewed are apparent, many share common functions for creating and using analytic frameworks. For example, VAST and MediaNotes scaffold teachers to attend to specific aspects of practice. VideoPaper, in contrast, appears to provide an open, unstructured approach to annotations. VITAL researchers recognized the importance of a specific method for analyzing and synthesizing video evidence, which has been refined through successive implementations of the software. VITAL researchers now encourage teacher candidates to walk through six steps in which they: observe, think, interpret, ask, transfer and reflect (Preston et al.,, 2005). Each tool involves the use of a specific framework to analyze practices.

VAT employs the metaphor of a “lens” through which specific practices are highlighted for detailed inspection as teachers identify a focus for an inquiry, collect evidence around that focus, interpret the collected evidence, and propose and enact a course of action—a process similar to how MediaNotes is used at Brigham Young University. Video Traces has been used with a statewide teacher assessment tool to guide mentor and student teacher “noticing.” Teacher educators using VideoPaper have employed the “wild triangle” approach, focusing on the teacher, students, and curriculum, and encourage preservice teachers to identify an aspect of teaching they wish to investigate prior to filming. MediaNotes allows a teacher to apply a specific ad hoc framework and to search for patterns among selected codes. In each case, the analytical task can be guided, in some case structured, to permit close examination of specific practices deemed important to decision making.

Collaboration

According to Barber (1990), "individuals tend to regard themselves as proficient, and honest/objective evaluation is difficult" (p. 226). Barber noted that effective self-assessment is not conducted in isolation, but through collaboration with others. While all the tools we reviewed enable teachers to share annotated video evidence, three facilitate collaborative analysis. VAT provides multi-window viewing panes, which allow teachers to share videos with peers, mentors, supervisors and teacher educators (Figure 2.7). This feature has allowed teacher educators and mentor teachers to independently analyze a preservice teacher's video, then exchange perspectives and interpretations related to instructional decisions (AUTHORS, 2007). MediaNotes also allows independent video annotation, but permits users to search across collaborators, both making independent analysis possible and facilitating collaborative review and pattern-finding. Video Traces utilizes a dialogic collaboration where several users can edit and comment on a single video and responses threaded around a specific set of actions (Figure 2.8). Teacher candidates receive the objective evaluation Barber (1990) advocates, and the ability to align collaborator's and the teacher's evaluative purposes and goals (Wright, 2007).

With the exception of VAT and VITAL, all of the tools reviewed are stored locally on an individual computer. Some researchers have cited computer availability as a hindrance to the tool's utility (Cherry, Fournier, & Stevens, 2003). In such cases, collaboration may become difficult as colleagues and mentors must share access to a single computer. VAT and VITAL differ in that they are Web-based tools that can access and share video files and assessments wherever Internet access is available. Video files can be accessed independently or collaboratively and annotations can be simultaneously accessed by numerous users—a feature math education students reported as being particularly valuable (Preston, 2004).

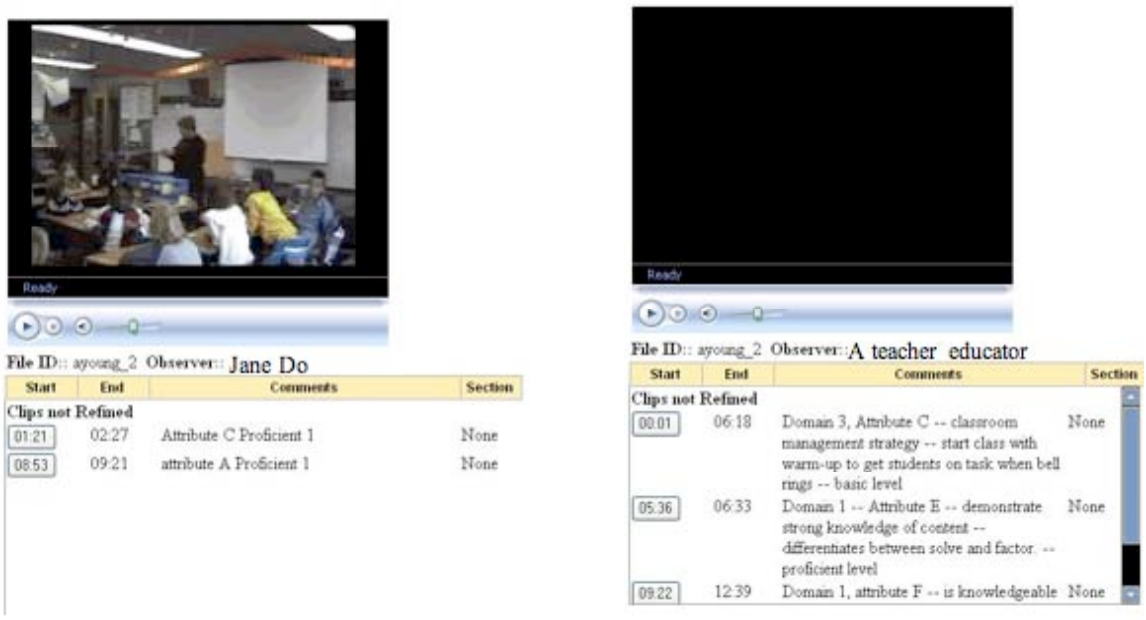

Figure 2.7. VAT collaborative view

Figure 2.8. Video Traces threaded view

Conclusions

Borko and Shavelson (1990) suggested the existence of an implicit relationship between thought and action was a key, if not tacit, assumption underlying teacher decision-making research. The issue of what constitutes *valid* evidence to bridge thought and action has been the subject of considerable debate. Cochran-Smith (2006) suggested that "evidence" has become the new buzz-word in teacher education, and Davies (1999) noted, "there is no such thing as context-free evidence" (p. 110). Traditionally, instructional decision-making research has been criticized for a lack of attention to situational variability and limited practical utility. Video annotation tools may help address these concerns by capturing practice in context and focusing on actual practices and evidence related to teachers' instructional decisions.

Those who have utilized video annotation tools in teacher education have cited the importance of framing practices within a particular perspective. In some cases, the framework is made explicit in the system itself, while in others teacher educators impose the framework through their courses. In addition to helping preservice teachers understand how their own instructional decisions relate to theory, video annotation tools have helped "make visible" those processes to others (Beardsely, Cogan-Drew, & Olivero, 2007).

While video annotation tools provide significant technological affordances, the little published research on their impact on teacher practice has been equivocal. Most of the information cited in this review was found in conference presentations, software materials, and Websites; researchers are only beginning to examine their effects. Further, the focus of available studies is typically on nascent, design issues such as how tools are used, how to optimize their use, and their influence on teacher reflection, rather than their effect as a mature system.

Research is needed to refine how video annotation tools *can* influence teacher education programs, but eventually to assess their impact on instructional decision making.

Perhaps of broader consequence, however, video annotation systems may help to bridge the distance among teacher education theory, research and practice (Noffke, 1995; Preston, 2004; Van Es & Sherin, 2002). Since the work of John Dewey, teacher educators seeking to balance formal and informal experiences with the ideals and the realities of teaching have been limited by access to schools, physical distance, and the resources needed to provide authentic opportunities to safely and effectively immerse preservice teachers in the culture of schools and the teaching profession. As technologies extend our ability to access authentic teaching opportunities, they increase opportunities for preservice teachers to practice the teaching craft and hone professional knowledge prior to student teaching or teacher induction. Video annotation tools offer preservice teachers and teacher educators the ability to not only see, but to analyze and refine instructional decision making prior to, during, and following formative field experience.

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CHAPTER 3

MAKING INSTRUCTIONAL DECISIONS VISIBLE:

THE USE OF VIDEO EVIDENCE TO ASSESS PRESERVICE TEACHER PRACTICE[4]

[4] Rich, P.J., & Hannafin, M.J. Submitted to the *Journal of Technology and Teacher Education, 05/31/2007.*

Background

Studies focusing on the relationship between instructional decision-making and teaching practices have been reported for nearly four decades. Phillip Jackson (1968) initially posited preactive (i.e., “planning”) and interactive (i.e., “teaching”) instructional decisions as key decision-making types. Decision-making models, expert/novice teacher thinking comparisons, and understandings of teacher judgment subsequently emerged, yielding a multitude of related insights (Clark & Peterson, 1986). Yet, while researchers deepened conceptual understandings about the intricacies of teaching, their findings have yielded little direct impact on teachers’ instructional decisions.

Teacher educators have long-recognized the disconnect between research and practice, and have attempted to bridge this gap (Shulman, 1986). Schön’s (1983) conception of teaching as reflective practice has become one dominant operational method of analyzing instructional decisions and teaching. Despite broad appeal, researchers have not demonstrated the effectiveness of reflective practices on teachers’ decisions.

> One of the almost shocking discoveries one can do when starting to screen the international literature on the issue of promoting reflection is that there is very little research on the effectiveness of teacher education programs aiming at the promotion of reflection....Many studies rely heavily on comments made by student teachers during course evaluations, as well as on self-reports, general observations, and isolated anecdotes. (Korthagen & Wubbels, 2001, p. 89)

Recently, the American Education Research Association panel on Teacher Education commissioned a study on the status of research on teacher education to document research on teachers’ beliefs and attitudes, preparedness to work with diverse and special populations,

professional and pedagogical content knowledge, teacher education program structure, program and individual accountability measures, and the politics of teacher education in changing times (Cochran-Smith & Zeichner, 2005). Despite the extensive practice of encouraging reflection in teacher education, (Zeichner, 1990, 1994; Zeichner & Liston, 1996; Zeichner & Tabachnick, 1991), research on reflective practices was not addressed in the 800+ page report.

Apart from occasional self-reports, general observations, and isolated anecdotes, there is a dearth of empirical evidence examining how teachers analyze and adapt their instructional practices. Recently, Recesso et al., (in press) proposed a systematic method for collecting, analyzing, interpreting and acting on emergent classroom practices. Their method uses video to systematically capture, identify, analyze and adapt a teacher's practice using specific protocols or "lenses." Building from these methods, the purpose of this study was to examine how preservice teachers used evidence-based methods and the Video Analysis Tool to analyze their instructional practices, assessed their practices using a self-determined lens, and subsequently adapted their teaching based on the analysis and assessment process.

Evidential Reasoning and Decision Making (ERDM)

According to Recesso, et al., (in press), ERDM consists of four iterative stages. First, a teacher chooses a focus, which might range from micro level concerns (e.g.,, how to individualize instruction for a struggling student) to macro-level issues (e.g.,, measuring teacher effectiveness to determine rewards and compensation). The teacher then identifies and collects evidence directly or indirectly associated with his or her focus (e.g., lesson plans, video recordings, etc.) and selects a lens to filter, analyze and interpret collected evidence. Lenses are protocols that amplify fine-grained attributes of practice while suppressing unrelated "noise," thereby helping to frame the teacher's perspective during analysis. The teacher synthesizes this

analysis, enacts a course of action, and then repeats this process iteratively to continually examine and act upon a specific aspect of teacher practice.

Sharpe at al (2003) suggested, “preservice teachers need guidance to integrate and apply the learned pedagogical information in ways that enhance their teaching” (p. 538). A key function of ERDM is to guide the interpretation of evidence through the use of lenses, which provide a specific perspective through which teachers can highlight and analyze specific aspects of their teaching.

Video Analysis Tool (VAT)

Several researchers (Chula, 2001; Jensen, 1994; Sharpe et al., 2003) have employed scaffolding frameworks to support video-based self-evaluations among preservice teachers. The Video Analysis Tool (VAT) was designed to facilitate the collection and analysis of direct evidence of teaching practice (see Figure 3.1) (Bryan & Recesso, 2006; Recesso et al., in press). Using VAT, teachers upload, annotate, and segment captured video samples of their teaching practice. Teachers then analyze their videos via a *commenting* process, where video clips are annotated using point-and-click responses (step 1). The teacher then annotates the event and interprets the video *clip* using the chosen lens (step 2), which zeroes-in on specific aspects of teaching practice. By clicking the ‘end’ button, the annotated clip is submitted to the teacher’s database (step 3). Because VAT appends meta-data rather than altering the content of the video, teachers can review and analyze their practices repeatedly without modifying the video itself.

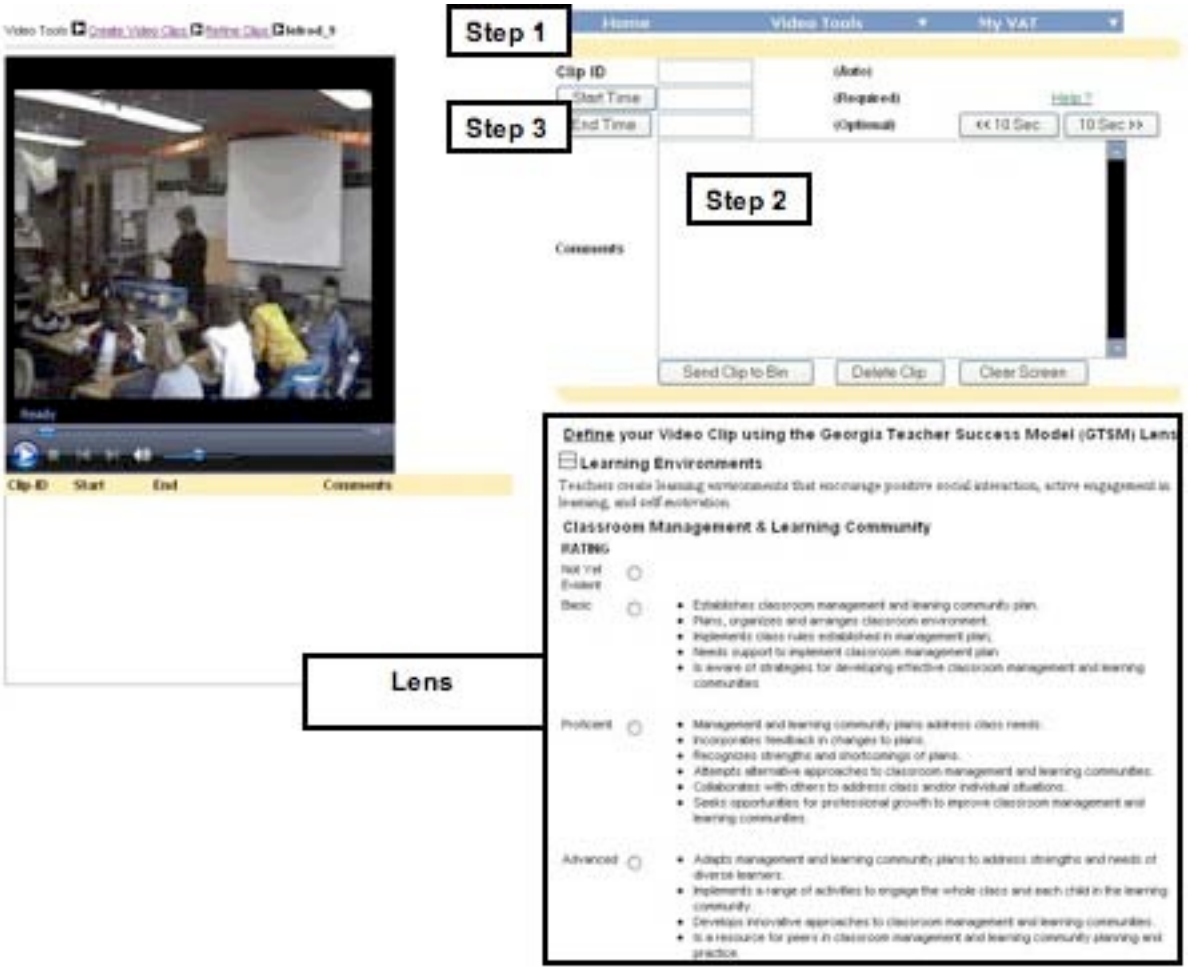

Figure 3.1. The Video Analysis Tool

The Study

Setting & Context

A cohort of 27 preservice teachers participated in a self-inquiry project during a progressively-intensive, one-month field experience conducted the semester prior to student teaching. For the self-inquiry assignment, each candidate taught an entire unit (five lessons) in a cooperating teacher's class and applied ERDM and VAT to analyze his or her practices. Teachers: (1) identified an area of their practice to focus on; (2) recorded themselves teaching;

(3) interpreted their practice using an individually chosen lens; (4) chose, enacted, and recorded a course of action; and (5) interpreted the second video using the same lens used to guide their course of action. Participants selected and constructed individual lenses by surveying a minimum of five different scholarly writings on a chosen topic. Each candidate also presented a summary of their findings and experience to the entire cohort roughly one month following their field experience.

Participant Selection

In order to examine preservice teachers' ability to focus on a specific self-inquiry topic, we used intensity sampling (Patton, 2002) based on a sample video analysis activity. Immediately prior to the activity, the entire cohort was trained to use the VAT. Then, each watched the first 10 minutes of a video in which a 3rd grade teacher taught a hands-on geometry lesson. The cohort was instructed to individually analyze the video based on the teacher's effort "to establish rapport and an atmosphere of respect" among her students. Participants were given 10 minutes to create these clips in the VAT, then they were provided a lens that specified what "establishing an atmosphere of rapport and respect" ought to look like in practice (Appendix A), after which they re-analyzed the same section of video.

We analyzed participant comments before and after their application of the lens to determine if the comments were related to the provided focus (1 point), unrelated to the provided focus (-1 point), or ambiguous (.5 point). The percent difference in initial-to-second alignment using the lens was calculated and graphed. This selection strategy allowed us to identify participants with potentially different approaches to codifying video data using a lens. As shown in Figure 3.2, for example, Natalie made 6 comments during the first part of the analysis. Since none of the comments were related to "establishing rapport and respect," she received a score of

-6 for the first task. However, after using a rapport and respect lens, Natalie's 6 additional comments were all related to the topic. Thus, she demonstrated a 100% percent improvement in the ability to focus on lens-related aspects of classroom practice.

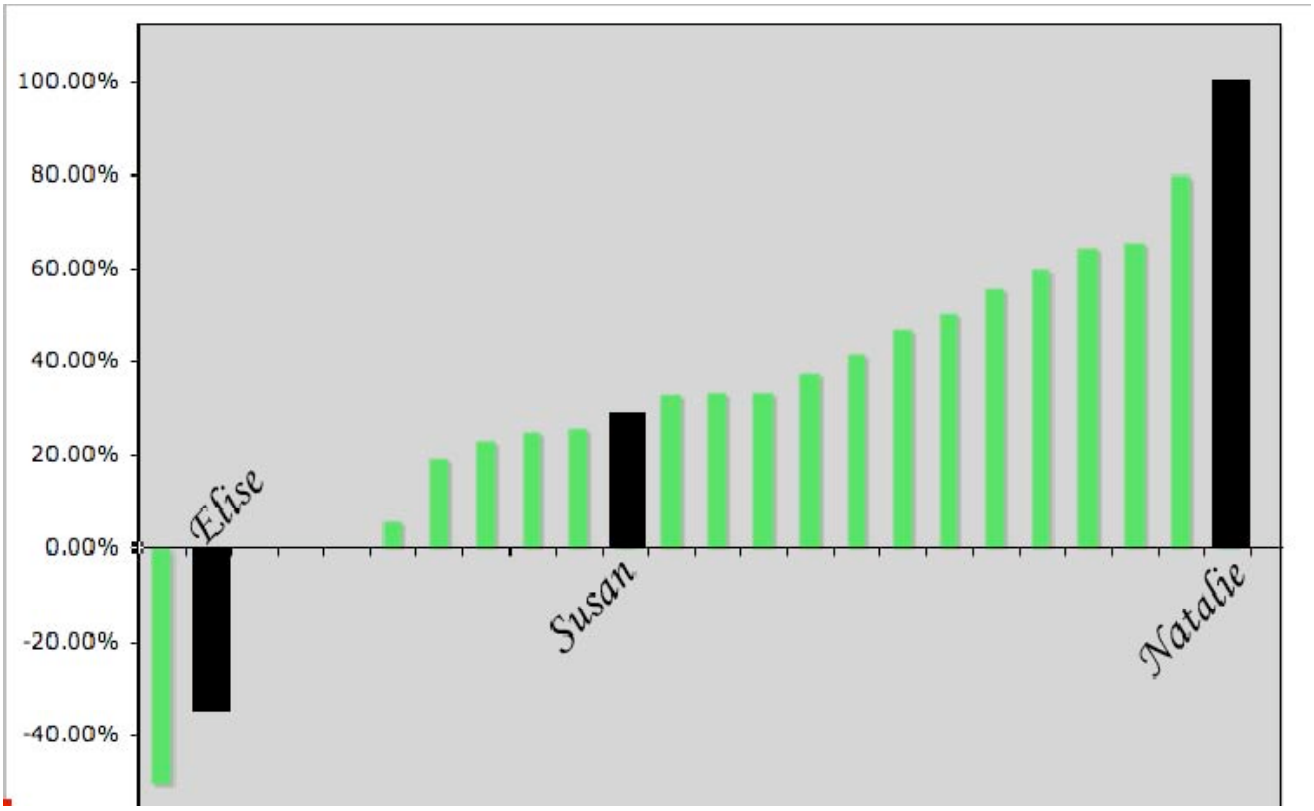

Figure 3.2. Percent change between topic-related comments before & after using a lens

Participants

Elise

Elise's initial task performance suggested that she focused less on topic-related issues using a lens than when she did not use a lens. Elise made few additions to her initial analysis, suggesting that lens scaffolding might add little to her analysis. Since we did not yet know how

she would assess her own teaching using a lens, we were unsure how Elise would approach a scaffolded analysis and anticipated she might benefit only minimally from scaffolded support.

Natalie

While none of her initial comments were related to the rapport and respect focus, all of Natalie's lens-supported comments were topic-related. Thus, while we expected to observe increased focus when she applied a lens to analyze videos of her own teaching, during her interview, Natalie reported, "I can notice more things if I don't look [via a recommended lens]." Yet, one of her mentor teachers noted, "to her benefit, she tried everything I ever suggested. If I brought it up, she owned it…So she owned it all, but she wouldn't… come up with it on her own." We characterized Natalie as faithfully applying recommendations given by others, but reluctant to seek this guidance on her own.

Susan

On the participant selection task, Susan's initial comments were mostly topic-related; after applying the lens, Susan commented more often than any of her 26 peers. Compared with her initial comments, she commented twice as often and all were topic-related. Additionally, after using the lens, Susan highlighted and commented on teaching qualities that were extended using ideas and focus provided by the lens.

In summary, the three preservice teachers seemingly approached video analysis very differently. These distinctions were important as we anticipated Rosenthal and Rosnow's (1975) concern that volunteers are often higher achieving and motivated while lower achieving students are underrepresented. The participants in this study represented a spectrum of candidates and their relative potential for success in a lens-assisted video analysis.

Analysis

This study focused on preservice teachers' first field experience during which the cohort would use evidence-based methods and the Video Analysis Tool to capture, assess, analyze and adapt their instructional decisions. To develop a working theory for the current and future studies, we used grounded theory techniques (Glaser & Strauss, 1967) to identify emergent themes and issues. We used an emergent coding scheme and constant comparative analysis to look for themes across participants' actions. Because we focused on teachers' decisions, we adhered to Charmaz's (2002) framework by using action verbs to describe coded segments of data. We coded interviews, VAT comments, class presentations, and documents (e.g., project summaries, lesson plans) for each participant. Thereafter, we employed a constant comparative process to identify and define themes within and across participants. We ensured triangulation by using matrix displays (Miles & Huberman, 1994) and maintaining original transcripts in the matrix to ensure fidelity to the original source of data (Table 3.1).

Individual Case Findings

While our selection criteria suggested that these participants examined other teacher's practices differently, each reported positive results when analyzing *their own* teaching practices. By establishing and supporting an inquiry focus, each preservice teacher in this study readily identified both corresponding evidence in their own practices as well as changes in their instructional decisions. Specifically, participants described a process in which they: (a) "stepped back" to see their teaching from another perspective, (b) noticed discrepancies between their recollected and their video-recorded experience, and (c) enacted and recorded purposeful change in their teaching.

Table 3.1. Sample coding matrix for theme "Change"

Participant	Original quote (interview)	Action description (Charmaz, 2002)	Property	Triangulation
Elise	I would give step by step as the lesson progressed instead of giving an overall run-through first and saying what I expected and that made a huge difference. So, that's what I changed out of my instruction.	Attributing success to changes made	actual	[FINAL PRESENTATION] Elise demonstrates that she was "very inconsistent" with her first VAT video. Gives examples of wishy-washy and nervous behavior. [VIDEO REFLECTION] Plans on making expectations more clear b/c it"ll help kids complete the lesson knowing what"s expected of them.
Elise	but in the second one I gave directions and that's what it was. There wasn't like, 'if you want.' So I, in the beginning was like, 'this is what we're going to do.' And then this, and then if you're done with this, you can do this. If you have new questions later, raise your hand.	Makes changes in directions-delivery in second lesson	actual	[VAT ANALYSIS] We are all clapping together as a class. I again remind the students that I am expecting raised hands.
Susan	'Cause I do kind of have a quiet tone in my voice. But I think I could still have done more, you know, use more expression and vary my volume to get their attention and stuff like that. I definitely tried to do that in the read alouds I did.	Claims that she could still "have done more" V/NV communication	actual but incomplete	[VAT ANALYSIS] Two boys raise up and say "ooh, ooh", and instead of stopping them, I respond to the comment, only chiding to say "let"s don"t call out" in a soft, petitioning voice
Natalie	They all sat at their desks.	Change-kids sat at desks	actual	[VAT ANALYSIS] The students are sitting at their desks. They are much quieter today. They all raise their hands to answer questions. [FINAL PRESENTATION] students distracted on floor but not at desks.

"Stepping Back"

While research on the influence of reflection on teaching practice is rare, participants used video to "step back" (Schrum, 1994), initiate and validate changes in their instructional decisions. Consistent with Sherin and van Es's (2005) research on "noticing" through the use of

video and video cases in teacher education, our participants discussed the ability to "see" their teaching as providing significant value. On the final survey (Appendix B), 91% (20 of 22) respondents indicated that the opportunity to see, notice or watch themselves teach was the most important outcome of their self-inquiry. They cited the ability to observe what was "really going on" in their classrooms as a key element of their experience.

Elise. Elise intended to focus on "confidence and clarity in [providing] directions and expectations"; following her first lesson, she reported having done so. As she watched her first video, however, she noted that the class became increasingly noisy. In her first VAT analysis, she noted, "I didn't redirect the students to get al.,l of their attention. I am having to talk over students." As Elise continued with her analysis, she associated video with a second pair of eyes:

> I like being able to see my tape because I was able to see what all the kids were doing, because when you're teaching you don't see what everyone is doing. You don't have like a million eyes to see what every single one of your kids is doing, so when I was able to watch mine, 'huh I didn't see that. I didn't realize he was doing this.

Natalie. Natalie chose to focus on student engagement. Since her cooperating teacher was not present during her first video-recorded lesson, Natalie's first-grade students quickly became unruly. Her initial response was to blame the children and establish strict management rules, such as sitting quietly at their desks instead of spreading out on the floor. Video became a tool for her to identify behavior management issues.

> I didn't realize how many students were not paying attention or were not looking at me. I hear some students whispering in the background…It was good, because I really got to see the worst of it (laughs)…I saw them looking around and turning around and not

> paying attention. I can slowly see the kids moving throughout the lines… they were looking around, talking, that I didn't even realize from the front of the class.

Susan. Susan's self-inquiry project focused on her verbal and non-verbal communication. Although she reported her first lesson went fairly well, she reserved judgment until after watching her video. She explained:

> …if you can take that step back from being in the moment and just looking at yourself, you know, and not worry about the teaching, what's actually going on in the classroom right then. Because when you're doing that, right then, you have so many other things to think about.

Gitlin and Teitelbaum (1983) noted that the ability to step back is important during teacher inquiry. Prior studies on interactive decision-making (Johnston, 1994) suggest that novice teachers experience cognitive overload while attempting to reflect-in-action. In the present study, all three participants used video to gain additional perspectives on their teaching. As Elise explained, "'Cause when you're doing it [i.e., teaching], you only see it, a percentage of how the kids respond. On the tape you see what everybody is doing." In other words, they used video to reflect-on-action and mitigate the cognitive and logistical complexity associated with reflecting-in-action. In a recent study in which preservice teachers observed videos of each others' practice, one mentioned,

> You haven't got the adrenaline rush that you've got in the classroom so there is time for critical reflection you notice and analyze more like you were watching a documentary and you pick away at it. (Whitehead & Fitzgerald, 2007, p. 8)

Detecting Discrepancies

Upon stepping back and seeing their teaching from a different perspective, participants noted differences between what they actually observed on video and what they recalled from memory.

Elise. Elise mentioned that video became her second pair of eyes—a management technique that she later used to encourage students to behave. Upon closer analysis, Elise's attention shifted from using video for student surveillance to noticing the effect of her actions on student understanding: "Without seeing myself do it, I wouldn't have known how chaotic it was, like I saw that kids were loud." Elise began to examine how her decisions may contribute to noise. During her first VAT analysis, she noted several inconsistencies in student behavior due to her class directions. She noted, "I was not that clear to when I wanted them to shut their eyes and begin thinking." She recognized that students were off-task because they were unsure of the procedures to be followed.

Natalie. Natalie initially indicated that student behavior was not mediated entirely by teacher action. After analyzing her video, however, she identified her influence on student behavior: "I only call out the behavior of the students that are labeled 'bad' and who usually don't listen. Watching the video I clearly see that other students are not paying attention also." In addition, she noted that her planned activities and question asking encouraged attention from a single child. She wrote in her final paper, "since only one student out of 23 participated at a time, the 22 students not involved were obviously distracted." Thus, students were often not engaged because she failed to engage the class as a whole.

Susan. Susan, upon examining her verbal and nonverbal communication through video analysis, realized she was sending conflicting messages to her students. On the one hand, she felt

she successfully used touch and facial expressions to communicate, but noted several instances in which her verbal language contradicted her nonverbal language. She cited one particular example in her VAT analysis, final report, and follow-up interview: “Like, I’d say, 'good job, Cole.' And then I immediately went to another thing and I didn't say it like I meant it. You know, I didn't stop and really look at him and make sure he knew.”

Each preservice teacher recognized a disparity between their recalled experience and what they observed during video analysis. Consistent with previous studies, participants documented discrepancies between what they perceived to occur during teaching and what they observed upon stepping back. Artzt and Armour-Thomas (2002), for example, examined preservice teachers’ use of video and observations to examine their own and others’ practice. Upon observing a colleague teach, one student teacher recognized errors similar to those he made during his own teaching. Video analysis provided a means for participants to identify discrepancies between practices recalled from memory and documented through video-recordings and analysis.

Reflecting for Action

Calandra, Gurvitch, and Lund (2006) noted that video-aided reflection was important in effective and meaningful self-analysis. Killion and Todnam (1991) introduced *Reflection for Action*—a potentially important concept for teacher self-analysis involving reflecting, information gathering, decision-making, and evaluating. According to O’Donnel, Reeve, and Smith (2007), reflection for action involves processes similar to the Evidential Reasoning and Decision-Making framework used in the present study, indicating that this process may help teachers act on their reflections.

Elise. Elise recognized the need for structured instructions. She resolved not to wander around the class, establish clearer expectations at the beginning of class, and ensure that students were attendant before giving directions. Within the first three minutes of her second recorded lesson, Elise noted that she has "given 'step-by-step' directions to what they would be doing." Prior to beginning the lesson, she "asks everyone if they are ready… summarizes what they will be doing…makes sure there are not any confused students…[and] is very clear with directions." Throughout the video, Elise highlighted her methods to ensure students understood their task.

Natalie. Having identified the need to engage all students simultaneously, Natalie decided to make several changes. In her second analysis, she noted, "I do not just give them the answer, I make them [i.e., the entire class] come up with the answers." As a result, she noted that students were more engaged because they generated their own answers: "I like my questioning a lot better today, because they demand actual answers and hypotheses from students." In addition, Natalie had used a 30-inch thermometer cutout for the first lesson. During her video analysis, she noted that some students could see it, and that introducing the thermometer at the conclusion of the lesson failed to interest students. She therefore determined to use graph paper as individual thermometers where students filled out the temperature on their individual sheets. Natalie reported that these (and other) modifications led to a successful second lesson for the class as a whole, as evident in a student comment: "It was so much fun…can we do this more often?" Her greatest success, though, came after class during an unexpected conversation:

> There's this one child…he's completely behind. And we were going through the lunch line and he was like, "Miss Natalie, look there's a thermometer on the milk refrigerator."

> And I was like, “Very good. What's the temperature?” And he was like, “It's forty degrees.” And that's how much it was. And it was so nice. It was so exciting.

Susan. Based on her initial assessment, Susan decided to reinforce nonverbally what she communicated verbally. She resolved to improve in two areas: tone of voice and minimizing interruptions. For example, she attempted to use tone and pitch for emphasis while reading in small groups. Based on her second analysis, she concluded, “I think I really did a good job of it.” In addition, Susan resolved to handle student interruptions by managing her own behavior.

> It was like, ok Susan, if you really say, ‘No interruptions,’ what are you going to do?..You need to ignore them…if you wanna’ get your point across. Otherwise they're just gonna' keep saying, ‘she [says] no interruptions, but she's still…acknowledging me.’… Sometimes I would comment or turn to them and give them positive eye contact or body language when they interrupted. But I wanted to change it to where I either just didn't look at them and just keep going…And they don't really interrupt anymore…so it's not like I had to stop what I was doing.

By changing body language to match her verbal language, Susan was better able to continue with the lesson and keep students on-task.

While changes in planned and enacted practices were documented for each participant, Elise’s comment epitomizes the value of deliberate video analysis in reflecting for action: “It definitely has helped a lot. In seeing what I still need to work on …I had an idea of what I had to change…but there was [sic] more things I saw on there.” While much has been written on the value of reflection, few have reported the outcomes of such reflections on, in, or for action. By developing a course of action associated with their scaffolded reflection, Elise, Natalie, and

Susan enacted purposeful changes, captured those changes on video, and evaluated their effectiveness.

Using Lenses

One of our research questions focused on how preservice teachers adapted their approaches based on VAT-enhanced ERDM analysis and assessment. The participant selection task required the use of a VAT lens to analyze another teacher's practice. Both Natalie and Elise's initial analyses were not topic-related, suggesting both might require the use of a lens to focus. Interestingly, both indicated they did not use their lens until analyzing their second video. Natalie culled the principles for student engagement (her lens) from her first analysis. "Student engagement is them not looking around, staying on task, doing what they're required to do. And just being actively involved… actually I came up with those things after I looked at my first one." Likewise, Elise confessed: "…in the first one, I didn't really use [a lens]." Both subsequently reported they perceived themselves as less critical in their second analysis than in their first analyses.

Conversely, Susan constructed an elaborate 2-page observation lens and used it to analyze both of her videos, and distributed the lens to her cooperating teacher, her university observer, and even her father and asked each to observe her video and assess her practice using her lens. Rather than reporting a decrease in criticality from one analysis to the next, Susan demonstrated the ability to identify conditions under which particular attributes of practice were manifested. She noted in her first analysis, "My voice—I still have problems with my intonation and volume when I am giving directions. *It happens more when I am reminding students to stay on task*" (emphasis added).

Whereas Elise and Natalie's first analyses focused mainly on negative aspects of their practice, Susan identified both positive and negative aspects of her teaching on both lessons. Both Natalie and Elise actually increased their ability to use the lens to critically examine their teaching practices, so this may reflect declines in negativity rather than in criticality

Because Susan's lens included both negative and positive observations, she highlighted positive and negative aspects of her teaching in both analyses. By using the same lens across both lessons, Susan identified when, in what ways, and how to improve her verbal and nonverbal communication. Consistent with previous research indicating the importance of a guiding framework (Poetter et al., 1997), Susan used the lens to align her practices with research evidence on effective verbal and nonverbal communication. She thus connected theory with her own practice, a well-documented challenge among preservice teachers during their field experiences (Maloch et al., 2003). Though increased opportunity for self-analysis may help preservice teachers to improve their teaching, the consistent use of a lens over time may increase and focus the impact on specific instructional decisions, such as the ability to associate specific actions with their consequences.

Implications for Teacher Education

Often, video has been used in preservice teacher education to capture and re-present examples of prototypical teaching cases (Copeland & Decker, 1996; Hewitt, Pedretti, Bencze, Vaillancourt, & Yoon, 2003). While potentially valuable, this may paradoxically limit opportunities to learn from, see, and perhaps most importantly, modify instructional decision-making and classroom practice (Sherin & Van Es, 2005). All three participants, when analyzing another teacher's practice, demonstrated varying ability to focus on a given topic. When analyzing videos of their own teaching, however, they noted discrepancies between what they

remembered and what they saw, and adapted their teaching accordingly. According to Dewey (1910), “reflective thought means judgment suspended during further inquiry” (p. 13). Our participants suspended their judgment until they evaluated their teaching on video, stepping back and noticing how their own decisions may have affected what they perceived to have happened.

Most importantly, this research demonstrates that changes can occur when reflection-on-action is a means to reflection-for-action. These adaptations are preserved on video and may provide a basis for highlighting discrepancies between anecdotal and direct evidence. Thus, the purposeful use of video to analyze one’s own teaching practices may help to induce analytical perspectives to observe, detect, and improve preservice teachers’ instructional decision making.

Interestingly, all participants used video to articulate discrepancies between their perceptions and direct evidence of teaching practices and events. Recent developments in science and mathematics education demonstrate that preservice teachers’ beliefs and practices are rarely aligned (Abell, Bryan, & Anderson, 1998; Borko & Putnam, 1996; Bryan & Abell, 1997, Conway, 2001), suggesting a need for approaches that help to recognize such contradictions. While Bryan and Recesso (2006) used the VAT specifically to address contradictions between thought and action, participants in this study identified discrepancies between perception and practice spontaneously (i.e., without being told to look for these discrepancies). This may prove especially important to making and correcting instructional decisions among preservice teachers. Each participant both identified discrepancies between perception and practices and modified instructional decisions to effect differences in her teaching.

Finally, while reflection emphasizes the importance of cultivating self-critical educators (Christensen, Wilson, & Sunal, 2004; Fendler, 2003; Noffke, 1995; Whipp, 2003), decreases in self-criticality appeared to represent declines in negativity, rather than criticality in analysis.

Both Elise and Natalie remained critical during analysis of their practices, but critical comments were bounded by the focus of their specific lenses. Additionally, the decline in negative criticality was evident only after participants initially applied a lens to their analyses. This supports Zeichner and Tabachnick's (1991, p. 2) claim, “it does not make much sense to encourage or to assess reflective practice in general without establishing clear priorities for the reflections that emerge out of a reasoned educational and social philosophy.” In effect, reflective practice may require guidance (Loughran, 2002), such as that offered through the use of video augmented with consistent, scaffolded lenses.

Limitations

While the entire cohort of 27 preservice teachers participated in the self-inquiry project, we have only presented detailed data from three participants. Thus, we consider our findings and claims to be tentative generalizations (Hoadley, 2004), ideas to be tested in subsequent studies. Also, while one month is typical for time spent in the classroom at the early stages of teacher education, it provides a relatively brief snapshot to measure growth and durability of changes in teaching practice. In Sherin and van Es’s (2005) studies, several video analysis sessions were needed before participants began to focus on distinct learning events. Future studies are needed to examine the use of evidence-based methods and tools during extended student teaching experience.

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CHAPTER 4

CAPTURING AND ASSESSING EVIDENCE OF STUDENT TEACHER INQUIRY: A CASE STUDY[5]

[5] Rich, P.J., & Hannafin, M.J., Submitted to *Teaching and Teacher Education*, 06/21/2007.

Background

Inquiry in teacher education involves systematically researching one's practices in context in order to improve teaching and learning. Many forms of inquiry have been reported in teacher education, including: action research, critical inquiry, reflective practices, analysis of beliefs, video clubs, and teacher research (Lytle & Cochran-Smith, 1993). Most approaches, however, are consistent with principles initially set forth by John Dewey (1910) and subsequently operationalized in various preservice teacher education programs (Noffke, 1997). Several authorities have since proposed teacher inquiry methods (see, for example, Hubbard & Power, 2003; Korthagen, 2001). In this paper, we examine how preservice teachers enact teacher inquiry to make instructional decisions using a Video Analysis Tool and feedback from cooperating teachers to analyze their practices.

According to Dewey (1933), an inquiry begins with a question, a "perplexity" (p.12). Something must challenge the thought process and bring to bear conscious and purposeful thinking about a subject. Dewey (1910) notes that "thinking is not a case of spontaneous combustion; it does not occur just on 'general principles.' There is something specific which occasions and evokes it" (p.12). Similarly, Schön (1983) noted that a teacher "reflects in action" when a "puzzling, troubling or interesting phenomenon" (p. 50) occurs for that teacher. Teacher educators seek to help preservice teachers consciously consider the perplexities of their own classrooms and teaching, encouraging them to become problem solvers (Dawson, 2006). Often, these perplexities occur in the teacher's everyday, moment-to-moment activities and actions.

> The skills, the arts of looking and listening to those things that happen every day in classrooms and that subsequently tend to be overlooked are invaluable to the teacher. It is so easy to peg one's self into the doldrums of hopelessness in school, the routines of day-

> to-day life in school along with the bureaucratic "mumbo jumbo" that don't seem to reflect who we want to be as human beings and what we want to do for children in classrooms. (Poetter et al., 1997, p. 184)

Thus, in an effort to improve their teaching ability, preservice teachers are encouraged to problematize classroom events in order to inquire about their practice.

Hubbard and Power (2003) suggested that preservice teachers also need support to establish parameters for their inquiries to ensure that the process does more than simply confirm or corroborate a predetermined outcome. AUTHORS (2005) characterized the inquiry process as “purposeful observation” that involves deliberate planning to anticipate what, when, and how methods are to be observed. “It is one thing to have flashes of inspiration and creative insights, but it requires careful planning and rational decision making to put most novel ideas into practice” (Goodman, 1991). While sufficiently flexible to accommodate unexpected events, systematic inquiry focuses observation on specific qualities and attributes of teacher and student activity.

During reflective thought “judgment [is] suspended during further inquiry” (Dewey, 1910, p. 13). ‘Stepping back’ involves detaching oneself from the observation without becoming detached from the evidence gathered, or the reflective process (Schön, 1983). Hubbard and Power (2003) characterize stepping back as “seeing and seeing again” (p. 88), noting that preservice teachers must first be able to describe observed evidence before making any concluding judgment. “Thinking, in short, must end as well as begin in the domain of concrete observations, if it is to be complete thinking” (Dewey, 1910, p. 96).

Teacher educators have lauded the inquiry process for encouraging preservice teachers to finally see the connections between the theories of learning and the practice of teaching (Poetter

et al., 1997), something preservice teachers report as difficult to do (Maloch et al., 2003). Gitlin and Teitelbaum (1983) contend that preservice teachers must "'utilitize' their university instruction and other sources of relevant knowledge to consider why particular schooling practices occur and their educational (and ethical) implications" (p.230). Analysis, therefore, helps to guide preservice teachers' assessments of their and others' practice (Gitlin, Barlow, Burbank, Kauchack, & Stevens, 1999). Analysis involves weighing concrete evidence of practice with established norms, theories and research.

Dewey (1910) further noted that "demand for the solution of a perplexity is the steadying and guiding factor in the entire process" (p. 11). The purpose of inquiry-oriented teacher education is to increase learning by improving individual teaching practices. If preservice teachers do nothing to improve their practices, then the inquiry remains incomplete. Educational researchers have made increasing calls for a "knowledge-base" in teacher education during the past ten years (Hiebert, Gallimore, & Stigler, 2002; Gitlin, Barlow, Burbank, Kaucak, & Stevens, 1999; Darling-Hammond, 2000; Supovitz, 2002). This knowledge base can only be built on a personal and professional level if teachers find and execute solutions to their inquiries. Gitlin and Teitelbaum (1983) extend this idea by declaring that preservice teachers can validate their analyses and findings by presenting and sharing their findings with a public audience, moving beyond what intuition and literature already tell them. In order to improve one's practices through inquiry, a teacher must necessarily return to the perplexity that initiated the inquiry by acting out a viable solution to it.

In a recent study (AUTHORS, 2007), we examined how preservice teachers analyzed and adapted their practices while implementing Evidential Reasoning and Decision Making (ERDM)—a scaffolded inquiry approach— via the Video Analysis Tool. ERDM involves

planning, analyzing, reflecting, and adapting instructional approaches by comparing evidence of one's practice with accepted norms, conventions, and standards. We found that preservice teachers that engaged in video analysis pinpointed discrepancies between their perceived and recorded actions. In the current study, we examined how student teachers engaged ERDM as they planned for, executed, and adapted their instruction.

The Study

During their student teaching experience, a cohort of 26 student teachers used ERDM to examine a self-defined attribute of their practice. All had previously used the Video Analysis Tool to analyze their teaching during a one-month internship experience (AUTHORS, 2007). In the present study, all student teachers engaged in two ERDM cycles during a 10-week student teaching experience. While we collected survey information from the entire cohort, in order to to examine individual experiences more closely we sought participants that would vary in motivation to engage in this process based on individual self-reports and the researchers' observations of the prior experience. We offered a stipend for participation, but none of the "less motivated" participants completed the study due to anticipated concerns over adding tasks during their student teaching. Thus, we used the complete data for and draw our conclusions from four preservice teachers considered motivated to participate and use the approaches.

In addition to individual analyses, we invited (and compensated) the cooperating teachers (CTs) to also analyze our four case study participants' videos during student teaching. We reasoned that doing so would provide additional clinical expertise in the analysis and interpretation of evidence of student teacher practice. Thus, we hoped to provide multiple triangulation points to assess student teachers' evidence-based decisions. Interestingly, there was a great degree of difference in each cooperating teacher's (CT's) experience in mentoring

preservice teachers. Kristen[6] was her CT's 32nd intern and Susan was the 10th intern to a CT who was her school's student teacher liaison. In contrast, Lisa and Zoe were both the first mentoring experience for their cooperating teachers. Three of the four cooperating teachers assessed their protégé's videos using the same framework as selected by their respective student teachers.

Methods

Data & Instrumentation

The data sources, instruments and data reduction and analysis methods used in this study are shown in Table 4.1.

Table 4.1. Data sources, instruments and analyses used for planning, implementing and adapting practice via ERDM

Instructional Decisions	Data Source & Instruments	Analysis
Planning	• Professional Development Plan • Recorded "Pre-brief" • Written Unit/Lesson Plans	• Open-coding, looking for evidence of implicit vs. evidence-based decisions. • Cross comparison to highlight themes across participants
Implementing	• Student Teacher (ST) VAT Comments • Cooperating teacher (CT) VAT comments • Follow-up Interviews	• Constant Comparison of codes, focusing on ERDM stages. • Triangulate interviews, surveys, debriefs, and VAT comments to look for references to suggested and enacted decisions. Compare within and across participants.
Adapting	• Follow-up surveys • Recorded "De-brief" • Final Reflections • ST Follow-up interviews • CT Follow-up interviews	• Compare debrief with VAT analyses, looking for evidence of implicit vs. evidence-based decisions. • Code for degree of alignment with teacher assessment instrument and frequency of lens use. GTSM code counts of VAT comments. • Content-based analysis of ST and CT VAT comments • Timeline comparison of ST coded events against CT coded events • Triangulation of VAT comments regarding assessment framework with interviews.

[6] All names are pseudonyms

Professional Development Plan (Appendix C). Prior to student teaching, participants created a professional development plan to document which aspects of their teaching they planned to analyze, what evidence they would collect around that issue, and their rationale for their instructional decisions.

Lenses (Appendix D*).* In order to interpret evidence of their practices through an established framework, participants were asked to choose a lens to analyze their evidence. A lens provides a specific perspective through which teaching practices can be examined. For example, in an earlier study, a preservice teacher interested in analyzing her questioning strategies used Bloom's taxonomy to rate the questions she asked during the course of a lesson. For the present study, teacher educators identified three attributes of a state-developed framework for teacher development that they felt were important for student teachers to focus on (Table 4.2). We reasoned that providing state-sponsored teacher assessment lenses would help student teachers focus their analyses around important teaching concepts.

Video Analysis Tool (VAT). Participants collected and analyzed video evidence of their practice using the VAT (see Figure 4.1) [See Bryan & Recesso (2006) and AUTHORS (submitted) for detailed descriptions]. Using VAT, student teachers uploaded and segmented evidence of their teaching practices, then analyzed them via *comments* associated with the video segments under review. Student teachers also annotated each event and, if desired, interpreted the specific video clip using their chosen lens; these meta-data were then saved in a database. Because VAT appends meta-data rather than editing the video per se, evidence could be reviewed and analyzed repeatedly. We collected and analyzed comments made by both student teachers as well their cooperating teachers' analyses of the same VAT videos.

Table 4.2. Example of a lens available to participants to guide/interpret their inquiries

Domain: Assessment: Teachers understand and use a range of formal and informal assessment strategies to evaluate and ensure the continuous development of all learners				
Attribute H:	Not yet evident	Basic	Proficient	Advanced
Identification of student strengths and needs		• Develops differentiated assessment plan/activities • Applies differentiated assessment to all students. • Needs routine direction and support to develop and implement differentiated assessment. • Is knowledgeable of varied assessment approaches.	• Organizes assessments based on individual student needs. • Applies methods for assessing individual student needs • Uses feedback from peers to revise assessments for individual student needs. • Seeks support to revise assessments. • Seeks opportunities to discover new assessment methods.	• Dynamically adapts assessments to address specific students' needs • Implements a *range* of assessments for the needs of each child. • Develops innovative assessments for specific students • Modifies assessments on the fly based on "teachable moments" to account for individual student needs • Is a resource to peers for sharing varied and individualized assessment methods.

Pre-briefing and Debriefing videos. In order to determine the extent to which student teachers' actions resulted from implicit reflection or detailed analysis of evidence, we asked each case study participant to video-record her thoughts prior to and following each recorded lesson. The purpose of the pre-brief was to document student teachers' preactive instructional decisions (Jackson, 1968) before they were enacted. The debrief, obtained immediately following their teaching but prior to formal analysis, was designed to document intuitive reactions prior to evidence-based comparison and to compare them with captured evidence of their actions.

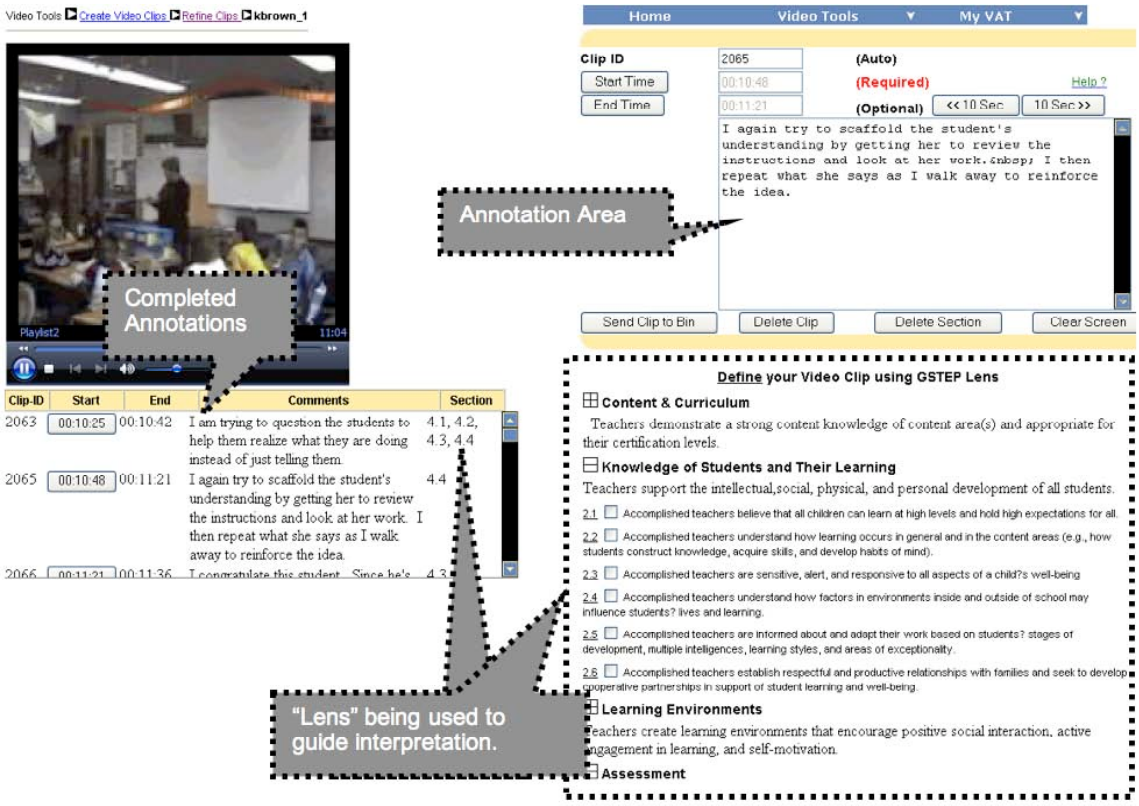

Figure 4.1. Video Analysis Tool

Follow-up Interviews (Appendix E & F). Interview protocols were constructed by choosing "Big questions" (Mason, 1996) to guide the interview, then constructing sub-questions and breaking these into micro-level questions. The purpose of this final interview was to report on the perceived effect of ERDM on participants' instructional decisions. We asked participants to describe how (or if) evidence affected their understanding and enactment of their instructional decisions. Participants also reported the extent to which they used the new state developed teacher assessment instrument and any effect this had on their instructional decisions. After interviewing each student teacher, we then interviewed cooperating teachers (CT) using a similar

semi-structured protocol in order to confirm or contradict evidence gathered from the student teachers.

Final Reflection Paper. At the conclusion of student teaching, participants completed a 2-3 page reflection paper that synthesized their experience using Evidential Reasoning and Decision Making and its impact on their instructional decisions. The paper provided first-person, narrative evidence of personal growth during the inquiry process.

Intermediate and Follow-up Surveys (Appendix G & H). Student teachers completed one survey at the mid-point and one administered after completing student teaching. The surveys queried the extent to which participants engaged ERDM, developed initial courses of action, and used a state-developed lens. Through the survey, all cohort members had the opportunity to share the outcomes of their inquiry projects and the perceived benefit of ERDM in this process.

Individual Supporting Documents. When participants referenced resources related to their assertions during the course of interviews, we obtained the corresponding documents and used these for triangulation purposes when available.

Data Analysis

We used an emergent coding scheme (Glaser & Strauss 1967) and constant comparative analysis to look for themes across participants' actions at each ERDM stage. Using Charmaz's concept of (2002) action verb descriptions, we coded interviews, VAT comments, pre-brief and debrief records, final reflections, and related supporting documents for each participant. Thereafter, we employed a constant comparative process to identify and define themes within and across participants. We conducted our analysis using Atlas.ti® because of its hermeneutic approach to coding, which allowed us to connect codes at various levels and to define

relationships between and among codes. We used matrix displays (Miles & Huberman, 1994) to triangulate similar and/or contradictory evidence across data sources.

In order to evaluate the relative importance of preservice teachers' comments, we also analyzed similarities and differences between student teachers' and cooperating teachers' VAT comments. We aligned the time-stamps (Appendix J) indicating when student teachers and cooperating teachers coded each video and contrasted their comments, or annotations, related to the specific segments to determine whether they addressed the same issue(s). Finally, we conducted a cross-comparative analysis of the cooperating teachers' VAT comments to determine whether their comments were descriptive or evaluative.

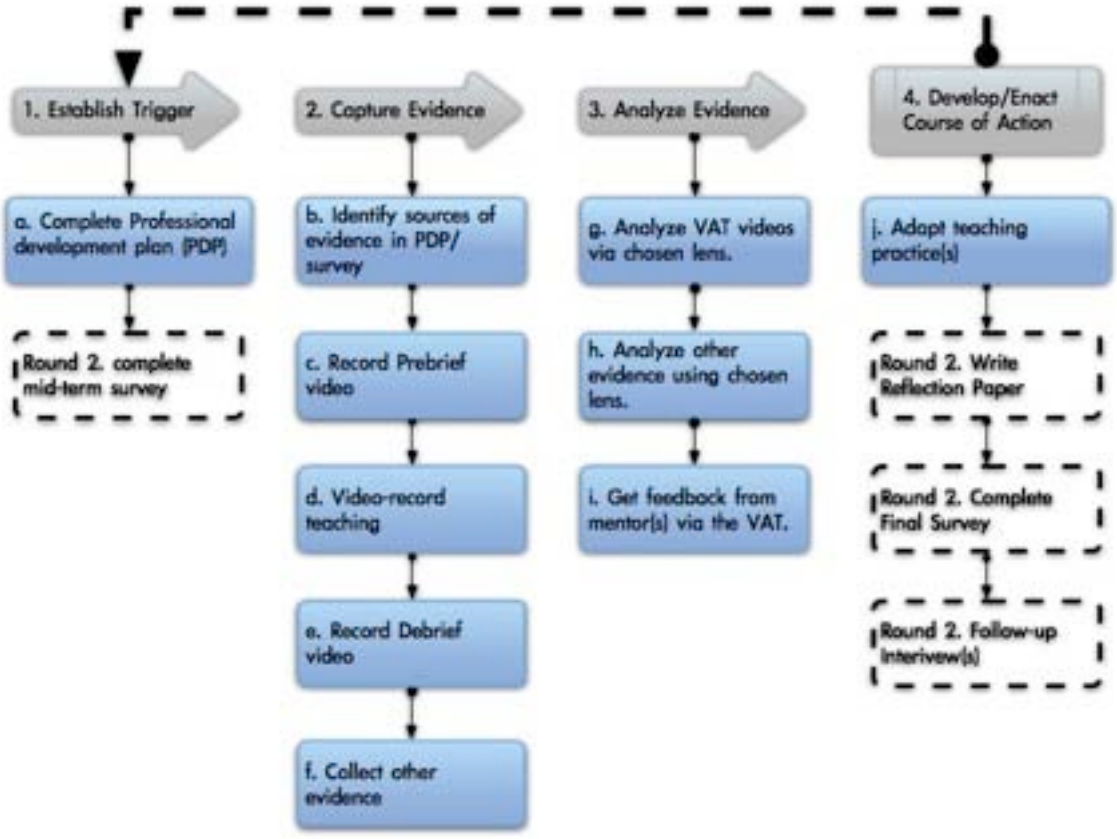

Figure 4.2. Procedures

Procedures

Figure 4.2 provides a graphical overview of the study procedures. In the following section, we discuss how participants enacted their inquiry during two ERDM iterations.

Establishing a Trigger. Similar to finding and framing a question, a trigger initiates an inquiry about a particular aspect of one's teaching. To encourage student teachers to succinctly define a trigger statement, they developed a professional development plan prior to beginning student teaching. Additionally, because research consistently shows that preservice teachers need guidance and direction when analyzing their own practice (Dawson, 2006; Griffin, 2003; Richardson, 1996;), participants framed their inquiries by selecting a lens that represented one of three attributes of a state-developed framework for teacher practices (Appendix D). Teacher educators identified three attributes they wished student teachers to use to focus their inquiries: One attribute focused on assessing individual students' strengths and needs; another attribute focused on accommodating individual student needs; and the third attribute focused on classroom management and learning environments.

For example, after studying the lenses and spending several weeks observing her cooperating teacher's classroom, Kristen identified her trigger, "Individualizing Lesson Plans during reading instruction." Her rationale was based on observations of students' activity during small-group reading lessons, indicating that she desired to teach to the comprehension level of the struggling students while still challenging the higher-achieving students.

Planning for and Collecting Evidence. Consistent with the principle that an inquirer engage in systematic observation, student teachers identified information to collect in order to investigate their triggers. We instructed the participants to identify a minimum of two sources of evidence for their inquiries. Since the emphasis was on improving student teachers' practice

through video, video was a required source of evidence. Once student teachers outlined their plans, they collected evidence for their first inquiry within the first six weeks of student teaching, such as recording practice related to their trigger and uploading videos to the VAT.

Kristen, for example, indicated that she would record herself teaching both the high reading group and low reading groups on the same day. She would then upload and annotate her videos using the VAT and compare her analyses with those of her cooperating teacher. In addition, she identified a "reading matrix" (i.e., a matrix in which she addresses varied teaching strategies for different levels of learners) that she intended to analyze given feedback from her CT.

Analysis. ERDM analysis subsumes the inquiry principles of "stepping back" and "analysis," and involves both the description and interpretation of collected evidence. Recent research (Davis, 2006) demonstrates that guidance helps preservice teachers to benefit from the teaching knowledge experts deem important. During analysis, student teachers used their selected lens, or framework, to codify and interpret their evidence. Using VAT's annotation feature, participants associated comments to their lens-related practices via hyperlinks. The cooperating teachers also analyzed student teachers' videos using the same trigger and lens, providing additional evidence to guide interpretation.

In order to compare instruction between the two reading groups, Kristen, for example, analyzed her first two videos by first watching each in its entirety. She then re-viewed the videos, creating and annotating clips wherein she did or did not differentiate based on student abilities. She then rated her clips using the associated VAT lens. Her CT used the same method to analyze Kristen's videos, then discussed her performance during after school review sessions, referring to specific video clips.

Developing and Enacting a Course of Action. Noffke (1997) points out, "The process of personal transformation through the examination of practices and self-reflection may be a necessary part of social change, especially in education; it is, however, not sufficient" (p. 329). Thus, following interpretation of their collected evidence, student teachers identified, chose, and enacted a solution related to their individual inquiry. In so doing, ERDM becomes a formative process for self-improvement that teachers may engage iteratively to systematically analyze and progressively refine their teaching. As Dewey (1910) noted about outcomes, "the ultimate educative value of all deductive processes is measured by the degree to which they become working tools in the creation and development of new experiences" (p. 96).

Based on feedback from her CT, Kristen decided to identify specific vocabulary words for the readings from each group and to use more modeling for the lower level group. She reported observing more modeling in her second set of videos as well as conscientiously planning around different sets of vocabulary words.

During the last 4 weeks of student teaching, participants repeated the process (Round 2) described above. They identified a new or refined trigger statement (via a mid-term survey), created plans for collecting data, video-recorded themselves, uploaded their videos to the VAT system, analyzed their videos using the VAT, and decided on a course of action for future teaching. At the end of student teaching, we also collected each participant's final course of action, final reflection paper, and final survey and conducted follow-up interviews.

Researcher Statement

We have been involved with the E-TEACH initiative funded by a United States Department of Education Preparing Teachers to use Technology (PT3) grant. The initiative, in part, involves developing and refining a technology innovation—Web-based tools and evidence-

Table 4.3. Comparison across participants' reported ERDM processes.

Participant	Trigger	Evidence Planning/ Collection	Analysis & Interpretation	Course of Action
Kristen	You have to teach for a little while before you can even start. 'Cause you have to know what your weaknesses are. You have to know what you're going to work on. You have to know where you are struggling or what you are uncomfortable with…once you have some experience, then you focus more on what you wanna' work on. And choose your topic.	I do the videotapes, I know what I'm looking at, and I'm already going to be better than I was, just because I'm conscious of it.	I analyzed the first video, usually after looking at all that, so I could really tell what I was doing. After you videotape the first time (laughs), I always looked at how I could do better. You know, either talk to somebody…	After I found the different ways to make it better…analyze it and then reflect on where it's headed. If it's something that you did perfect in that time, then you can close it and feel like you have that down, but otherwise keep going. Know that that's something that you need to pay attention to in the future.
Lisa	First I was observed and decided, with the help of my observers, something that I needed help on.	I did research in an informal way by talking to people. And then I implemented the research, and the different ways and strategies.	And then I did assessment by video.	Then I decided what I still needed work on...So kind of back to the beginning of the observation… The first time, in the beginning of my stages, I was observed…after I watched that first video I was able to observe myself and decide what I needed to work on for the next time
Susan	I picked something that I thought I needed to work on or saw the problem. I thought about it.	I collected some evidence by videoing myself and talking to other people and observing my cooperating teacher.	I analyzed what went on in the lesson. I got feedback from my cooperating teacher.	And then I developed another strategy for combating the problem that was a little different from my first one, just because of what I found out. And then I taped again and that just led me to more thinking.
Zoe	In the beginning I wasn't really sure what I wanted to focus on…I knew I wanted to focus on something and so I chose something that was almost isolated to the situation I was in, with a very standards-driven school.	through the process and through that video	I was able to find something that I really want to focus on in my teaching…because of my goals as a teacher. Not because of the situation I was in.	I've already begun doing this, kind of working on it in the classroom I'm in now...Working on recognizing the key points that I need to cover beforehand in my planning. And then keeping the pre-assessment minimum so that I can go right into those key points and get the kids started.

based practices—using design-based research. As part of this emerging innovation, our research addresses the adaptation and use of the technology innovation by preservice teachers, teacher educators, mentors, and cooperating teachers. We believe that the Web-supported, evidence-based approaches can facilitate the formative development of preservice teachers' practices. Consistent with the principles of design-based research, we attempt to harbor a healthy cynicism as to the value of the system such that we might improve both the tools and the methods through deliberate and iterative changes.

Findings & Discussion

To gauge the degree to which participants enacted ERDM methods, we asked each to summarize their individual inquiry process; their responses are summarized in Table 4.3. Each participant chose a unique trigger statement, or inquiry, and reportedly progressed through each ERDM stage accordingly. Despite uniquely individual inquiries, participants shared similar experiences in how they approached the inquiry process.

Enacting ERDM Stages

Establishing and Refining a Trigger. Of the three lenses available, Kristen originally intended to address assessment-related concerns—an area she most wanted to improve in her teaching. However, prior to recording her first lesson, she changed focus. Kristen's cooperating teacher noted:

> She felt comfortable with assessments…so she wanted to choose something that she didn't feel quite so comfortable with....[As she] went through the student teaching experience and she worked more and more with the kids, she realized that she...wanted to focus on differentiation.

Kristen's new trigger addressed emergent events in her classroom. Her cooperating teacher recalls, "I have a very wide range of abilities in the classroom…In reading we work in literacy groups, but it…varies by ability." Because of this range in abilities, Kristen wanted to differentiate instruction for both higher as well as lower performing learners.

Lisa began her inquiry by observing how her current student teaching context differed from the prior semester. In her prior experience teaching fifth grade, she could give several directions and expect students to follow them. But in kindergarten, she noticed, “I just kind of shout out all the directions, and they were lost.” In her first pre-briefing video, Lisa reported that the transition between story-time and calendar was difficult. Thus, her initial trigger focused on transitions between floor and seat time. Lisa noted that this decision originated during prior field experiences, but with different implications for her kindergarten classroom. “I’d been...focusing on transitions and directions, the whole time, from my first practicum, and in my second. And then I realized that I had to change it depending on the age level, so I decided to try…focusing on ways to work with my kindergarteners.”

Prior to choosing a trigger, Susan also based her inquiry on needs evident in her present classroom. After observing her cooperating teacher for several weeks, she stated:

> I noticed that [the same kids] got called on a lot more than some of the students who didn’t really know what was going on, so they didn’t want to...embarrass themselves by raising their hands or they weren’t engaged enough to know what question was being asked.

Although Susan observed her cooperating teacher calling on specific students more than others, she noted the same tendency in her own teaching: "The first few times I taught, I was doing the

exact same thing as she did. ‘Cause it’s easy just to call on the kids that are raising their hands to get the answer that you need to move on to the next point that you are going to make."

Similarly, Zoe modified her focus based on evidence in her current student teaching context. Whereas she previously conducted read-aloud activities primarily for enjoyment, she reported feeling constrained by the need to associate her teaching with a standard. "At the school I'm at right now, everything has to be backed up with a standard. And so I want to make sure that I'm able to transition from a read-aloud into an effective activity." Interestingly, Zoe indicated that adherence to standards "wasn’t necessarily something that was going to overall enhance my teaching…for years to come." Thus, her first inquiry addressed external expectations more than intent to improve her own practice.

Although asked to identify a trigger prior to beginning student teaching, all four participants subsequently modified their inquiry based on their emergent classroom needs. As Kristen noted, “Once you have some experience, then you kind of focus more on what you wanna’ work on.” Zoe’s second inquiry, which emerged as she initially analyzed her teaching using the video analysis tool, became more personally than externally relevant. Unlike her initial trigger, she reportedly planned to continue in the future by planning how and when to end classroom activities. Interestingly, while participating student teachers underscored the importance of identifying a personally relevant trigger during actual teaching experience, their CTs recommended they find and investigate a trigger as soon as possible, preferably within the first two weeks of their experience. While participants intended to transition to their inquiries as they became better acquainted with their teaching responsibilities and needs, tension was evident between the student teachers’ agency to identify a situationally relevant trigger and their CTs’ expectations to investigate using their trigger.

Although directed to develop a trigger a priori, participants established their initial trigger with explicit advice from a cooperating teacher or a university observer. Kristen recalled, “[My CT] told me pretty much that should be it." Susan relied on observations and conversations regarding her CT’s practice, and collaboratively discussed approaches to involve students. As Lisa notes, “First I was observed and decided, with the help of my observers something that I needed help on.” While Zoe’s second trigger was influenced somewhat by her video analysis, she later wrote in her final paper, “Though I recognized this weakness in myself, initially it was brought to my attention by my university supervisor during my first observation.” Susan deferred to the cooperating teacher to develop a trigger: “She is the expert in her classroom, ‘cause she knows how I am doing in there, or what’s normal for these kids.”

Planning for and Collecting Evidence. In professional development plans written prior to their initial inquiry, each participant identified a minimum of one additional related piece of evidence to corroborate findings. Susan created a checklist to track the frequency with which her CT called on students during class; she then asked her to keep a similar tally while Susan was teaching. However, the lists were rarely used because, “We’d half-way start and then wouldn’t finish them. So [we] just kind of gave up a little bit on that.” Kristen planned to use a structured approach with her cooperating teacher. She reported:

> We did what was called a matrix, and we had what was the three groups and three days. We did what we were gonna’ do for each group with the same lesson...When I was preparing, I mentally did it, but I didn’t write it down.

Zoe and Lisa, in contrast, did not plan to collect evidence other than informal observations from their cooperating teachers and university supervisors. Lisa provided written observations

received from outside observers, but reported that she did not use them in her formal self-analysis. Thus, participants collected and analyzed primarily their own video evidence.

While video evidence is central to ERDM inquiry, Sherin and van Es (2007) recently cautioned that video's "keyhole" effect—the tendency to focus narrowly on specific events to the exclusion of other, equally important events—may provide an incomplete picture of classroom practice. However, limiting the scope of an inquiry to specific aspects of teaching may also prove beneficial and necessary. ERDM, for example, uses complementary and converging evidence from non-video sources to corroborate, augment, or refute video evidence. Despite indicating their intent, our participants did not include additional evidence suggesting that collecting multiple forms of evidence may be impractical for preservice teachers in many classroom settings, or that our participants perceived their video evidence alone to be sufficient. David Shum (1994), an authority in the use of evidence, suggests that force—the potential influence a particular piece of evidence on a decision outcome—is more critical than the amount of evidence gathered. Participants in the West et. al (2007) study characterized this as the extent to which evidence represents adequately the critical elements in a given situation. Thus, while we are concerned about our participants' seeming over-reliance on video evidence, it may be that they perceived it to have greater force for their individual inquiries.

Analyzing Practices: Lenses, Triggers, and Mentors. Having previously examined how participants approach analysis (AUTHORS, 2007), we examined how and why participants "noticed" (van Es & Sherin, 2002) discrepancies in their teaching and generated possible solutions to their actions using a lens from the state framework. Lisa reportedly used all three of the provided lenses for her inquiry on student engagement. An analysis of her VAT comments

reveals that Lisa explicitly integrated the language used in the lens to make her comments. She described the lens as an assessment tool for her progress, referring to them as teaching standards:

> Those are what we're trying to meet to be effective teachers. So those are the things that we've looked at, that I've looked at every semester, in my teaching....Last semester I think I would have been here and now after working with different people and trying different strategies, I'm here….So, it was good to see the growth along the spectrum of the standards, and also to know, ok I'm meeting this standard. I can graduate now.

Interestingly, Lisa and her CT only addressed the same issues in their video analyses 10/21 times (abt 48%). Her CT took a different approach to coding video, explaining that she used the video as an opportunity to address aspects of Lisa's teaching that were un-related to her inquiry. Additionally of the 21 annotations she made, only 2 could be construed as more than descriptive commentary on what Lisa was doing. Lisa did not receive her CT's feedback in time to implement any of it. Lisa explained, "[My CT] is shy…and really quiet. I have to ask her explicitly, did I do this? And if she says, 'Yes,' then I have to say, 'How can I do it differently?' So it's, it was hard for us to communicate through the video…without sitting down and having to talk to her." While the lens was useful for Lisa, it was not the principal mechanism for detecting the influence of her work with individual students in the overall class. Rather, Lisa's refocusing seems to have been influenced by a combination of her video analysis and discussions with her university professor. She reported, "I saw through my video that I had students wiggling in the background and not really paying attention. But I also got that as a suggestion from Dr. Trubach."

Kristen reported difficultly analyzing her first set of videos using the provided lens, stating that her classroom setup worked well for providing individual attention to students, but

poorly for video analysis. After attempting to differentiate the reading level of books selected, which was not easily observable on video, she stated that, "The video does not capture that very well, but they were almost a whole grade level apart." Video's limited ability to capture differentiated techniques may have influenced her conclusion, "I didn't find very many differences in my instruction between the low level group and the upper level group. Upon failing to recognize differences in approach to the different reading groups, Karen used stronger and more explicit differentiation strategies in her subsequent recordings. When asked to describe the role of the lens in her analysis, she responded, "I kind of felt like most people are going to be on basic anyway." Interestingly, her CT identified the same limitation: "When I looked at the lens, I thought well, before I even see the videos, just from watching her every day, I know she's pretty much gonna' be [basic]." Thus, rather than using the lens to examine enacted teaching practices, both Kristen and her cooperating teacher assumed that her practices would be basic because she was a beginning teacher.

Kristen did, however, apply her selected trigger to analyze her practice, as did her CT. Kristen and her CT addressed the same issue 7/10 times (70%), indicating that both focused on similar aspects of Kristen's practice. Her CT described her approach to video analysis: "I tried to relate them to what she was working on. Not just make random comments about her lesson. I tried to think about how she was differentiating and meeting student needs." Her comments were mostly evaluative, in which she posed questions to encourage Kristen to think about her teaching. She reported that they discussed Kristen's teaching for at least one hour every day after school and that their discussions focused on "differentiation" for 20-30 minutes of that time. Additionally, she reported that video facilitated feedback and discussion when she and Kristen jointly discussed their individual VAT analyses, "because lots of times you teach a lesson and

you remember part of what you did, but you don't really remember everything you did…I like being able to give her the feedback right there. Ok, here's the snippet I'm talking about."

Like Kristen, Susan reported the lens to be of little use during her self analyses: "I think the real comments, or what helped me the most are just the things that I typed in." Both Susan and her CT's comments also focused on the trigger rather than the lens. Each analyzed her first VAT video within the first few days of her lesson. Out of 27 overlapping comments (in regards to time), Susan and her CT addressed the same issue 20/27 times (abt. 74%). Of the 5 times that Susan and her CT both rated an overlapping clip using the lens, only once did they differ in their rating of Susan's practice. Susan's CT's comments were descriptive and evaluative, offering both recommendations and praise for Susan's practices. Susan reported that her CT's comments helped to reinforce areas where she had been successful, highlighting instances in which Susan had encouraged responses from students even when they initially gave incorrect answers.

According to Zoe, "I don't remember which [lens] I chose." Instead, as with Susan and Kristen, Zoe's VAT comments focused on her selected trigger. While noting during her first video that she took too much time on a single topic, she observed that she originally had many students participating, but dragged a lesson to the point at which only a few students were participating. As with Lisa, Zoe's initial analysis was influenced not by her CT, but by a combination of her video analysis and comments from her university facilitator who observed a review activity at the conclusion of a lesson that took longer than expected prior to recess.

> He could see the kids getting antsy, and he said you want to end it a few minutes before recess, give them a little time extra, so the next time you say, 'Alright, we're gonna' play a racer slide,' everybody's thrilled. So he was the one that brought it to my attention that you need to end things when the kids are still enthusiastic about it.

Zoe also sought outside support in subsequent activities, requesting that her university observer focus on her ability to end lessons on a high note. Interestingly, when probed about whether the observer gave written feedback on her performance, Zoe noted that he used the "checklist that the program gave him, but...he checked 'good' on closure." Thus, she underscored the need for face-to-face feedback from observers in order to get in-depth feedback.

Enacting and Adapting a Course of Action. All participants used both video evidence and input from outside observers to develop, enact and revise their course of action. Kristen, for example, reported, “talking with [my CT] was huge. More so than watching the videos…She’s able to tell me practical things to do to make it better.” Having made successful transitions, Lisa sought practical suggestions from the student teaching supervisor: “I saw through my video that I had students wiggling in the background and not really paying attention. But I also got that as a suggestion from Dr. Trubach…after I had watched the first video.” During her first video analysis, Susan noted that her second-language learners were more often disengaged than the rest of the class. She identified the need to "think about setting them up for success more...because you couldn't just ask [students] a question and then expect [them] to answer…that's why they weren't participating…they didn't understand." Together with her CT, she developed and enacted several techniques, including using hand-gestures to communicate, asking simpler questions, and calling on a variety of students. Zoe’s course of action involved creating a lesson that would be “efficient and engaging.” She began her second videotaped lesson by "immediately let[ting her] students know the plan for the day." Zoe commented, "I definitely think this was better in timing than the last taped activity. I'm glad this is what I focused on." Thus, by incorporating the input she had received from a university observer with her own analysis, Zoe’s second course of action proved more effective.

General Discussion

Several findings emerged as important to evidence-based, video-augmented teacher inquiry. First, both preservice and cooperating teachers did not meaningfully use the state-standard lens to examine practice even though those attributes were considered sufficiently important to include in the state teaching framework. Perhaps the lens, alone, provided insufficient guidance; alternatively, limited familiarity with the lens and video analysis might have encouraged a return to current practices. Among participants, the participant who recognized the lens from her earlier courses used it most often, albeit only to gauge herself against perceived state teaching standards.

However, this may also reflect a tacit resistance to using "standards-based" approaches to assessing teaching practice. During trigger development, for example, participants co-opted the focus of the assigned lens, imposed their own standards for evidence rather than applying those assigned to the lens, or simply disregarded or abandoned their initial lens entirely. In a prior study (AUTHORS, 2007), the same participants customized individual lenses. Kristen, who used Bloom's taxonomy as a lens during the previous study, explained: "I liked the first time better. But it might have been because I was able to choose it myself, and it was really easy to measure which level I was on." Susan supported the idea of creating her own lens, something she gained great benefit from in her prior experience: "I think it might have been more useful for me to create some sort of rubric thing, too [because]… what I really ended up doing was typing up more specific comments to what I was looking for and when I did my…refining on the video."

If the state-standards lenses did not guide participants' analyses of their teaching practice, what did? All participants and 2 CTs reported that their comments were grounded in their identified trigger statements. Participants generally followed one CT's approach to, "not just

make random comments about her lesson" by focusing on the defined trigger. The lens was designed to aid in identifying those state-specific teaching attributes deemed critical for teacher development. Whereas Dias, Calandra, and Fox (2007), who conducted extensive video reflection research with preservice teachers, noted that excessively structured guidance may promote scripted responses, the present findings suggest that such guidance may be ignored—even when key teaching standards are emphasized.

However, "more knowledgeable other(s)" (MKO) (Vygotsky, 1987) may have validated what participants "noticed" (van Es & Sherin, 2002) during video analysis. Susan stated that her cooperating teacher's, "comments were the most important part to me… she would give me feedback in the classroom, but when she had to sit down and write comments like that, it was a lot more in-depth than what I had been getting from her." Even when CT feedback was minimal, Lisa and Zoe combined video analysis with input from their university facilitators: Zoe asked her observer to pay special attention to her redefined trigger in future observations; when Lisa believed that she had successfully accomplished her first goal, she sought out her university faculty adviser for further direction. While all participants noted the importance of video analysis for examining their teaching, the CTs and teacher educators were more instrumental in directing and refining their inquiries.

External support was also important as participants sought to identify situationally relevant triggers. Once participants assumed teaching responsibilities in their own classrooms, they redefined their triggers based on observation and negotiation. Additionally, while participants voiced a preference for determining their own assessment framework, they relied more heavily on a MKO's recommendations because "they can give me practical things to do to make it better" (Kristen).

Consistent with Miller and Carney's (2007) findings, our cooperating teachers varied widely in their use of the state-sponsored tool to evaluate student teacher practice. One of the goals of teacher inquiry is to develop educators capable of critiquing and improving their own teaching. While this research highlights the importance of a mentor in student teaching, it is also important to encourage student teachers to learn to examine their practice based on observations and evidence of their own teaching. Several researchers have cited the importance of grounding student teacher inquiries in a specific framework (Dawson, 2006; Loughran, 2002; Parkinson, 2005; Zeichner & Tabachnick, 1991). This study suggests that simply providing a given framework may not provide sufficient guidance and support to facilitate its use. This does not necessarily suggest that participants failed to examine their practices carefully; rather, their examination was not guided by the framework standards. Thus, we need to examine both how to implement frameworks as well as whether they are necessary to examine teaching practices critically.

Finding the balance between student teacher agency and external approaches to inquiry may prove problematic. Davis (2006) analyzed 70+ preservice teachers' reflective journals, and highlighted several problems in their self-evaluative and reflective abilities. "They do not consistently provide evidence for their claims, generate alternatives to their decisions, or question their assumptions…Furthermore, their reflection may lack focus and be judgmental rather than evaluative" (p. 282). We employed the state-adopted lens to guide student teachers to focus on issues and assessments considered important to professional teacher educators. In effect, while supportive, we did not determine whether student teachers enacted key teaching skills or how they "measured up" to the state's standards. Since CTs vary in their use of the tools and mentoring experience, it is especially problematic to give preservice teachers the agency to

conduct their own inquiries without simultaneously assuring the mechanisms are in place to help them address important teaching attributes.

Another concern was the reliance on a single source of evidence (video) to assess one's practices. While video capture extended our participants' ability to reflect on their practices beyond anecdote and recollection, it represents only one aspect of their classroom practice (Sherin & van Es, 2007). Given the clamor for increased student evidence (Whitehurst, 2002) for teacher decision-making, we need to examine multiple inquiry-based approaches, such as action research where teachers examine evidence of student understanding to enact change (Noffke, 1997). Our participants opted to collect only video data, which fails to address Messick's (1994) cautions about consequential validity: Given the complexities of the classroom, video alone does not provide valid evidence of teaching or learning effectiveness.

The mentor—CT or university observer—was crucial throughout inquiry. Prior to and following the action stages (collecting evidence & course of action), they provided insight to guide how participants considered their inquiries. In their review of nearly 100 studies, Wideen, Mayer-Smith, and Moon (1998) concluded that successful teacher education programs involved, "close collaboration …between the players in teacher education" (p. 152). Our study reveals that student teachers sought out different players. Lisa and Zoe sought out their teacher education professors when the aid provided to them in the classroom was insufficient. Yet, Susan's comment that, "when [my CT] had to sit down and write comments, it was a lot more in-depth than what I had been getting from her [orally]" indicates that video and written analysis promoted more collaboration. Other researchers (Baker & Milner, 2006) report that when CTs address needs in preservice teachers' zone of proximal development, they focus on pedagogy more than personality. However, the present findings indicate the need to better prepare

supporting educators for “conversations between the mentors and the student teachers…[that] have an impact on student teacher classroom practice” (Hawkey, 1998, p. 657).

Conclusions

The use of video proved to be beneficial to our participants, but sometimes in ways other than those intended. The role of mentors—cooperating teachers and teacher educators—was crucial in helping preservice teachers to both direct and interpret videos of teaching practices. However, based on differences between formal evidence of practice and less-structured feedback garnered from experienced and inexperienced CTs, mentors also need to use analytic tools, interpret formal evidence of teaching and provide practice-specific guidance accordingly. Additionally, while our participants indicated a preference for creating or choosing their own assessment frameworks, it may prove difficult to balance the agency given to teachers to define their own priorities with external expectations to demonstrate specific competencies. Inquiry-based methods may improve preservice teachers’ teaching knowledge and skills, but further study is needed to develop and validate structured, formal approaches to refining inquiry methods that influence their practice.

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CHAPTER 5

DECISIONS AND REASONS:

EXAMINING PRESERVICE TEACHER DECISION-MAKING THROUGH VIDEO SELF-ANALYSIS[7]

[7] Rich, P.J., & Hannafin, M.J. Submitted to the *Journal of Computing in Higher Education, 8/13/2007*

Background

In their seminal chapter "Teachers' Thought Processes," Clark and Peterson (1986) proposed that, "the ultimate goal of research on teachers' thought processes is to construct a portrayal of the cognitive psychology of teaching for use by educational theorists, researchers, policymakers, curriculum designers, teacher educators, school administrators, and by teachers themselves" (p.255). Over the past forty years, researchers have employed several techniques to elicit teachers' thinking in order to better understand and influence teacher practice. Research on teacher thinking is particularly important in teacher education, as it promises to help novice teachers inquire, understand, and analyze their own and others' practice. Three methods have been used extensively to study teacher thinking: reflective thinking, examination of beliefs, and stimulated recall.

Recently, teacher educators have implemented reflection to help preservice teachers inquire about and analyze their own thinking. Reflective practices have been examined prior to (Conway, 2001), during (Schön, 1983), and after (Field & Latta, 2001; Collier, 1999) preservice teachers' teaching experiences. Reflective thinking emerged as a practical method to help preservice teachers elicit and analyze their own thinking about teaching. Efforts to implement reflective practices in teacher education programs vary greatly (Jay & Johnson, 2002). For example, Collier (1999) studied preservice teachers' post-teaching reflective statements, which promised to influence future teaching decisions (Field & Latta, 2001) by helping teachers think about their reasons for enacting practices. In contrast, Schön (1983) initially characterized "reflection-in-action" as a way to transform the practitioner into an evaluator via formative, in the moment, self-evaluations. Still others, however, suggest that reflection be conducted *prior* to teaching (Conway, 2001). Anticipatory reflection (Van Maanen, 1995) serves as an advance

organizer for one's own actions. Results of research on the impact of reflection on teacher practice have been mixed (Loughran, 2002). While it is common practice to encourage reflection in teacher education program, most reports of the influence of reflection on teachers' actions are anecdotal (Korthagen & Wubbels, 2001).

Researchers have also explored how inquiry into teachers' tacit assumptions influences their actions. Researchers have attempted to help teachers recognize inconsistencies between their beliefs about teaching—personal, psychological and emotional representations of how teaching ought to be (Nespor, 1987; Clark, 1988)—and their enacted practices (Abell, Bryan, & Anderson, 1998; Pajares, 1992). Beliefs encompass the role of the teacher as educator, personal epistemologies on the nature of knowledge, and value-laden opinions of how students learn and internalize information (Clandinin & Connelly, 1987). Since few novices have had first-hand experiences as a teacher (Richardson, 1996), preservice teachers' beliefs emerge largely via interpretations of their experiences as students (Abell & Bryan, 1997; Clark, 1988; Cuban, 1986).

Recently, researchers have sought to demonstrate the elusive link between teachers' practice and beliefs (Cheek, Steward, & Launey, 2004; Christensen, Wilson, & Sunal, 2004; Sturtevant & Linek, 2003). Despite intuitive appeal, only sparse evidence connecting preservice teacher actions with beliefs about teaching and learning has been published to date (Borko & Putnam, 1996; Wolfolk-Hoy, Davis, & Pape, 2006). Individual beliefs about teaching and learning may prove more transient than often assumed. More than three decades ago, Schutz (1970) suggested that individual beliefs are often ill-specified and contradictory. Paradoxically, recent developments demonstrate that *preservice* teachers' beliefs may actually contradict their practices (Abell, Bryan, & Anderson, 1998; Conway, 2001). As with reflective practices,

evidence on the effectiveness of having preservice teachers examine their beliefs about teaching or their personal pedagogies is equivocal. For example, while Virginia Richardson (1996) argues that preservice teachers' lack of teaching experience may interfere with efforts to engender dissonance between their beliefs and practice, Bryan and Recesso (2006) used video successfully to help preservice teachers recognize this dissonance.

Finally, several researchers have examined the thought and judgment processes underlying teachers' instructional decisions using stimulated recall (Clark & Yinger, 1979; Johnson, 1992; Housner & Griffey, 1985; Jensen & Winitzky, 2002; MacKay & Marland, 1978; Meijer, Zanting, & Verloop, 2002; Schepens, Aelterman, & Van Keer, 2007). During preservice education, such methods typically involve videotaping while teaching or "microteaching" to a group of peers, followed by replaying the video to stimulate teacher thinking as they observe and comment on their recorded actions. Presumably, since teachers' actions are directed by their thoughts (Shavelson & Stern, 1981; Clark & Yinger, 1979), stimulated recall makes visible otherwise invisible but important cognitive processes. While these studies frequently compare novice and expert thinking, they often reveal little about how the thinking of novice teachers can become more expert. Clark (1988) noted, "the study of the thoughts, knowledge, and dispositions of *experienced* teachers (important as this is) does not answer the questions of what novices should be taught and how they should be prepared" (italics original, p. 6).

The aforementioned methods commonly used to elicit teacher thinking offer complementary insights but limited utility for preservice teacher inquiry. Despite evidence of widespread use across teacher education programs (Hatton & Smith, 1995; Lee, 2005), no evidence on the effects of reflection was reported in AERA's report on teacher education research (Cochran-Smith & Zeichner, 2005). Where studies were conducted, researchers

concluded that preservice teacher's reflections often were not sufficiently self-critical to influence their subsequent teaching (Zeichner, 1994; Collier, 1999; Jay & Johnson, 2002). Similarly, while the study of teachers' beliefs promises to reveal tacit, underlying assumptions about teaching, teachers' own actions, teacher actions cannot be accounted for by beliefs alone. Finally, research conducted through stimulated recall serves to reify teachers' thought processes, but often proves impractical in teacher education.

Despite limitations, each method also offers potential strengths for understanding teachers' thinking. Reflection potentially elicits teachers' thinking and provides a means to examine and refine those thoughts. By encouraging teachers to examine their own beliefs, we can identify potentially powerful, but tacit, influences on teachers' actions. Finally, stimulated recall utilizes captured evidence of teaching practices to associate action with teacher intentions.

Recently, video capture and analysis tools have been developed that optimize the benefits of these methods, providing potentially deeper and more precise insights into teachers' thought processes (AUTHORS, submitted) for practical inquiry. Such tools both capture video evidence of classroom teaching and structure and scaffold analysis by preservice teachers, mentors, cooperating teachers, and teacher educators to stimulate analysis of teacher practice. In traditional stimulated recall, for example, teachers are typically asked to recall thinking about all their actions, or about specific actions considered important to the researcher (Ericsson & Simon, 1993). In contrast, when using video annotation tools to inquire about their own instructional decisions, teachers' comments might reflect only actions they deem to be personally significant to their future teaching practice. Teacher educators, for example, have used video analysis tools to help preservice teachers compare and contrast beliefs about teaching using evidence of their teaching in context (Bryan & Recesso, 2006), to help teachers reflect on their practice (van Es &

Sherin, 2002; Sherin & van Es, 2005), and to examine changes in teachers' thought processes (Preston et al.,, 2005; Schepens et al.,, 2007).

While video has been used recently to combine methods to improve teachers' instructional decisions, most studies document overall experience and perceptions of teachers (Preston et al.,, 2005, van Es & Sherin, 2002, Wright, 2007). These have helped researchers and teacher educators to begin to understand the consequences of such analysis on teaching. By examining *what* instructional decisions preservice teachers' focus on in their video analyses, howver, we may better understand how their inquiries lead to, or influence, future actions. The purpose of this study was to investigate the instructional decisions preservice teachers chose to focus on during their analyses and their thinking behind these decisions.

The Study

We analyzed the video analysis comments of four student teachers—Karen, Lisa, Susan, and Zoe—during their student teaching experience. Their comments were documented through individually-defined teaching inquiries using an online, video-based tool. During the course of a 10-week student teaching internship, a cohort of 26 preservice teachers engaged in a scaffolded teacher inquiry project to systematically investigate, analyze, and adapt a particular facet of their teaching. Participants identified an area of their teaching they wished to inquire about during student teaching, then planned for and collected videos of their teaching in order to investigate their inquiry focus. Next, they used the Video Analysis Tool (VAT) to analyze their individual videos and identified actions to take to refine their focus. Participants subsequently enacted their action plan and repeated the inquiry process of refining their focus, planning for and collecting teaching videos, analyzing those videos in the VAT (vat.uga.edu) and acting out a course action in response to their video analyses.

We inspected the specific instructional decisions identified by participants in their video analyses and examined their rationale for those decisions. While the entire cohort participated in the student teacher inquiry project, we solicited in-depth participation by individuals with varied motivation to participate in this project. Due to attrition and concerns over increased workload during student teaching, we report findings for four students.

Methods

Data & Instrumentation

Since existing literature on video analysis of teacher thinking lacked description, we used the annotation feature of the Video Analysis Tool to capture and analyze student teachers' commentary during analysis of their student teaching[8].

The Video Analysis Tool (VAT) is an online video annotation tool (AUTHORS, submitted) created to aid in the analysis and interpretation of video evidence. A VAT *clip* is a specific video segment that has been identified by the user as relevant to the inquiry and annotated accordingly. Users annotate or comment clips by: (a) choosing a video to annotate, (b) identifying the start time of the video, (c) typing their analyses in the "comments" area, and (d) submitting their clips to the library. For example, Figure 5.1 shows that clip number 10677 started at 9 minutes, 15 seconds and ends at 10 minutes, 9 seconds (Step 1). Once the start-end points are defined, the clip can be accessed by clicking the corresponding button. As shown in Step 2, the student teacher annotated the clip, questioning whether or not the student activity evident was active engagement. Users can create multiple clips for consideration and temporarily store each in a bin (Step 3). Once finished, the student teacher can determine which annotated

[8] For a full case report, refer to AUTHORS et al., (submitted)

clips to keep or discard, and submits the “keepers” to permanent storage on the VAT server (Step 4).

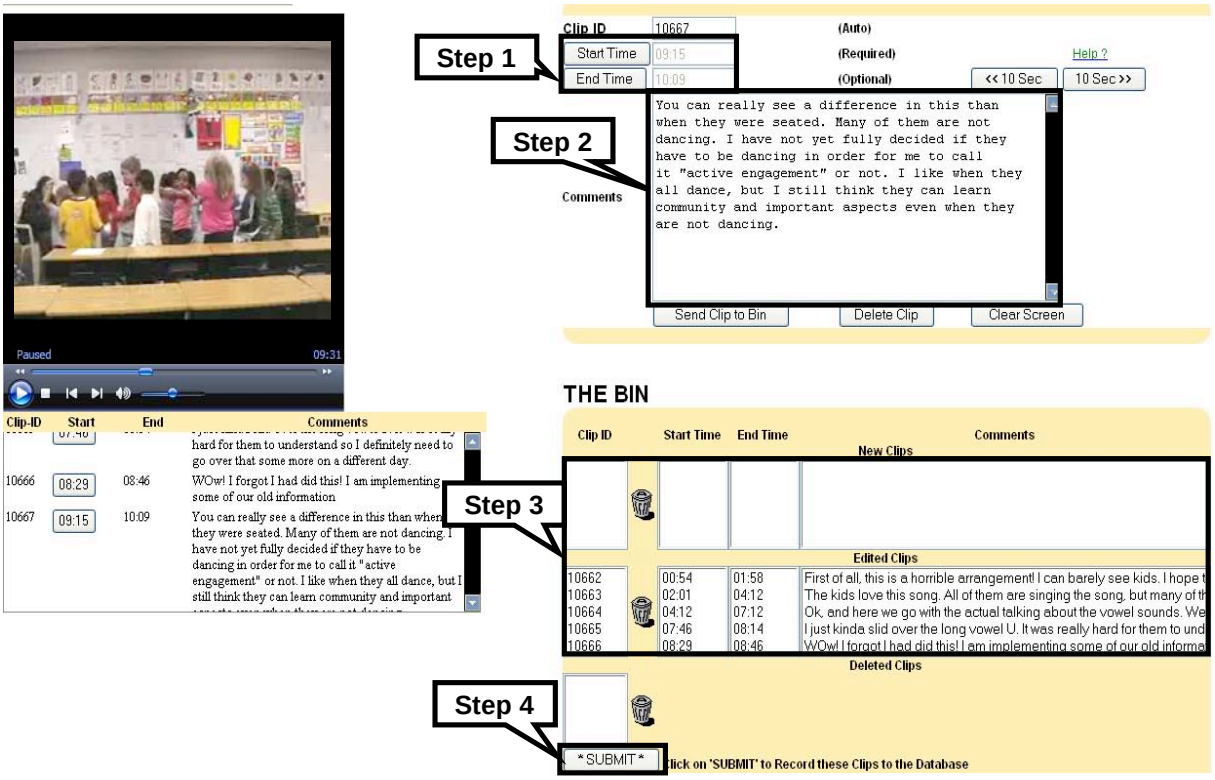


Figure 5.1. Making comments in VAT

After annotating their videos, users can review them individually via the “view clips” screen. As shown in Figure 5.2, all saved clips including start-end times and comments can then be accessed on-demand during subsequent reviews. To review clips, users select the button of the initially defined “start time” (Step 1), and the corresponding video clip will play until the designated end time. Because VAT appends XML meta-data rather than altering the actual content of a video, participants can edit and re-edit their comments without changing the physical makeup of their videos; likewise, teacher educators and cooperating teachers can view, analyze and comment on the same clips for independent review, or to review side-by-side with the student teacher’s self-analysis and comments. Since the VAT is a Web-based video

annotation tool, participants can upload and edit their videos from any location in the world with a sufficient Internet connection.

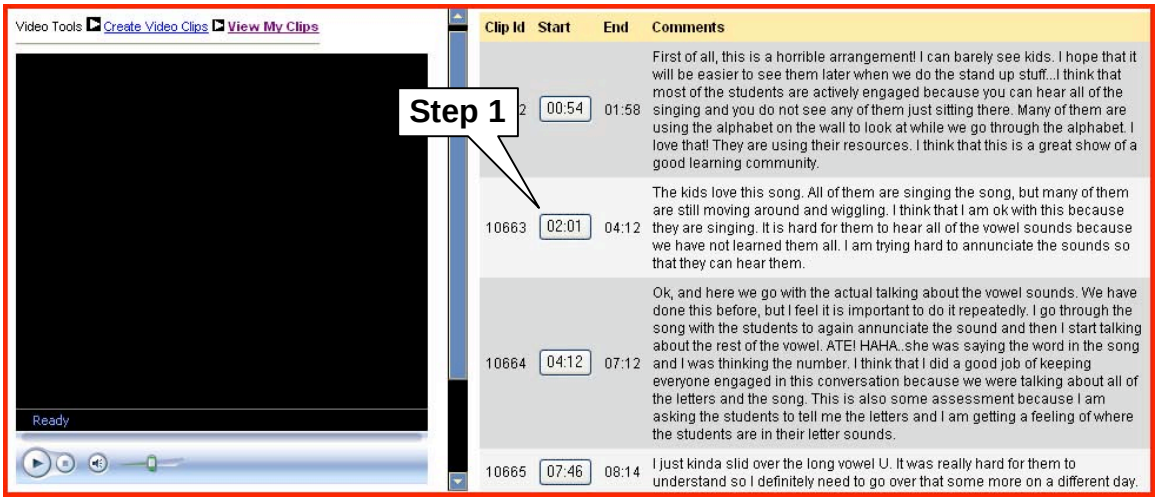


Figure 5.2. "View clips" screen (VAT)

Procedures

The procedures are summarized in Figure 5.3. Consistent with the principles of teacher inquiry, participants first established a specific topic focus they wished to examine and analyze in their videos. Student teachers then recorded an instance of their teaching using a JVC Everio camcorder—a digital format that facilitated both video conversion and file transfer. Participants transferred their video files from their cameras to a laptop computer that contained PowerDirector Express®, software that converted their video files to the windows media (.wmv) format. This converted individual video files to a streaming 256 Kbps .wmv files in a 320 x 240 format. Participants were trained to use the VAT, the camcorders, and conversion software in a prior study (AUTHORS, 2007). After converting, participants uploaded their files to the VAT. The entire process of converting and uploading a video file was normally completed in less than one hour, so student teachers could potentially analyze their video(s) the same day as recorded.

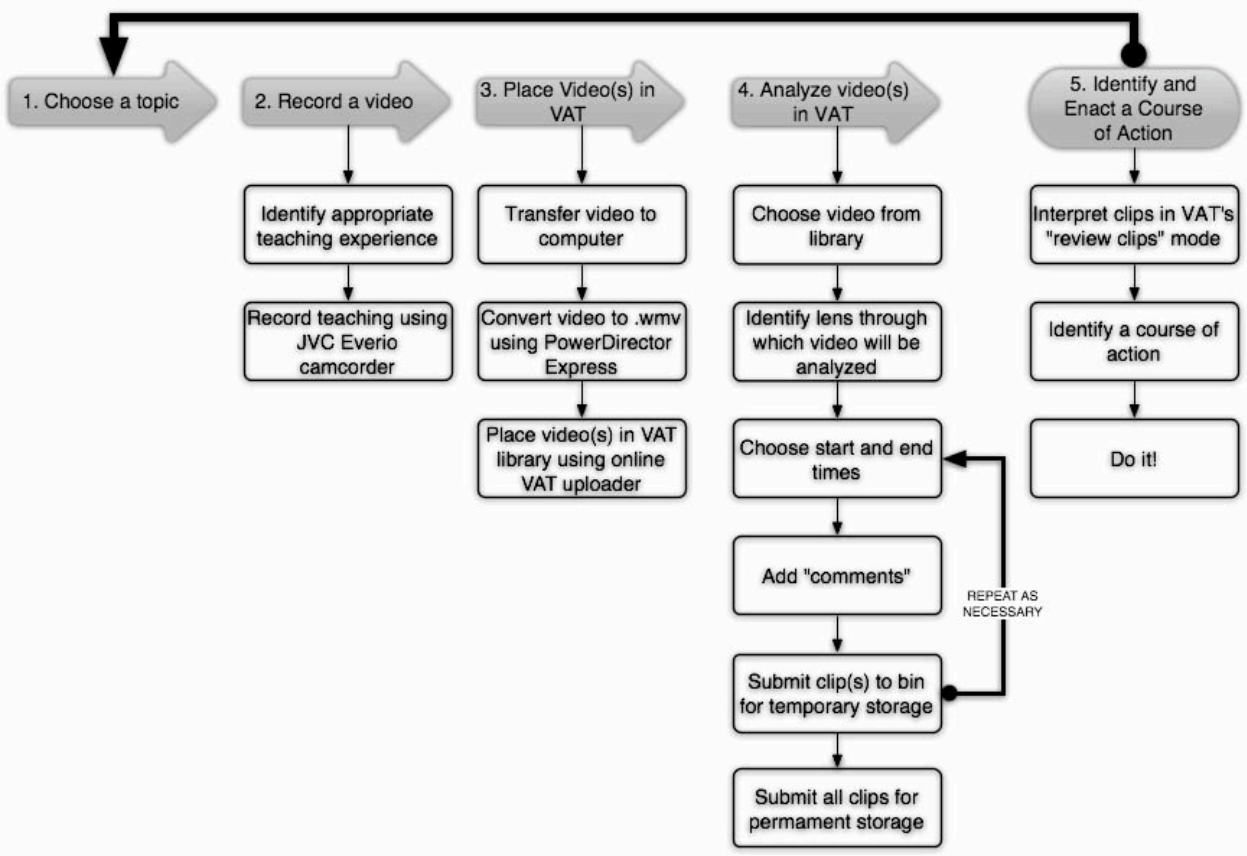


Figure 5.3. Procedures for identifying inquiry focus, analyzing video, and adapting practice.

After participants uploaded their videos into the VAT, they became available in the individual's library. To analyze a VAT video, participants first chose their video from a list and selected a lens—an externally defined framework for interpreting evidence of practice—appropriate to analyze that video. For this study, participants were instructed to analyze their practices using a statewide framework for teacher development (Appendix D).

While analyzing their videos during their inquiry, participants identified specific aspects of their teaching to reinforce, alter or adapt future practice. For example, one participant's initial inquiry was to "actively engag[e] all students in the lesson." Upon video analysis, she identified students that did not participate when they seemingly did not understand, but participated

actively when they did. Thus, she refined her second inquiry to “set [Limited English Proficiency students] up for success...because you couldn't just ask them a question and then expect [them] to answer…that's why they weren't participating…they didn't understand."

Data Analysis

VAT comments for our four participants were imported into Atlas.ti®. Using an inductive constant comparative approach (Strauss & Corbin, 1990), we looked for emergent themes within and across participants’ comments. Because we focused on instructional decisions and actions, we used Charmaz’s (2002) concept of action verbs to describe decision/reason pairs. Participants initially described their actions (decisions) and provided the rationale for their actions (reasons). For example, the comment, “I made sure to call students' names that were not doing the motions so they were involved” reveals both a decision to call on non-participating students and a reason based on the need to engage students. We categorized each decision and reason independently in order to classify the thinking guiding particular actions. We used Atlas.ti®’s “network” function to create and view relationships between and among themes. Once general themes were established, we defined properties and dimensions of each (Glaser & Strauss, 1967) using the software’s “comment” feature, and exported the results to a codebook (Appendix J).. Through constant comparison of codes and network graphs, we modified and updated the definitions. Two hundred and forty-seven coded instances of decisions and associated reasons were initially identified across the four participants’ VAT annotations.

We tentatively identified 10 ‘decision’ themes and 7 ‘reason’ themes. To address concerns of reliability and validity, we then employed 3 other qualitative researchers that were aware of, but not associated with, this study to independently code the decision/reason pairs using: (a) the decision/reason pairs, (b) the lists of themes, properties and dimensions; (c) a

codebook; and (d) the original VAT transcripts so the reviewers could review the excerpted comment in context and make independent assessments. Reviewers were asked to code decisions and reasons independently at the thematic level for each excerpt and at the property and dimension levels according to the guidelines provided.

We then used MS Excel to make side-by-side comparisons across coders. Fifty percent of the cases resulted in initially high agreement (3 or more researchers coded the data identically); two or more raters agreed in approximately 90% of cases. An analysis of inter-rated agreement revealed that initial agreement was initially very high (Appendix K) but became increasingly variable during subsequent ratings. This suggested that initial definitions were sufficiently distinct to guide analysis, but that coders may have created nuances as they progressed through the task. The coders then attempted to reconcile differences by discussing each decision and reason theme and, when appropriate, properties of themes.

Researcher Statement

This research was conducted through E-TEACH, a federally funded Preparing Teachers to Use Technology (PT3) grant. Through this design-based research initiative, we have been involved with the successive implementation and adaptation of studies on the use of the Video Analysis Tool in different varied teacher education contexts with the goal of refining the tool itself, advancing theory related to its use in teacher education, and test the tool in authentic, everyday situations. We hope to begin to advance the utility video analysis tools might have in teacher education, and to promote applications to improve teacher practice. Consistent with both qualitative and design-based research approaches, we believe that the use of video-analysis tools can benefit teacher education, but also harbor a healthy criticism of our own work in order to critique and improve the tools and methods employed. The following presentation seeks to

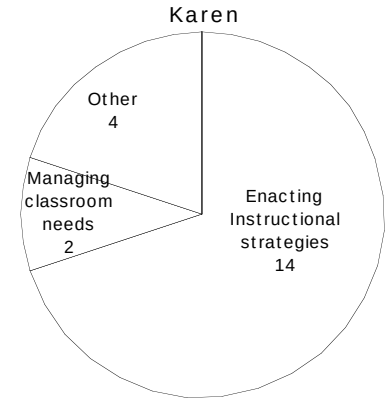
benefit the teacher education community through an optimistic, but critical representation of our work.

Findings & Interpretations

While participants' analyses were guided by their inquiry focus and framed within a state teaching framework, they received no formal guidance to structure the semantic content of their analyses. Still, though participants typically provided both a decision and an associated rationale for the decision, they reported them differently. While Karen, Lisa and Zoe commented comparably, Susan made slightly more than half of the overall decisions and reasons comments. In the following, we describe and illustrate how themes were manifested across participants.

Decisions (Appendix L)

The breakdown of each participant's instructional decisions by inquiry focus is illustrated in Figure 5.4. Decisions are descriptive comments of student teachers' actions during a given lesson clip. Whereas participants did not use the VAT to highlight all decisions made during teaching, follow-up interviews indicated that video analysis triggered recall of forgotten, overlooked or personally important instructional decisions. Two prevalent themes emerged: 'employing teaching strategies,' and 'managing classroom needs.'

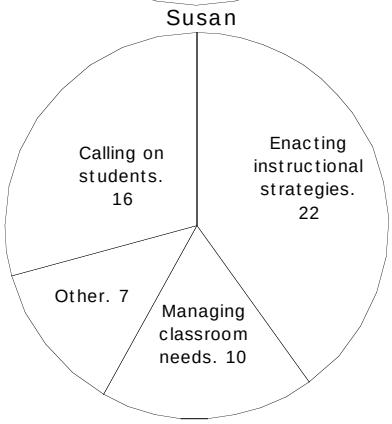


Focus #1. Differentiating small-group reading instruction for high and low-group learners.

Focus #2. Varying techniques for individual students within both high and low groups during small-group reading instruction.

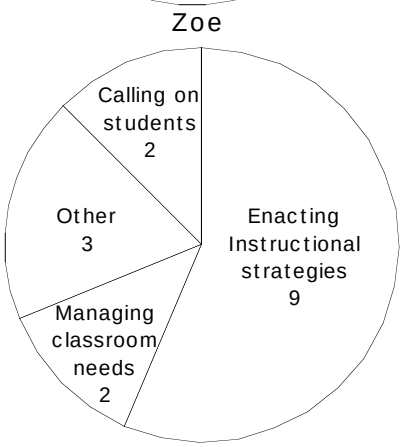
Focus #1. Improving transitions between floor time and calendar time.

Focus#2. Ensuring the active participation of all students during group instruction.



Focus #1. Ensure the active participation of all students during group instruction by calling on students equally.

Focus #2. Actively engage Limited English Proficiency students during a reading lesson by use of visual objects and schema.



Focus #1. Teaching read-aloud activity in accordance with state teaching standards.

Focus #2. Ensuring the active participation of students by ending activities while students are still showing interest.

Figure 5.4. Breakdown of participants' decisions and associated inquiry focus.

Employing Teaching Strategies. Overall, roughly 49% of student teachers' decisions focused on how participants employed a variety of teaching methods. As noted in Figure 5.4, 'employing teaching strategies' accounted for a sizeable proportion of each participants' reported decisions. For example, Lisa commented: "The questions that I ask throughout the book are an assessment of the students' comprehension of the book and also their empathy skills." She classified her decision to ask questions as a purposeful method to gauge student comprehension and ability. Similarly, Susan indicated intent to utilize a specific teaching strategy: "I gave more open-ended options, like 'Will you raise your hand if you have a connection to this book?'" Both participants described their actions as intentional teaching strategies.

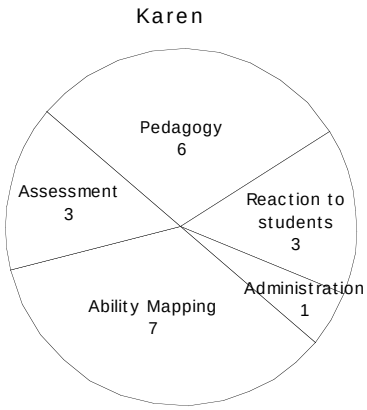
Participants identified a total of 13 different teaching strategies they employed during instruction. Several strategies were noted by multiple participants. Susan noted 9 different teaching strategies across her two video analyses (one-on-one, asking questions, body language, group work, guiding, modeling, repetition/reinforcement, teaching a learning strategy, and waiting). In contrast, the remaining participants identified a similar number, but different types, of learning strategies. Karen, who analyzed 4 videos that lasted 15-20 minutes each, identified 6 different teaching strategies (assessment, differentiation, guiding, individual work, modeling, and teaching a learning strategy). Lisa also identified 6 different teaching strategies (asking questions, assessment, modeling, repetition/reinforcement, and teaching a learning strategy), while Zoe described 5 different teaching strategies across 2 videos (assessment, discussion, repetition/reinforcement, teaching a learning strategy, and waiting). While the most frequently identified properties were 'guiding' and 'repetition/reinforcement,' they were not noted across participants' analyses; only 'assessment' and 'teaching a learning strategy' were mentioned by all participants.

The focus on teaching strategies was prevalent among student teachers, but their repertoire of teaching strategies varied considerably. These varied teaching strategies suggest that student teachers' video analyses emphasized pedagogical techniques even though a broad range of related and appropriate teaching attributes were available. Understanding the strategies student teachers highlight may provide insights as to the repertoire of strategies available during the early stages of teaching as well as measures of their perceived self-efficacy as teachers.

Managing Classroom Needs. Classroom management actions, defined as administrative or managerial actions that do not directly relate to learning (but may affect learning indirectly), were identified in 17% of the decisions across participants. Management comments were exemplified by statements such as, "I give tallies to tables that follow directions" (Susan, rewarding students) or "reminding students how we should sit during the read aloud" (Lisa, class rules). Management actions included awarding students, setting class rules, ensuring participation, easing teaching load, gaining attention, and addressing social needs.

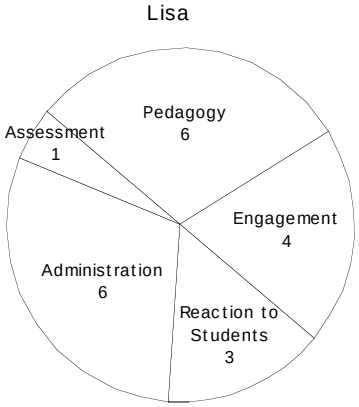
Reasons (Appendix M)

Figure 5.5 illustrates the distribution of participants' reasons by inquiry focus. Participants' reasons were stated justifications or explanations for their actions. Most decisions were accompanied by a specific reason, providing both a first-person description of what occurred as well as an associated rationale. The relationship between each participant's decisions and corresponding reasons is shown in Figure 5.6. We identified 4 themes across participants—pedagogy, engagement, administration, and assessment.



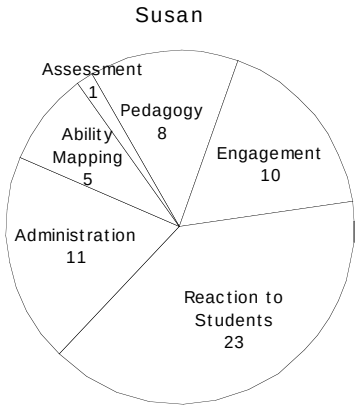
Focus #1. Differentiating small-group reading instruction for high and low-group learners.

Focus #2. Varying techniques for individual students within both high and low groups during small-group reading



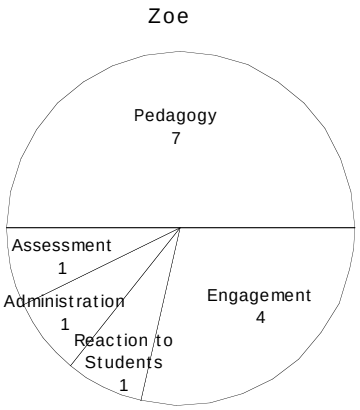
Focus #1. Improving transitions between floor time and calendar time.

Focus#2. Ensuring the active participation of all students during group instruction.



Focus #1. Ensure the active participation of all students during group instruction by calling on students equally.

Focus #2. Actively engage Limited English Proficiency students during a reading lesson by use of visual objects and schema.

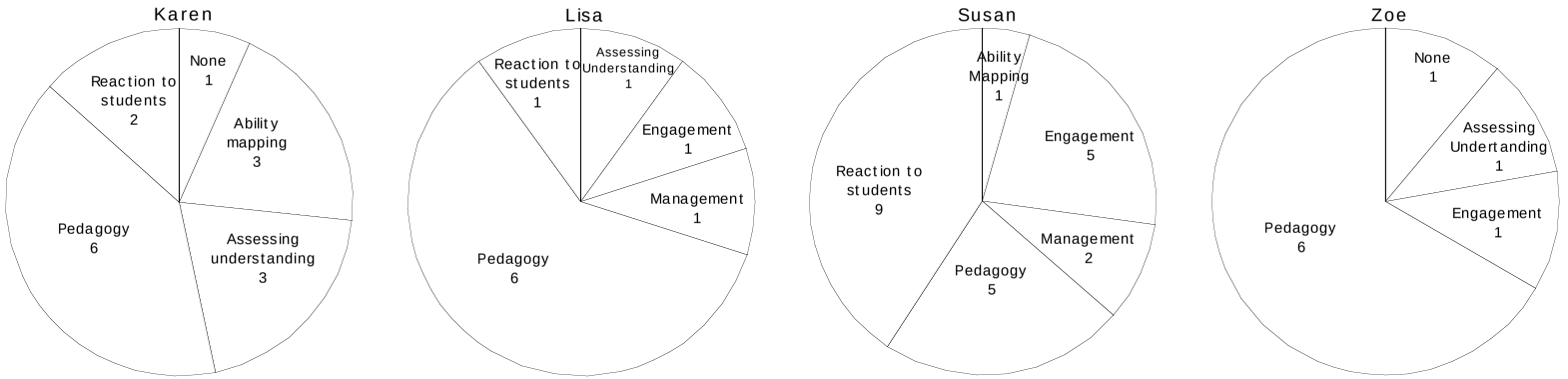


Focus #1. Teaching read-aloud activity in accordance with state teaching standards.

Focus #2. Ensuring the active participation of students by ending activities while students are still showing interest.

Figure 5.5. Breakdown of participants' reasons for instructional decisions by inquiry

Enacting a Teaching Strategy



Managing Classroom Needs

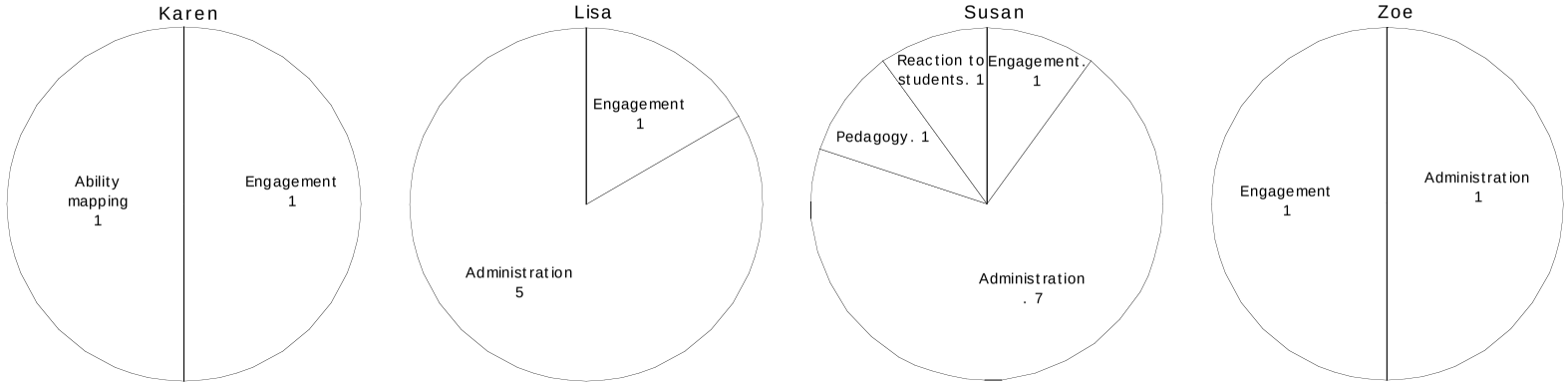


Figure 5.6. Breakdown of participants' reasons for specific instructional decisions

Pedagogy. As noted in Figure 5.5, pedagogical reasons, defined as adhering to a particular instructional approach independent of classroom context, reveal underlying beliefs about the nature of learning. Pedagogical reasoning was comparable across participants: Karen and Lisa each provided 6 pedagogical reasons, Zoe presented 7, and Susan offered 8 pedagogical reasons for her decisions. Lisa's reason for asking questions, "because they are putting themselves in someone else's shoes," suggests that asking questions was intended to help students take different perspectives—a pedagogical approach she believed to be important independent of her current classroom context. Similarly, Karen cited a pedagogical reason for modeling: "I wanted them to hear it and see it so that they could model it," and Susan described her reason for changing facial expression during a read-aloud "so everyone could relate and understand—a visual almost universal expression." The rationale provided by Zoe's suggestion that students take notes during her read-aloud was "so that they might listen with the lens of predicting who our author is." The explicit reasons provided for choosing methods suggests implicit assumptions about the utility of such pedagogies for learning. While numerous pedagogical properties emerged, student learning needs remained the most frequently represented, indicating that pedagogy was influenced by tacit assumptions about the usefulness of specific methods for fostering student learning.

Engagement. The second most frequent rationale for instructional decisions that appeared across multiple participants was "ensuring participation and attention through involvement or motivation." Lisa's comments are embodied in her statement: "Because whether they can count or not, they are still involved." Susan's engagement comments echo her goal that she allow all students to participate in the activity: "[I] wanted everyone to participate, and only a few would if I left it wide open for response." Likewise, Zoe's engagement comments reflect her need to

maintain student interest in the content being taught: “By calling it a challenge, I reengage any student that may have stopped listening during the brain drain.” For these three participants were concerned with ensuring their students were noticeably involved during the lesson.

Administration. Administrative reasons included character education, class rules, easing teaching load, ensuring participation, motivation, and time. While participant comments reflected administrative concern, they were not as prevalent in their video analyses as we might have predicted. Only 19 of 110 (17%) participant reasons were rated as administrative. As shown in Figure 5.6, a strong relationship was apparent between administrative reasons and management decisions. Lisa’s justification for having students talk one at-a-time demonstrated concern for teaching class rules and character education: “This is a good way for the students to realize that they are interrupting and talking when Guido should be talking.” Likewise, Susan’s reasoning is consistent with and reflects her concern for maintaining orderliness: “Their desks are clean and they are at their seats.”

Assessment. All participants discussed their efforts to assess student comprehension by gauging student understanding in a pre-planned or interactive manner. Lisa explained how an assessment technique she used was designed to gauge both whole class and individual comprehension; Zoe conducted a preassessment to assess students’ entry level comprehension and to hopefully interest them in a task; Susan used body language to understand an individual students’ thinking; and Karen asked students to read individually so she could measure, “just a little of what they were struggling with.” While all participants included at least one assessment reason, this was the least common category among all participants (6/110), demonstrating less of a focus on assessment than other concerns.

The Influence of Inquiry Focus

Thus far we presented decisions and reasons that were shared across participants. However, the influence of the inquiry focus on instructional decisions and reasons was often represented in individual comments. As evident in Figures 5.4 & 5.5, inquiry focus appeared to influence participants' decision making and rationale. For example, Susan's inquiry focused on "ensuring the active participation of all students," so a significant portion of her decisions involved calling on students.

Calling on Students. The second most frequent decision theme (20/108) was "calling on students," which was principally characterized by "asking questions." Asking questions involved calling on students to create, reinforce or ensure comprehension. While Zoe and Lisa each highlighted two instances during which they called on students, 82% of the remaining comments (18/22) were made by Susan. This may be influenced by Susan's inquiry, which was initially triggered by her observation that both she and her mentor teacher tended to call on the students who already knew the answer. She explained during a follow-up interview:

> From several weeks of observing, I noticed that [the same students] got called on a lot more than some of the students who didn't really know what was going on, so they didn't want to embarrass themselves by raising their hands or they weren't engaged enough to know what question was being asked… it's just so much easier to call on the kids that are raising their hand…I just wanted to make sure that everyone was really paying attention and draw them in.

Susan, therefore, decided to implement different methods to ensure the active participation of all students through questioning. An analysis of her VAT comments reveals that the 18 times she mentioned decisions to call on students referenced 9 different children by name

including calling students to get them involved, providing or guiding a response, and making a prediction. Thus, Susan's inquiry focus was evident throughout her VAT analysis.

Reacting to Students. While pedagogy and engagement were the most prevalent themes across participants' reason themes, 'Reacting to Students' emerged most frequently. More than three-fourths of these reasons were provided by Susan: "When tuning in to each of them individually, I noticed that this was a word that they all struggled with." Of her 23 comments while reacting to students, 74% were made to an individual, while 26% focused on a group or the entire class. Citing several reasons, she cited 'attending to student learning needs' most frequently (9), demonstrating a concern for ensuring students' comprehension.

Karen recorded twice as many videos as the other participants but provided no engagement rationale for her instructional decisions; with 4-5 students per group, and an inquiry focus on differentiation, engagement may have been less relevant to her analytical focus. Karen made 7 of the 13 overall participant "ability mapping" comments (54%)—an important activity for differentiated instruction. She noted, "This group is capable of reading the rest of the story and comprehending it…I chose a book that was on an upper fifth grade level because this group is a higher level."

Axial comparisons

In order to further relate decision themes with reason themes, we applied axial coding principles (Strauss & Corbin, 1990) to assess the extent to which themes interrelated or opposed each other. To compare themes, we then noted commonalities by merging shared properties from different themes. As shown in Figure 5.6, differences are evident across participants in their reasons for enacting teaching strategies and managing classroom behavior. All participants focused more on instructional techniques than management/administrative decisions. Both Susan

and Lisa commented regularly on managerial decisions (45% and 60%, respectively), but Karen (7%) and Zoe (11%) rarely included a management focus in their comments.

Pedagogical reasoning accounted for a large proportion of each participants' reasons for enacting a particular teaching strategy, that is, their rationales for teaching strategies reflected individual perceptions of pedagogical importance. Further analysis (at the property level) indicates that participants' employed teaching strategies to address student learning 62% of the time. For example, Karen describes her decision to allow her high group to continue reading as, "a conscious effort to allow them to figure out the information using context." While coded thematically as a particular pedagogy, the pedagogical property relates to her desire to address the different learning needs of high learners. Similarly, Susan explained her decision to address an individual learning need: "I didn't say 'Wrong'-I just said, 'Let's think' and explained another way to do it. I knew Shelby would have trouble, so I scaffolded for her." Most decisions to enact a particular teaching strategy were intended to address student learning needs. A similar pattern emerged when comparing the reasoning associated with teaching a metacognitive strategy, for which 73% of explanations provided focused on teaching strategies. Thus, while reasons were influenced by individually perceived pedagogical significance, the majority of reasons for employing a particular teaching strategy or for teaching a metacognitive strategy were to address individual student-learning needs.

In contrast, reasons associated with administration decisions were dominated by concerns for management. A typical attempt to manage classroom behavior is evident in Susan's attempt to gain students' attention while explaining procedures, "so that they would NOT shout out this time." Lisa similarly explained her decision to say, "I want to see everyone's beautiful faces" as facilitating transitions between activities. Even participants that made the fewest management

attributions provided administrative rationale. Zoe's changed the lesson presentation, "because half the class leaves during reading"; Karen's instructed that "everyone follow along, so they would focus on the text." These findings may reflect the need to establish effective classroom control where management decisions are a concern.

General Discussion

While past research suggested teacher-centered concerns, our research indicated considerable student-centered thinking among preservice teachers. In the following, we relate the current study to prior studies on novice teachers concerns and examine the emergence of student-centered thought via video-enhanced self-analysis.

Teacher-Centered Decisions and Reasoning

Managing Classroom Needs. Consistent with previous research, our findings suggest that participation and classroom management influence how student teachers analyze videos of their own practice. Prior literature has suggested that novice teachers are largely concerned with teacher-centered issues, beliefs and concerns, such as management and engagement, and are heavily influenced by entrenched pedagogical beliefs (Kagan, 1992). In 1990, Borko and Shavelson reviewed nearly fifteen years of research on teacher thinking, concluding that, "inexperienced teachers attend more to information that is relevant to behavior and classroom management concerns" (p. 334). Fuller and Bown (1975) developed the concerns-based assessment model, through which teachers' concerns were classified as survival concerns, teaching situation concerns, and impact concerns. Since then, applications of the model have consistently demonstrated novice teachers' initial concern with issues such as classroom management and ensuring that students are participating in their lessons (see, for example, Pigge & Marso, 1992; Smith & Sanche, 1992, 1993).

Not surprisingly, our student teachers also focused attention on administrative concerns in their analyses, as indicated by ‘management’ decisions and ‘administration’ reasons. The most frequently cited rationale for management decisions involved administrative concerns, such as the need to finish on time, enforcing class rules, disciplining a student, or easing a teaching load. These concerns are related to teacher-centered issues that do not directly relate to student learning or understanding. Thus the present study both reinforces classroom management as a concern among preservice teachers, and provides preliminary evidence of their acting on these concerns during video self-analysis. Further, the study demonstrates that when student teachers focus on management issues, they tend to characterize their reasoning as classroom-focused on administration rather than student needs and not student learning, per se.

Engagement. Some researchers have concluded that teachers are influenced heavily by student involvement, or engagement, in a lesson (e.g., Johnson, 1992). O’Donnell, Reeve, and Smith (2006) describe a distinction among behavioral, emotional, and cognitive engagement. Cognitive engagement is concerned with engaging a students’ mind (often measured by his/her initiative for seeking out information), and emotional engagement refers to issues of positive or negative feeling. Behavioral engagement, in contrast, is concerned with what students are doing, measured by effort and attention. Student teachers in the present study demonstrated a concern for behavioral engagement, commenting on students’ level of attention, justifying their actions, and reasoning how actions might increase involvement. Student teachers sought to engage their students by ensuring that they participate during the lesson, but focusing on other forms of engagement much less frequently. This is consistent with prior research on teacher thinking: “perceived student participation in the lesson emerges…as the foremost behavioral cue by which teachers judge the success or failure of a lesson” (Parker, 1984, p. 221). Thus, while student

engagement is one predictor of student achievement (Connell, Spencer, & Aber, 1992), preservice teachers demonstrated more concern with behavioral means of ensuring students' active participation.

Student-centered thinking

The emergence of student-centered thinking, in contrast, is inconsistent with much prior research on teacher-thinking. In the present study, student teachers' reasons for instructional action were often rooted in individual student concerns. Among reasons for instructional decision-making, whole class reasons were given 42% of the time, individual student reasons 40% of the time, and small-group reasons only 14% of the time. While these findings reinforce the importance of class-based decisions among preservice teachers, they also highlight the impact of video analysis on individual, student-based decisions. Researchers have reported that while novice teachers are concerned with group responses, expert teachers attend to individual needs (Borko & Shavelson, 1990). Similarly, Fogarty, Wang, and Creek's (1983) report that novices fail to adapt instruction based on student cues. Our analysis reveals that student-teachers' reasons for initiating instructional decisions were triggered nearly as often by individual student concerns, and that they reportedly adapted their actions accordingly.

Our participants chose an area of their teaching to improve. Yet, while their inquiry focused on their actions and decisions, participants cited student-centered reasoning. In-the-moment decisions demonstrated a concern for student understanding. In many instances, they identified how their teaching strategies would address different cognitive aspects of student understanding. They explained that many decisions were meant to engage students in learning and encourage their active participation. In addition, in-the-moment decisions demonstrated a concern for gauging student understanding. This may suggest that supporting preservice teachers

to analyze their own actions using video may sensitize them to making decisions based on student needs.

Years of research on teacher thinking suggest that information about students is critical for effective teacher planning (Borko & Shavelson, 1990). Interestingly, the most cited reason our participants provided for their decisions was the presumed cognitive development of either an individual student or a group of students (i.e., “addressing student learning needs”). Despite relative inexperience, participants enacted several strategies based on information about their students. This was demonstrated by Karen’s individual assessment of reading abilities while enacting teaching strategies to differentiate to allow support for individual students to work individually, Susan’s increased emphasis on calling on students who might not normally participate, Lisa’s whole class assessment questioning strategy, or Zoe’s preassessment teaching strategy to know how to direct the lesson. Fuller’s and Bown’s (1975) model of teacher concerns emphasizes the tailoring of instruction to individual needs during most the advanced stage of preservice teacher development. The findings of the present study support the notion that preservice teachers moved beyond initial teacher-centered concerns, and implemented practices based on concerns for individual and groups of students. They cited such concerns most when discussing their employed teaching strategies or their efforts to teach a metacognitive strategy to students. Thus, encouraging student teachers to focus their video-self analyses on their teaching strategies may help them to better account for student information when they plan for and enact teaching.

Pedagogy. Despite longstanding and recent research indicating that teachers’ actions and beliefs often do not coincide (Borko & Niles, 1982; Wolfolk & Pape, 2006), instances emerged in which participants’ pedagogical reasons aligned with instructional decisions. It is important to

note differences between prior approaches to examining teacher reasoning and the methods used in the present study. In prior research (Pajares, 1992), researchers elicited non-situated statements of teachers' beliefs about effective teaching strategies; in the present study, preservice teachers' contextualized statements about pedagogy revealed beliefs about the importance of specific teaching actions taken, such as modeling, note-taking, and open-ended teaching strategies. Allowing preservice teachers to relate their beliefs with actions during video analysis may provide a more explicit link among beliefs, thoughts and actions than previously available. The connections between beliefs and actions may be extended from broad aspects of beliefs to highly situated teaching actions and events. Previously, researchers typically elicited teachers' beliefs by having teachers write out explicit statements of their purported convictions or approaches to teaching (Bryan & Recesso, 2006; Kagan, 1992); in contrast, after identifying their specific inquiry focus, our student teachers used a scaffolded tool to analyze videos of their own practices. In so doing, each student teacher associated their teaching beliefs and rationales with specific, observable actions.

Similarly, the emergence of student-centered reasoning may have been influenced by the method used to elicit preservice teachers' thinking. Whereas past investigations have attempted to explain teacher enactments, the video self-analysis in the current study required that teachers select and comment on issues of specific aspects of their own inquiries. Despite the varied inquiries, all participants provided student-centered reasons for their decisions.

Conclusion

The formative use of video analysis enabled our participants to highlight teacher- and student-centered concerns, actions and reasoning. When student teachers' analyses focused on management or engagement, their reasoning became increasingly teacher-centered, whereas

when focused on teaching strategies their reasoning became increasingly student-centered. In addition, their pedagogical reasoning revealed implicit preservice teachers' beliefs about and rationales for using specific teaching strategies. Video analysis may offer potentially rich, complementary, and highly situated methods to elicit teachers' beliefs about *specific* teaching practices. Video analysis may provide a valuable tool for both researchers and teacher educators to assess, understand and affect student teacher thinking and action in context.

Video self-analysis is becoming increasingly powerful and accessible among teacher education programs (AUTHORS, submitted). Still, longitudinal research is needed to examine how student teachers engage in inquiry about their own instructional decisions, and the teaching, management, and engagement issues that emerge over time. In this way, student teachers may become increasingly capable of examining the relationships between their own actions and their students. Further, video self-analysis may provide a window into teacher thinking to extend the way researchers conceive of the connection between beliefs and actions.

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CHAPTER 6

CONCLUSIONS

The studies and papers included in this dissertation do not represent the complete implementation of the ongoing design-based research (DBR) initiative; rather, they are part of a larger DBR initiative to determine how to optimize Evidential Reasoning and Decision Making (ERDM) and the Video Analysis Tool (VAT) across the continuum of teacher development (i.e.,from pre-service to career professional). DBR provides a systematic way to optimize an innovation by testing theoretical interventions (Brown, 1992) in the messy context of learning environments (Shavelson, Phillips, Towne, & Feuer, 2003). They are considered a way to bridge the elusive gap between theory and practice. DBR attempts to "simultaneously and iteratively [address] the scientific processes of discovery, exploration, confirmation, and dissemination" (Kelly, 2003, p. 3). Researchers begin with a theory grounded in current research, and work together with practitioners to test, revise and retest that theory (Collins, Joseph, & Bielaczyc, 2004). Thus, DBR approaches progressively refine either the tools or theory (or both). In the spirit of DBR, I consider the positive and negative outcomes from these studies and related studies and how they might jointly inform future directions for research as well as practice.

Though not documented in these studies, I asked each participant for feedback regarding their technical experience in using the Video Analysis Tool (VAT). Throughout these studies, I documented and reported several technical and user concerns with the VAT. The VAT is currently undergoing revisions that address many of these technical concerns (file uploading, file tagging, searching through comments). These changes may resolve some of the issues that may have impeded participants' implementation of the methods (e.g., usability of a lens).

Throughout the remainder of this paper, I discuss three key issues that emerged from my research, and describe how they might inform teacher education experiences for preservice teachers: Benefiting from dissonance; the role of a lens; and social dimensions of self-analysis.

Benefiting from dissonance:

As documented in "Making Instructional Decisions Visible" (chapter #2), preservice teachers noted dissonance between recollected and recorded instructional decisions which engendered a type of "disequilibrium," an important concept for developmental psychologists (Piaget, 1954). Disequilibrium situates thinking in an open-minded state in which individuals are more likely to engage cognitively in a task (O'Donnell, Reeve, & Smith, 2007). In "Decisions & Reasons" (chapter #4), preservice teachers tended to highlight their instructional strategies and their reason(s) for enacting these strategies based largely on pedagogical interpretations related to students' learning needs. Together, these findings suggest the potential importance of intentionally stimulating disequilibrium by engaging preservice teachers' in an analysis of their teaching strategies and examining their underlying pedagogical assumptions. Such a program might reveal their reasoning about certain pedagogies (evident to both preservice teacher and researchers), stimulating questions about their thinking, and confronting potential alignment and disparities between their pedagogical assumptions and practices.

In addition, while participants' pedagogies—a driving force for many teaching strategies—were largely focused on addressing student learning needs, they rarely collected student evidence to test their assumptions or corroborate their findings. Further research is warranted to examine how (or if) consideration of student data affects student teachers' decisions and reasoning, and whether or not these alter their pedagogies.

The Role of a Lens

As noted in both "Making Instructional Decisions Visible" (chapter #2) and "Capturing and Assessing Evidence of Student Teacher Inquiry" (chapter #3), lens use was highly variable. This may have been due to last-minute changes in how lenses were identified, selected and structured. Lens definition and use may be improved in the future by eliciting a more central role for the teacher educator to serve as the influential mentor mentioned in chapter #3. However, technical issues also played a significant role. The in-progress technical improvement in VAT's capability to dynamically search for comments using associated lens(es) may make the lens more integral to the annotations and more useful in post-hoc analyses.

Significantly, however, both participants' and cooperating teachers' individual inquiries provided the driving interpretive force for their actions (chapters #2, #3, & #4). A few participants reported they used the lens and participated more when they took part in the lens creation. Future lens implementations might build on the link between teaching strategies and pedagogical rationale by increasing user autonomy over lens choice/creation. For example, in order to formalize otherwise tacit knowledge or assumptions, preservice teachers might complete a teaching styles inventory prior to being introduced to different pedagogical approaches. They could assert autonomy by identifying a particular teaching style prior to the internship experience and create an interpretive lens to examine how they enacted their presumed preferred approach.. A follow up survey could then be used in concert with their lens analysis to identify the effect of their use of *their* lens on both their pedagogical beliefs and practices, providing preservice teachers both the autonomy to identify target teaching strategies and choose a lens while balancing with evidence of those beliefs and practices through video self-analysis.

Social Dimensions Of Self-Analysis

Barber (1990) notes in *The New Handbook of Teacher Evaluation,* notes that good evaluations are not conducted in isolation, but involve peer analysis. Chapter #3 illustrates that the mentor—a cooperating teacher or a university facilitator—was vital in shaping student teachers' instructional decisions. Although mentor teachers played a key role in this study, it was largely peripheral and unguided. Some participants were assigned to cooperating teachers with significant mentoring experience, while other mentors had little to no experience. The availability of the seasoned teachers' perspective and insights affected student teachers' subsequent analyses. Future implementations might need to account for differences in the role and preparation of the cooperating teacher, and scaffold participation explicitly to ensure that both student teachers and cooperating teachers benefit comparably.

Asking Questions—Going Beyond The Surface

As noted in "Video Annotation Tools" (paper #1), a good deal of work is being implemented with video annotation tools in teacher education, but little has been disseminated among researchers. Research is only beginning to emerge, and it typically focuses on the general experience of preservice teachers. Research is needed to study the effect of the experience on teacher development and student performance. The EBRM and VAT changes, both already underway and recommended, should enhance preservice teachers' experiences as well as enable researchers to pose important questions:

1. *What is the impact of video-enhanced self assessment on student performance?*

   Collecting student evidence in tandem with teacher performance data should enable researchers to assess the impact of the tools and methods on student learning, perhaps which is the ultimate goal of teacher development. As our understanding of the use of

evidence in decision making increases, teachers educators may become more able to prepare preservice teachers to assess how their decisions do (and do not) affect student learning.

2. *What is the relationship among conceptual beliefs, tacit awareness of classroom practice, and direct evidence of teaching practice?* By pairing key pre-post assessment data across multiple measures (e.g., teaching styles inventory, teaching knowledge, student knowledge, lens-based assessment of target teaching practices, self-reported accounts of classroom events), we may better establish the presence of presumed correlations central to the tools and methods. Understanding preservice teachers' need for autonomy in identifying such a lens informs the researcher how to present the lens for use in the study when validation is a concern. Using validated instruments and procedures, researchers can both validate the underlying assumptions of, and attribute changes to, video-based self analysis tools and methods.
3. Finally, mentors—cooperating teachers, university facilitators, or teacher educators—introduce important dimensions to preservice teacher development; we need to better identify how they influence the perceived value, use and impact of EBRM methods and VAT tools to strengthen ties among research, theory and practice. By including these important players in the process, we may better organize teacher development experiences, while simultaneously improving clinical aspects of preservice teacher development.

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APPENDICES

Appendix A. GTSM Lens for study #1 participant selection

2-C. KNOWLEDGE OF STUDENTS AND THEIR LEARNING: Teachers support the intellectual, social, physical, and personal development of all students.

B.2-C. Communicate respect for and develop rapport with all students. **GSSP:** SFCS.2 **GSPL:** C.1
Teacher Evidence: • **Greets students cheerfully.** • **Communicates with students respectively.** • **Listens to students about their needs, goals, lives, and learning.** • **Arranges to spend time with each child as an individual.** • Responds immediately to clues of distress, following established procedures and laws. • Seeks help from counselors, administrators, social workers as needed and appropriate to remedy problems. • Participates actively in student support teams.
Student Evidence: • Responds positively to teacher and peers. • Feels free to communicate with the teacher and other adults about issues that are important to him/her. • Is protected and supported within the school environment.

Appendix B. Follow-up survey (study #1).

Name:

What was your reason for volunteering to use VAT for your self-inquiry project?

How did you use evidence in your self-inquiry project? What evidence did you most rely on (e.g.,video, lesson plans, etc.)?

Did you use a specific lens for your analysis (if so, which)? How likely are you to analyze your own practices using a specific lens in the future (explain)?

Did you share your evidence and observations with others? How did this affect your self-inquiry project?

How did the self-inquiry project affect the way you think about your own teaching decisions?

What are your plans for using VAT for future self-inquiry (explain)?

What are your plans for using evidence for future self-inquiry (explain)?

What was the best thing about this self-inquiry project?

What was the worst thing about this self-inquiry project?

What grade would you give yourself on this project (explain)?

What grade would you give this project?

Appendix C. Professional Development Plan

Professional Development Plan

Name:		**Date: From:** **To:**

List 2 aspects of teaching that you will work to strengthen during student teaching. **1.** **2.**				
List a minimum of two methods/strategies for dealing with each aspect				
Methods/Strategies	**Time Line**	**Resources/Support**	**Indicators of Progress**	**Types of Documentation**

Methods/Strategies	Time Line	Resources/Support	Indicators of Progress	Dates & Type of Documentation

Appendix D. Lenses available to participants during student teaching

Level	Basic	Proficient	Advanced
Descriptions	**Introduced to professional learning communities.** Making a successful transition from preparation program (traditional or alternative pathways) to the field of education. Rudimentary approach to planning, organizing, and conducting day-to-day learning experiences. Teacher centered; needs clear and close direction from others; able to demonstrate *knowledge* of teaching.	**Becoming member of professional learning community.** Becoming deliberate and purposeful about trying and selecting appropriate practices, utilizing feedback and implementing direction given about teaching and learning. Perceives self as learner and willing to try new classroom strategies; identifies frustrations and seek support. Implements alternative strategies with direction and support. Refines approaches through experience and selects strategies in response to both own and student needs; demonstrates *facility* in teaching	**Contributing member of a** **community.** Sets and meets demanding and appropriate goals (individual, team, school, state, national) for themselves and students. Applies knowledge (content, pedagogical knowledge, and pedagogical content knowledge) to educate the whole child. Knowledge of professional and practical *knowledge and practice* deeply engrained and automated. Takes risks and has the expertise to implement alternatives effectively. Utilizes multiple methods and tools for assessment (self and student) to measure progress towards goals and promote continuous growth. Pursues professional learning resources and opportunities to grow. Vast repertoire of strategies; able to adjust on the fly, and determine best options for a given situation.

Domain: Assessment: Teachers understand and use a range of formal and informal assessment strategies to evaluate and ensure the continuous development of all learners.

Attribute H:	**Not yet evident**	**Basic**	**Proficient**	**Advanced**
Identification of student strengths and needs		• Develops plan to assess class performance. • Analyzes class data to identify class performance. • Is aware of strategies/methods to assess class performance.	• Assessment plan identifies individual strengths and weaknesses. • Implements assessments that identify individual strengths and weaknesses • Uses feedback to revise assessments of individual strengths and weaknesses. • Seeks support to select assessment methods and tools. • Seeks opportunities to expand knowledge of new assessment methods.	• Adapts assessments to address specific student needs • Implements a *range* of assessments for the needs of each child. • Develops innovative assessment methods to assess unique performance requirements • Modifies assessments based on emergent opportunities and "teachable moments" • Is a resource to peers for sharing varied and individualized assessment methods.

Domain 2: Knowledge of Students & Their Learning: Teachers support the intellectual, social, physical, and personal development of all students.

Attribute E:	**Not Yet Evident**	**Basic**	**Proficient**	**Advanced**
Accommodation of individual student needs.	•	• Develops and organizes differentiated learning lesson plans for class • Implements differentiated lesson plans as intended. • Is aware of differentiated learning techniques; •	• Develops and organizes differentiated learning lesson plans *based on individual student needs*. • Implements *individualized* lesson plans per specific student needs • incorporates feedback about differentiated learning into lessons. • Recognizes strengths and shortcomings in accommodating individual learning needs • Attempts alternative approaches to accommodate individual learning needs • Collaborates to refine individualized approaches. • Seeks opportunities for professional growth in individualizing to accommodate individual needs	• Adapts lesson plans to address specific student needs. • Implements *a range* of diverse activities for individualized learning to the needs of each child. • Develops innovative activities for individualized learning; • Modifies approaches based on emergent opportunities or needs. “thinking-in-action” • Is a resource to peers in sharing differentiated instruction techniques.

Domain 3: Learning Environments: Teachers create learning environments that encourage positive social interaction, active engagement in learning, and self-motivation.

Attribute C:	**Not Yet Evident**	**Basic**	**Proficient**	**Advanced**
Classroom management and learning community.		• Establishes classroom management and leaning community plan. • Plans, organizes and arranges classroom environment. • Implements class rules established in management plan; • Is aware of strategies for developing effective classroom management and learning communities.	• Management and learning community plans address class needs. • Incorporates feedback in changes to plans. • Recognizes strengths and shortcomings of plans. • Attempts alternative approaches to classroom management and learning communities. • Collaborates with others to address class and/or individual situations. • Seeks opportunities for professional growth to improve classroom management and learning communities.	• Adapts management and learning community plans to address strengths and needs of diverse learners. • Implements a range of activities to engage the whole class and each child in the learning community. • Develops innovative approaches to classroom management and learning communities. • Is a resource for peers in classroom management and learning community planning and practice.

Appendix E. Student Teacher Follow-up interview protocol

Big Questions	Sub-questions	Micro-questions
A. Does EBDS help preservice teachers focus on critical elements of practice? If so, how?	What was your initial focus?	What triggered that focus? How did it change as you analyzed your videos? Describe how you have used evidence to investigate this focus.
	You were asked to use the GTSM lens for Basic teaching to analyze yourself. Did you use it and how?	If not, what is your reasoning? How helpful was the lens? What recommendations do you have for future use?
C. Do preservice teachers use EBDS to systematically plan, enact and adapt instructional decisions? If so, to what extent?	What influence did your self-inquiry question have on your lesson planning over time?	How did it influence what you thought about during the lesson? How did it influence the things you actually did during the lesson?
	Did thinking about evidence affect your lesson/unit plan? If so, how?	What evidence did you consider (during planning)? What sorts of evidence had the greatest effect and why?
	Describe the process you went through to analyze and interpret the evidence you collected.	What was the most helpful source for analyzing this evidence? How helpful were the analysis materials you were given?
	After analyzing each analysis phase, what instructional changes did you adapt (if any) and how?	How did you come to that conclusion? What effect do you think this outcome had on the way you used EBDS during student teaching?
C. How do the outcomes of evidence-based instructional decisions compare to current conceptions of basic teaching practice?	Where do you feel you are at in terms of your teacher development?	What effect has EBDS had on that development? According to the standards you used, where should you be at?
	How have the evidence-based decisions you've made affected your teacher development?	What decisions did you make that lead you to think this? How has using evidence to think about and see your own instructional decisions impacted the way you think about your teaching? What are your future plans for using EBDS methods and tools?
	How did your analysis compare to your mentor teachers' analysis?	How did you use your mentor teacher's analysis in deciding what steps to take next? Did you look at her analysis prior to enacting your next inquiry? How do you think your revised actions (chosen decisions) compare to what your mentor teacher would have done?

Appendix F. Cooperating Teacher Follow-up Interview Protocol

Big Questions	Sub-questions	Micro-questions
A. Demographics	Years Teaching Mentoring Using Video Rating teachers	How long have you taught? What grades? What experience do you have mentoring student teachers? What experience have you had in using video to look at your own or others' teaching? What experience do you have assessing other teachers using rubrics or other rating instruments?
B. Does EBDS help preservice teachers focus on critical elements of practice? If so, how?	What was your student teacher's initial focus?	What role, if any, did you have in helping your student teacher come up with a focus for this study? How did it change as you analyzed her videos? Did you and your student teacher use anything other than video to investigate this focus? What was it how did you use it?
	You were asked to use the GTSM lens for Basic teaching to analyze your student teacher. Did you use it and how?	Describe how you used this lens in your analysis, if at all. How useful was the lens? What recommendations do you have for future use?
D. Do preservice teachers use EBDS to systematically plan, enact and adapt instructional decisions? If so, to what extent?	What influence did your student teacher's self-inquiry question have on her lesson planning over time?	How did it influence the things you noted her doing during the lesson?
	After analyzing each analysis phase, what instructional changes did your student teacher adapt (if any) and how?	Did you discuss your VAT analysis with your student teacher? If so, how? What effect do you think this outcome had on the way she taught during student teaching? What were the changes she made? What was the role of the VAT in these changes?
F. How do the outcomes of evidence-based instructional decisions compare to current conceptions of basic teaching practice?	Where do you feel your student teacher is at in terms of her teacher development?	What effect has EBDS had on that development? How much prior experience have you had mentoring student teachers? Where would you say your student teacher is at in her overall teacher development? What is the contribution of the VAT in this development?
	How did the evidence-based decisions she made affect her teacher development?	What decisions did she make that lead you to think this? How has using evidence to think about and see your student teachers' instructional decisions impacted the way you think about student teaching?
	How did your analysis compare to your student teachers' analysis?	Did you view or discuss your student teacher's analysis in helping her to decide what steps to take next? Did you look at analyze her video prior to enacting her next inquiry?

Appendix G. Round 1 Follow-up Survey

Name:

What is your inquiry focus?

What is your rationale for choosing this focus?

What evidence, other than video, have you used to investigate this focus?

What did you discover (or confirm) about your teaching in the first round?

What course of action are you going to take?

How did you come to that conclusion (See #5)

Which lens did you use? How helpful was it?

What would you change about this project?

What has been the best thing about this project?

How has this project affected your teaching decisions?

Appendix H. Round 2 Follow-up Survey

Name:

What was your second inquiry focus?

What is your rationale for choosing this focus?

What evidence, *other than video*, did you used to investigate this focus?

Did you review your first video prior to filming your second video? If so, how did it affect your second inquiry? If not, what did you discover in watching your videos that you would now act on?

What course of action did you to take upon analyzing your evidence?

How did you come to that conclusion (see question #5)?

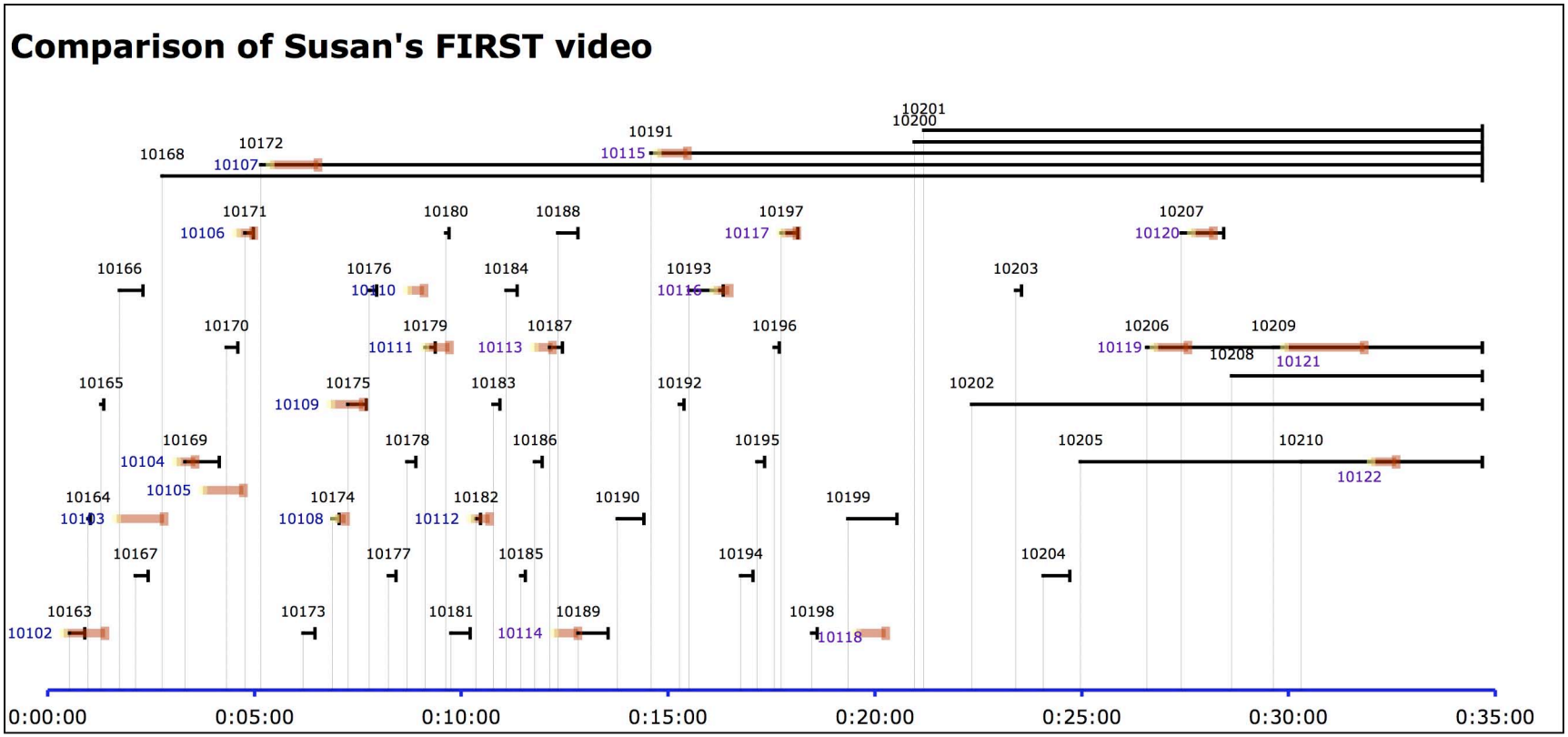
Which lens did you use? Did it affect your analysis? (Explain)

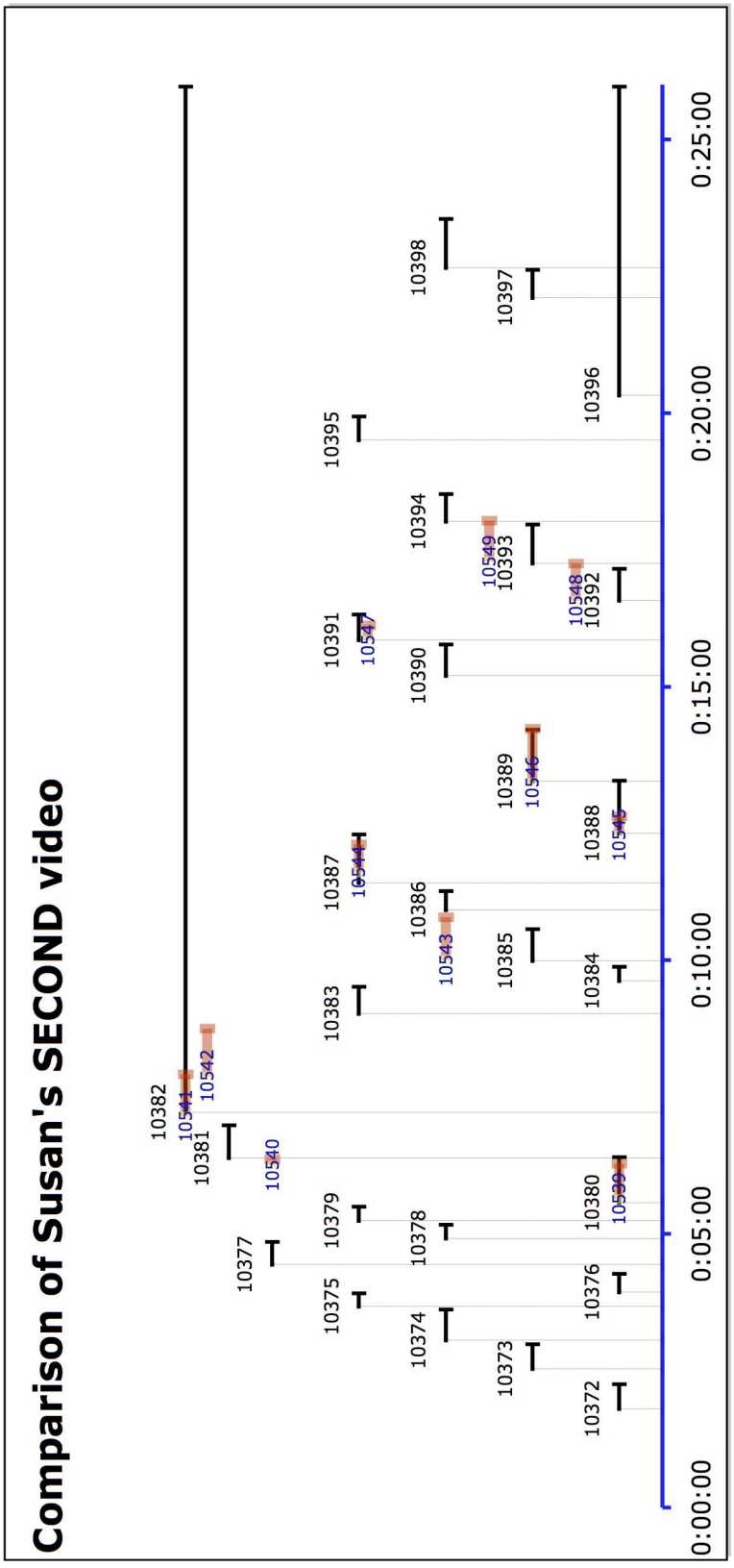
What has been the best thing about this project?

What would you change about this project?

How has this project affected your planning and teaching decisions?

Appendix I. Visual Timeline Comparison Of Student Teacher And Cooperating Teacher Comments

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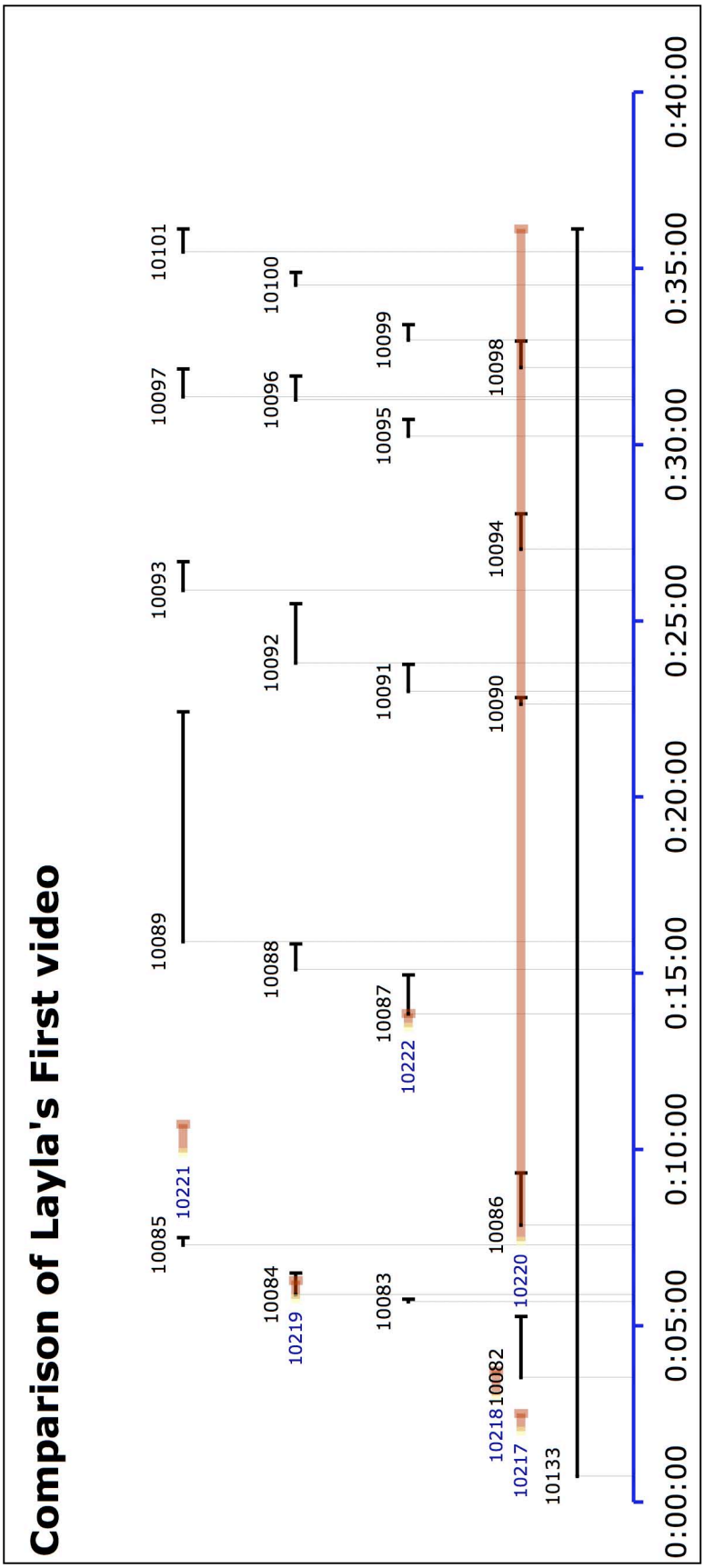
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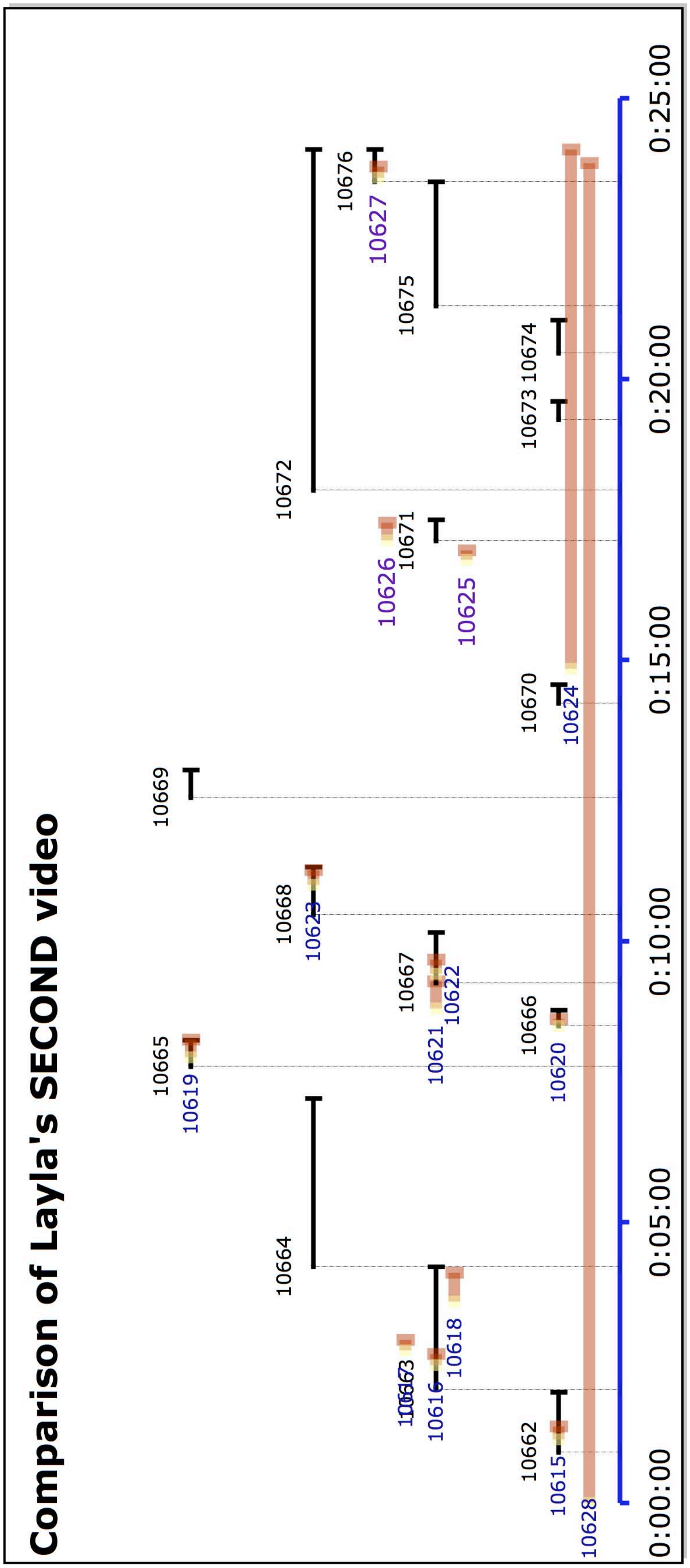
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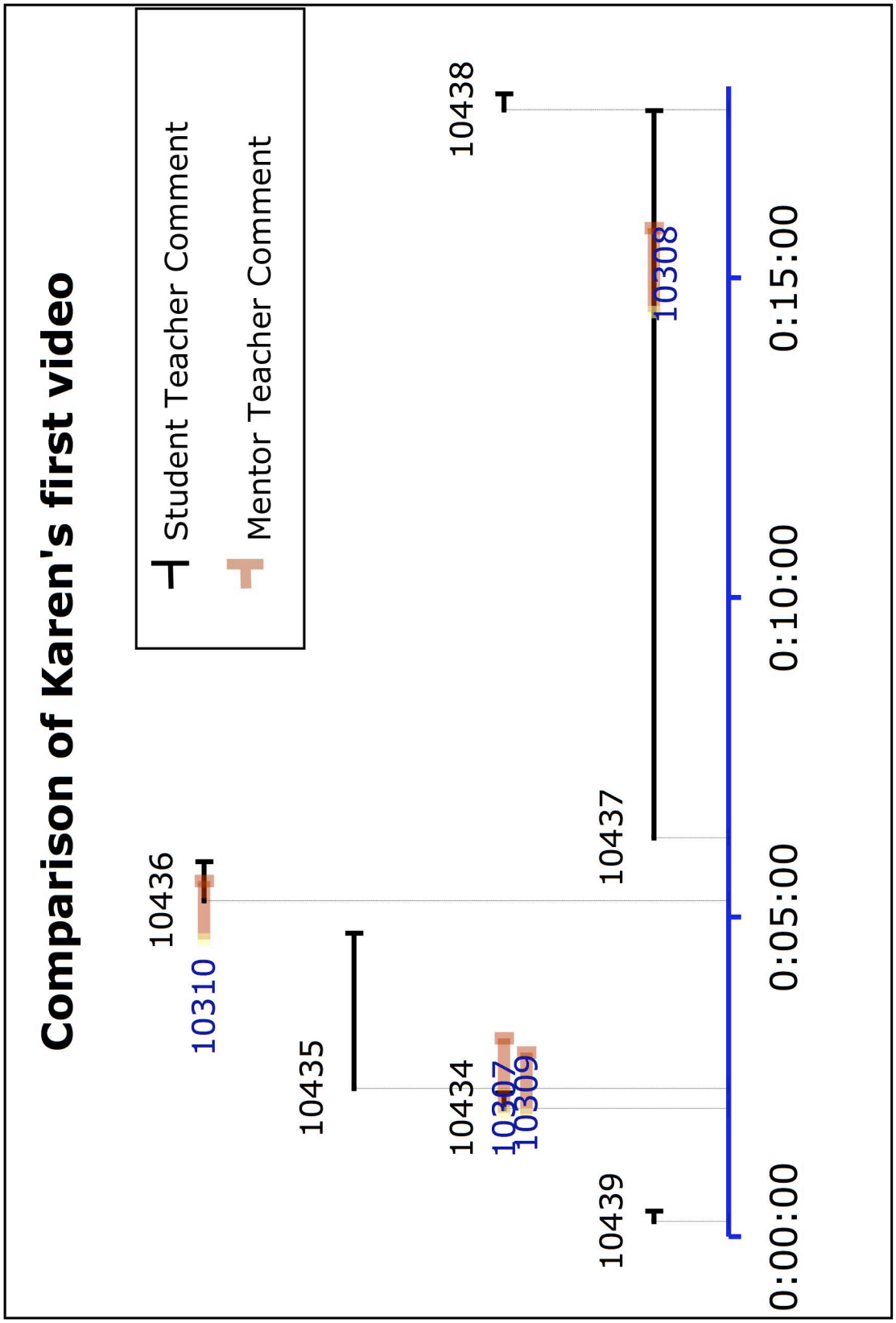
Comparison of Karen's first video
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Mentor Teacher Comment
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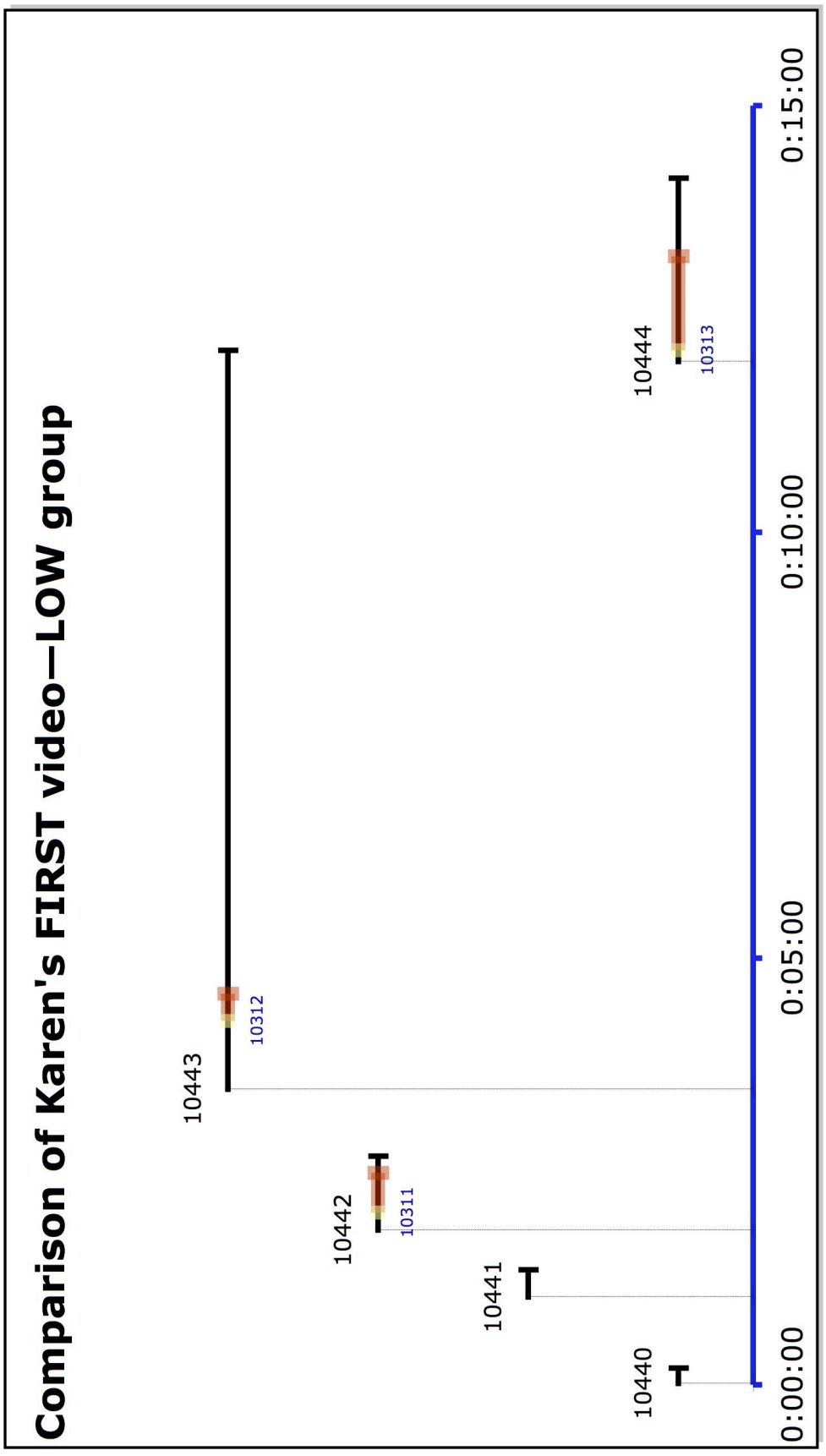
Comparison of Karen's FIRST video—LOW group
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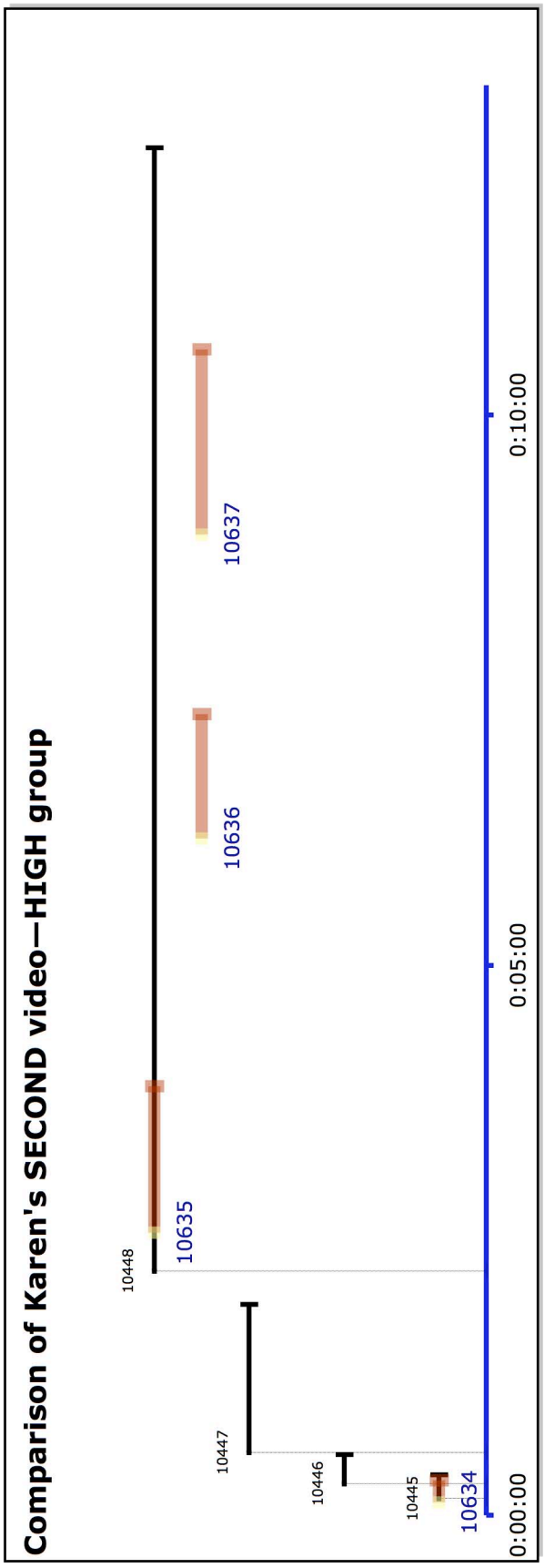
Comparison of Karen's SECOND video—HIGH group
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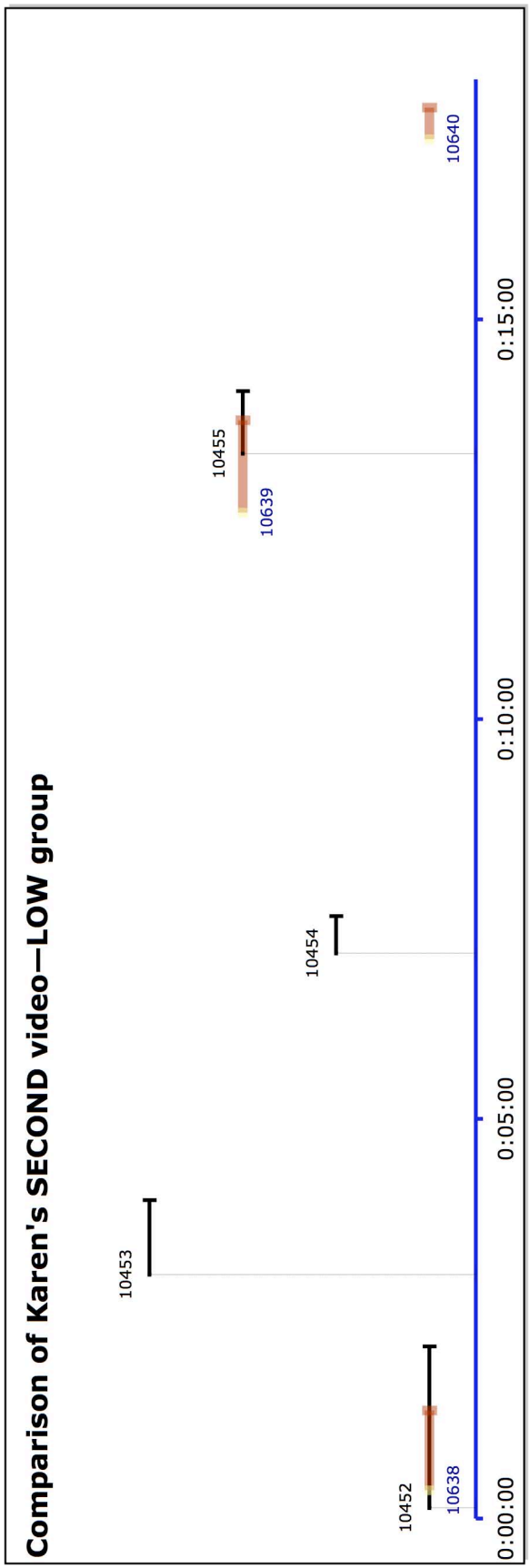
Comparison of Karen's SECOND video—LOW group
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Appendix J. Codebook terms and definitions

Code	Definition
Working 1on1	"Working one on one with a student"
Ability mapping	"matching content and instruction to cognitive ability"
Asking Questions	"Asking questions to create, instill, or ensure comprehension."
To assess understanding	"gauging student comprehension. Can be preplanned or interactive"
Awarding Students	Recognizing or rewarding students for positive behavior/actions
Using body language	"using body language to convey an idea"
Calling on student(s)	
To teach social responsibility	"efforts to teach/instill/enforce social norms and behaviors."
To clarify a concept	"may refer to addressing a misunderstanding as well as further elucidating a topic in response to student feedback."
Class	"Addressing the learning needs of the entire class"
To enforce class rules	"Reinforcing or establishing class rules."
Decisions	"Decisions describe instructional actions taken by the preservice teacher. They most often followed by a reason. They differ from descriptions in that descriptions paint a picture of the scene whereas decisions are focused on the instructional actions of the teacher."
Differentiating/Differentiation	"varying instruction for student learner abilities and other factors"
To discipline a student	"actions taken to correct/prevent disobedience"
Doesn't know	"Participant does not know the reason for the action taken."
To ease teaching load	"actions taken to lighten the burden of teaching."
Engagement	"ensuring participation and attention."
To ensure participation	"efforts to ensure students are paying attention and/or participating in the activity."
Giving Instructions	"Includes setting expectations."
Group	"addressing the learning needs of a group of students (a sub-group of class)"
Group Work	"Allowing students to work in groups."
Guiding	"acting as a guide to help students understand/learn content"
Individual	"addressing the learning concerns of individual students."
Letting students work individually	"Allowing students to work on their own and/or efforts taken to help students construct their own understanding of a concept."
Instructional content	"decisions dealing with the choice or presentation of instructional content of the lesson."
Interactively making decisions	"Decisions made on-the-fly in response to something that occurs in the classroom."
Managing classroom needs	"Managerial actions that don't directly relate to learning (but that may most certainly affect learning indirectly)."
Modeling	"Demonstrating how a task is to be performed."

To motivate students	"references to motivation or enjoyment of task/activity for the student(s)". Time/routine/discipline
Pedagogy	"Instructional approach. May appear as an expression of a participant's belief about how learning should be."
Reaction to students	"deals with students. May be observed, implicit or supposed (see sub-codes)". Interactive
Reason	"Reasons deal with the justification or explanation for actions taken. In the case of the preservice teacher they serve almost as a "think aloud" for why they acted the way they did. Although they are usually accompanied by the decision they are descrbing, this decision may be absent (sometimes teachers give their reasons in a general sense, or else feel no need to describe what they were thinking since it was captured by the video)."
To reinforce a concept	"Deliberately repeating/reinforcing an idea to ensure it enters into long-term memory."
To simplify a concept	"simplifying content to ensure better understanding."
To satisfy social needs	"acting or thinking in terms of the social wellfare of a student/group of students."
To address student learning needs	Addressing the cognitive concerns of a student or a group of students
To teach metacognitive strategies	"Teaching students metacognitive or other strategies to increase students' ability to learn or monitor their own learning."
Teaching Strategies	"Teaching strategy(ies)"
To make efficient use of time	"actions taken to improve efficiency due to time."
Waiting	"Purposefully pausing."

Appendix K. Selection of first 20 codes, demonstrating initial rater agreement

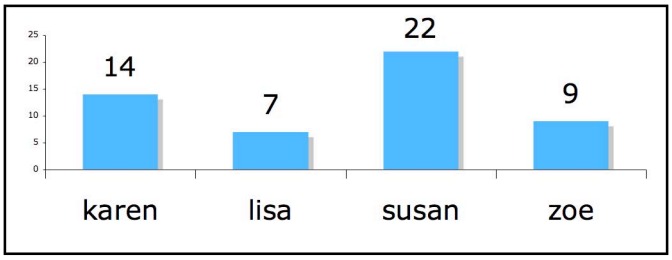
Instructional Decision	**Agree**		**Rater #2**		**Rater #4**
In this clip I am looking at 3 different sets of books. Each of the sets were nonfiction and they were all about the Everglades but they were on three different levels.	4	Instructional content	Instructional content	Instructional content	Instructional content
I chose a book that was suitable for a higher fourth grade level	4	Instructional content	Instructional content	Instructional content	Instructional content
so I decided to go over it together.	2-split	Interactive	Interactive	Enacting a teaching strategy	Enacting a teaching strategy
I had them go back to their desk to finish the book	3	Management	Management	Giving Instructions	Management
For this section, I trusted that the students had finished the book	3	Management	Management	Instructional content	Management
I chose to stop in smaller chunks for this group	3	Enacting a teaching strategy	Enacting a teaching strategy	differentiation	Enacting a teaching strategy
I emphasized "everyone follow along"	2-split	Giving Instructions	Enacting a teaching strategy	Giving Instructions	Enacting a teaching strategy
It was important to me that *they stayed with the text while others were reading*	2	Enacting a teaching strategy	Management	differentiation	Enacting a teaching strategy
I tried to give them A LOT more guidance on the process of reading a non-fiction book before I started reading aloud to them.	4	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy
I also had the students read smaller chunks individually	3	Enacting a teaching strategy	Enacting a teaching strategy	differentiation	Enacting a teaching strategy
Since this was my high group, I let them read a little more and there wasn't much talk in between the pages.	3	Enacting a teaching strategy	Enacting a teaching strategy	differentiation	Enacting a teaching strategy
From this point to the end, I chose to allow them to read out loud individually.	4	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy
This was a technique in which all of the students were reading at the same time.	4	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy
I probably should have chosen to read the book aloud to this group rather than have them read it	4	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy
I modeled how I would find the main idea	3	Enacting a teaching strategy	Enacting a teaching strategy	Instructional content	Enacting a teaching strategy
In this I was modeling how to read aloud when we are in small groups. I	4	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy
I used this to model the wrong way to read.	4	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy	Enacting a teaching strategy

I have taken time to model it and now I am giving them time to practice it	3	Enacting a teaching strategy	Enacting a teaching strategy	Instructional content	Enacting a teaching strategy
With this group, I focused more on HOW to read non-fiction texts (slow) and how I digest it.	2-split	Enacting a teaching strategy	Instructional content	Instructional content	Enacting a teaching strategy
With the higher group, I mentioned that you read it slower but I focused more on finding the main idea which wasn"t the primary focus of this group	2-split	differentiation	Enacting a teaching strategy	differentiation	Enacting a teaching strategy

Appendix L. Instructional decisions by participant

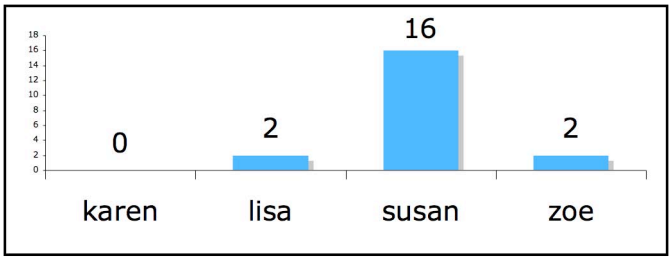
Enacting a Teaching Strategy

Repeating/Reinforcing	8
Guiding	7
Teaching a learning strategy	6
Assessing student comprehension	5
Using Body Language	5
Differentiating	5
Modeling	5
Waiting	3
Working 1 on 1	2
Asking Questions	2
Using Discussion	2
Letting students work individually	2
Grouping students	1



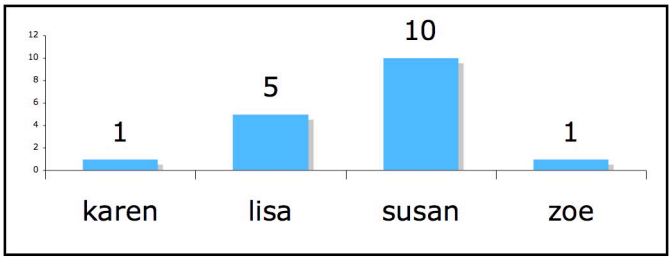
Calling on students

Asking questions	21
Saving Time	1

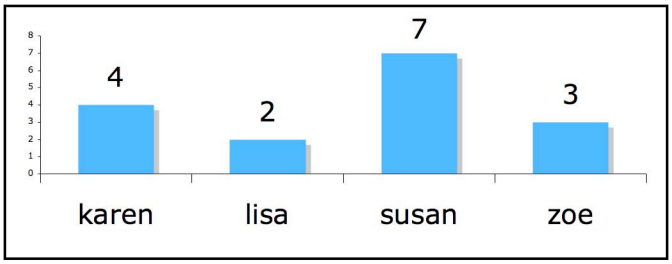


Managing Classroom Needs

Giving Instructions	4
Enforcing Class Rules	3
Ensuring participation	3
Gaining attention	3
Awarding Students	2
Easing teaching load	1
Addressing Social Needs	1

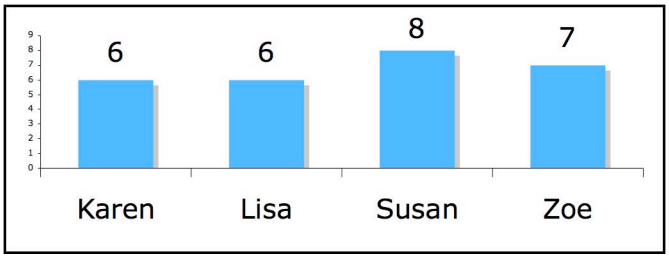


Other decisions

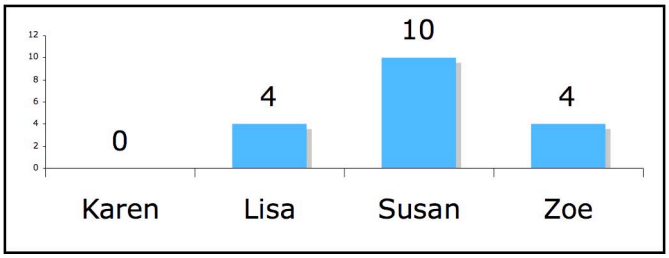


Appendix M. Reasons for instructional decision by participant

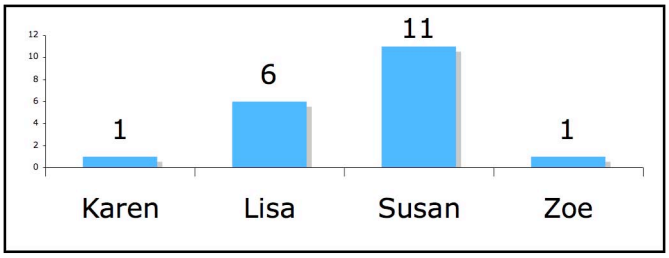
Pedagogy	
To address student learning needs	10
To teach metacognitive strategies	7
To reinforce a concept	3
To assess understanding	2
To clarify a concept	2
To ensure participation	2
To satisfy social needs	1



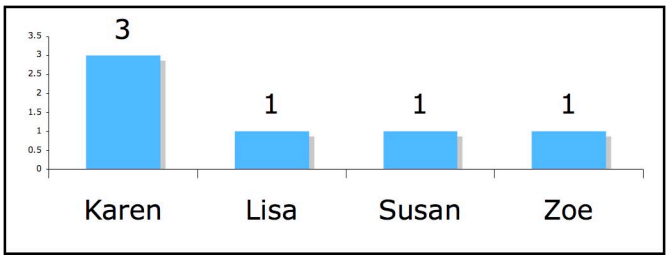
Engagement	
To ensure Participation	16
To motivate students	2



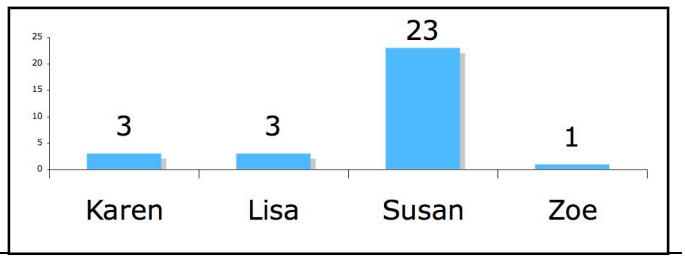
Administration	
To enforce class rules	6
To ensure participation	3
To teach social responsibility	2
To discipline a student	2
To ease teaching load	2
To motivate students	2
To make efficient use of time	2



Assessment	
To address student learning needs	6



Reaction to students	
To address student learning needs	12
To ensure participation	6
To adhere to a pedagogy	4
To teach metacognitive strategies	3
To satisfy social needs	3
To ease teaching load	1
To clarify a concept	1



Ability mapping

To ensure Participation	1
To address student learning needs	6
To simplify a concept	1
To satisfy social needs	1
To teach metacognitive strategies	1