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Using Technology to (Re)Conceptualize Preservice Literacy Teacher Education: Considerations of Design, Pedagogy, and Research

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THE NEED TO (RE)CONCEPTUALIZE PRESERVICE TEACHER DEVELOPMENT AND THE ROLE OF TECHNOLOGY IN THAT DEVELOPMENT

Teacher education appears to have changed little in half a century or more. Although various instructional models, from traditional classroom instruction to apprenticeship/internship approaches, have gained and lost favor during this time,[1] preservice education programs continue, appropriately, to address three areas: knowledge of subject matter, knowledge of instructional processes and procedures, and implementation of appropriate processes and procedures in the classroom. Yet, for all of the innovations that have been and are being tried, it has generally been the case that teacher education programs are more successful at enhancing future teachers' knowledge of subject matter and instructional procedures than at developing their instructional decision-making abilities (e.g., see Munby, Russell, & Martin, 2001)—even though the making of moment-to-moment decisions about what to teach, when to teach it, and how to best do so is perhaps what characterizes the most effective classroom teachers.

It has been noted that future teachers appear to rely more on their own experiences as learners than on the knowledge provided to them by their teaching methods courses, and that field experiences may have more effect on future teachers' development that does coursework (e.g., Griffin, 1989). In light of such findings, Borko and Putnam (1996) and Feiman-Nemser and

[1]The handbooks of research on teacher education (Sikula, Buttery, & Guyton, 1996) and on teaching (Richardson, 2001) contain several discussions of these and other models.

Remillard (1996) cite the need to change teachers' beliefs about teaching and learning, and advocate doing so through constructivist perspectives and situated cognition. Borko and Putnam note the following factors as contributing to successful teacher learning:

1. Addressing teachers' [existing] knowledge and beliefs about teaching, learners, learning and subject matter;
2. Providing teachers with sustained opportunities to deepen and expand their knowledge of subject matter;
3. Treating teachers as learners in a manner consistent with the programs' vision of how teachers should treat students as learners;
4. Grounding teachers' learning and reflection in classroom practice; and
5. Offering ample time and support for reflection, collaboration, and continued learning. (Borko & Putnam, 1996, pp. 700–701).

These points have been applied to literacy teacher education in various ways. For example, Snow, Burns and Griffin (1998) propose that teacher education prepare future teachers for the complexities of classrooms by closely connecting preservice teacher education with what we know about effective instructional practices. Others agree that teacher preparation programs must move beyond simple presentations when preparing teachers for the complexities of classroom contexts (e.g., Alvermann, 1990; Bransford, Brown, & Cocking, 1999). Traditional lecture-based, preservice education experiences do not adequately prepare future teachers, largely because these approaches cannot adequately address the components presented herein. In addition, many current preservice courses do not integrate technology effectively, despite the fact that these preservice teachers will almost certainly be required to use technology in their own classrooms.

In fact, we believe that traditional methods used in teacher education are hard pressed to provide the experiences that address the items on Borko and Putnam's list. Furthermore, we suspect that without the inclusion of technological tools, these methods may be unable to provide the experiences. Even teacher education programs with substantial field-based components frequently come up short because they rely on unique and individualized experiences for each preservice teacher. For example, when preservice teachers come together in a student teaching seminar to share their classroom experiences and ask questions that might help them solve a problem, each preservice teacher approaches questions and reflections from his or her unique field experience classroom. Therefore, collaborative reflection is difficult to achieve. In effect, each individual's field experience is unique, and the potential benefits of collective experience are dissipated into what may be regarded as 20 or more teacher education programs (depending on the number of students in the class), rather than a single, powerful, connected program. Preservice peers, while empathetic to and supportive of each other, cannot closely relate to field experiences in which they are not grounded. As a result, reflection activities intended to mediate underlying beliefs and perceptions about teaching lose much of their power.

Consider, for example, the differences in the impact of reflective discussion in the following two scenarios. The first involves two individuals, one of whom has had field experiences in a second-grade classroom at Brewer Elementary School and another who was involved in a third-grade classroom at Cavasos Elementary (all names are pseudonyms). They come to their student teaching seminar class to discuss their respective experiences. Each individual briefly presents his or her field experience and asks for comments and suggestions. They each receive support and generic comments from their peers, but are left to reflect individually about what took place and how their beliefs and knowledge operate within their unique environment.

However, what if we could enable future teachers to participate in a shared experience that serves as a focal point for discussion and grounds the teaching and learning of subject matter knowledge and instructional procedures as well as participate in their own individual field experiences? In this second scenario, individual presentations about unique field experiences would be related to the shared context. The group could then discuss similarities and differences between the shared context and the individual's unique preservice placement. As a result, group reflections and suggestions become more specific and beneficial in affecting individuals' underlying beliefs. In effect, the shared experience facilitates bringing peer reflections to bear on individuals' field placement discussions. (See Roskos, Vukelich, & Risko, 2002 for a discussion of research on reflection and reflective practice related to literacy.)

Multimedia technologies that present cases of classroom practice offer especially promising opportunities to provide students with situations like the second scenario just described. Through the delivery of visual and textual information on the Internet, students can share a common experience that grounds further learning in a rich socio-constructivist environment. The project, Case Technologies to Enhance Literacy Learning (CTELL) that we have developed (http://ctell.uconn.edu/home.htm), attempts to move toward the second example by merging two instructional perspectives—anchored instruction and case-based learning methods—through the use of video embedded in interactive multimedia cases delivered over the Internet or on CD-ROM.

Case-based methods, common in business, law and medicine, are becoming more accepted in educational settings, but there are important differences to consider in cases used in various content domains (Williams, 1992). For example, cases in law are based on precedent, but cases in classrooms cannot be viewed in this way. Educational practice, as a social and cultural endeavor, does not act on strict rules of precedence because classrooms are dynamic and changing environments. Lesson plans written by and for one teacher often fail when used by a different teacher, perhaps a substitute, because the context has changed and precedence does not apply. The importance of understanding the context within which teachers make their instructional decisions cannot be overemphasized. As discussed later, video provides possibilities for contextualizing instruction in ways not possible through print-based cases.

With the recognition of the importance of context as a facilitative factor in knowledge acquisition (Munby, Russell, & Martin, 2001), case-based instruction has become increasingly popular in teacher education (see discussions by Merseth, 1991, 1994; Shulman, 1995; Silverman & Welty, 1995; Lundeberg, 1999, Sykes & Bird, 1992). Case-based methods in education provide students with a contextual understanding of how complex teaching and learning can be (Bowers et al., 2000). Cases fit well into constructive, interactive pedagogies like anchored instruction (Kinzer & Risko, 1998) in that they allow for multiple entry points and perspectives to be explored. Many believe that teaching in such a complex field as teacher education is best taught by situating instruction in complex spaces like cases (Ferdig et al., 2002). Teaching and learning are both situated in real-life spaces that are complicated, changeable, and difficult to assess. Case-based instruction provides a scaffolded sense of such complexity in ways that help preservice teachers begin to negotiate classroom situations (Hughes, Packard, & Pearson, 2000).

Case-based instruction has been presented as being quite different from transmission models, largely associated with lecture formats in traditional preservice teacher-education methods courses, that are prevalent in teacher education (e.g. see Risko, 1995). A comparison of many case-based methods, which presuppose exploration and problem-solving by a learner, and transmission models, which are analogous to filling empty vessels, might begin with the underlying assumptions of how case-based methods are used in the classroom. These include provision for analysis of data, thought of as the content of the case (in our instance, this includes video of

classroom teaching, students' written work, interviews, and so on, as detailed later). Case content also is viewed as including the context(s) where instructional procedures are used and modified, as well as factors and variables that must be considered when choosing and implementing instructional decisions. Cases therefore allow preservice teachers to bridge from theory into the complexities of practice (Greenwood, 1996). As noted in the section that follows, computer technologies that include interactive, multimedia learning environments offer preservice teacher instructors with unique avenues for effective case-based instruction. Indeed, computer tools and content offer distinctive affordances that are difficult to realize in print-based forms.

A Brief Discussion of the Promise of Technology Combined with Case-Based Methods

Casebooks for use in reading education are increasing in availability but, as Kinzer and Risko (1998) point out, there are important differences between print- and even videotape-based cases and those delivered through video on digital, random-access media. Although print-based cases can provide shared knowledge for discussion purposes, they are limited in utility when viewed from a perspective of access and analysis. Print-based cases are usually written after the fact and cannot truly capture a classroom's complexity. They present a single viewpoint and lay out events within a complex space in a linear format. Classrooms, however, are rarely that simple. Video images, combined with text, offer much richer possibilities for understanding classrooms (Baker, 2000; Hughes et al., 2000; Catalyst Web, 2004; Ferdig et al., 2000).

Videotape is capable of capturing a classroom's complexity but cannot be quickly rewound and re-viewed—a critical requirement in preservice classes. While videotape is able to play a scene from start to finish, it has significant shortcomings if a student asks for a particular part to be replayed so that a question or clarification can be addressed. Yet deeper analysis takes place when a segment of a classroom interaction is viewed more than once and analyzed from a variety of perspectives. At present, only random-access delivery systems (i.e., CD-ROM, DVD and digital video over the Internet) allow such functions. And these are important functions if we desire to address the calls for reforms as capsulated on Borko & Putnam's (1996) list, shown earlier.

Random-access video as part of case design allows one to revisit a scene to analyze what is occurring from multiple perspectives, and viewing a classroom from multiple perspectives is important in gaining knowledge about classroom complexity. Random access also allows a preservice instructor to break a class into groups with multiple assignments—perhaps various groups or individuals focusing on a particular student, on the teacher, on the instructional materials and procedures being used, and so on, and to revisit a single piece of video to look at each of these items as they arise in class discussions. By looking repeatedly at a video segment from different perspectives and for different purposes, one is left with a deeper understanding of the interaction of factors that are involved in the respective instructional situation.

In the case of the CTELL project, this means that the case content is taken from authentic classrooms with enough data provided in the case so that learners can analyze and compare classroom cases to enhance their understanding of instructional decisions and to foster the ability to suggest alternatives. In addition to video of classroom instruction, these data include any of (???) a combination of children's test scores, their parents' wishes, the teachers' experience, and so on. In case-based instruction, analysis and reflection are critical, and cases provide learners with opportunities to revisit the data and decisions in the case, along with the chance to consider alternative solutions. Revisiting case content provides a more sustained and recursive learning environment; reflection occurs in groups and individually as part of case analysis.

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Traditional, transmission methods operate from a different set of assumptions, which make it difficult to meet the goals set out in Borko and Putnam's (1996) list. Most transmission methods present procedural steps and their appropriate uses to learners in a direct rather than a constructivist mode. Thus, students typically absorb facts about teaching methods and procedures. Even when instruction provides information about the use of instructional methods and procedures in classrooms in a general sense, this does not facilitate a deep understanding of the arena(s) where these methods might be implemented and under what conditions. This teaching model usually provides a "one-shot" exposure to the content within a course; revisiting content occurs largely when learners re-read their notes or assignments, usually in preparation for an examination. Further, reflection in transmission models is usually done outside the instructional situation and is linked to lecture content rather than to a decision-making process.

This is not to say that transmission models are inappropriate in all situations—after all, at times the most effective way to provide knowledge is to tell someone a fact. However, we argue that when instructional methods are intended to be used in a decision-making sense, and when knowledge is to be transferred into complex classroom contexts, then analysis, reflection, decision-making, and opportunities to learn recursively are critical. These (?)elements ??? are precisely what case-based methods require and are one reason why cases are popular in law, business, and medical education where linking facts and procedures to decision making are valued. Thus, CTELL uses case-based instruction with a significant video component, accessed through random-access technology, as one aspect in its effort to enhance preservice literacy education. The other aspect in which video plays a central role is as an instructional anchor, described in the next section.

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Anchored Instruction as a Factor in CTELL Cases

Anchored instruction (CTGV, 1997) and situated cognition (Brown, Collins, & Duguid, 1989; Feiman-Nemser & Remillard, 1996) provide a context where all participants in the learning environment (teacher and students) experience a situation that becomes the springboard for future learning. Anchored instruction has been used successfully in elementary-grade mathematics and literacy classrooms (e.g. Cognition and Technology Group at Vanderbilt, 1997). In CTELL, the use of anchored instruction follows the outline provided by colleagues at Vanderbilt University:

> We emphasize the importance of anchored instruction because, in many educational settings . . . students often have not had the opportunity to experience the types of problems that are rendered solvable by the knowledge we teach them. They treat the knowledge as an end rather than as a means to important ends. . . . The common denominator in all these cases is that new information is treated as facts to be learned rather than as knowledge to be used.
>
> A major goal of anchored instruction is to help students experience the kinds of problems that experts in an area encounter and to understand how core concepts in a discipline help clarify these problems. We want them to transform knowledge from mere facts into useful tools. We also want to provide a common context that can be explored by students, teachers, parents, and others so that they have a common ground for communication. (CTGV, 1997, p. 25)

As discussed elsewhere (Kinzer & Risko, 1998), anchored instruction serves to mitigate three major issues confronted by all teachers, including instructors in preservice literacy classes: (1) teachers face students with a wide range of backgrounds; (2) there is often little shared knowledge among teacher and students, and (3) knowledge often remains inert; it is not accessed and used in appropriate situations.

The importance of mitigating these issues in preservice education is easily seen when one asks students to "think back to when you were taught to read." Some students report to us that they were taught in classrooms with desks in rows; others had flexible arrangements. Some were taught through a decoding emphasis, and others through more holistic programs. Some recall much drill and practice; others recall extensive use of children's literature. Differences in what each student brings to the task impacts shared knowledge among students in a class and between students and preservice instructor. Teachers and students must be able to link given knowledge to new knowledge, and course instructors must be able to refer to knowledge that students bring to the class and to draw examples from this knowledge. However, when there is discrepancy across the prior knowledge within class members, this end is difficult to achieve. Anchored instruction addresses issues of background knowledge and shared knowledge by providing a contextualized task experienced by teacher and learners, which then becomes the background and shared knowledge from which instructional examples can be drawn and used as a common reference point during instruction. CTELL uses the notion of anchored instruction in its design of cases and in the recommended instructional procedures used in case-based instruction. Not only is a CTELL case in itself a shared experience, but each individual case includes in its design a "video anchor segment." This approximately 20-minute video anchor is intended to be viewed initially in its entirety by each learner, before other parts of the case can be accessed. Anchored instruction, as instantiated in an online learning environment, weaves together authentic classroom content with interactive navigational and communicative tools that amplify and enhance constructivist and socio-constructivist learning opportunities.

Using Technology Through the Design of the CTELL Cases

Designing instructional materials is a complex, multifaceted process, particularly in relation to the integration of technology. Design must consider questions such as, "What is curriculum and instruction?" "How should a learner progress through the material?" and "What support for reflection and communication can be provided?" In addition, instructional materials using technology must also consider what medium, or combination, to use to support material access and exploration. What media are aligned with the best way to achieve curricular goals? Certain media, including paper-based and electronic cases, afford different things. Paper-based cases are often more linear and do not offer as many opportunities for multiple perspectives (Baker, 2000). Other questions to consider are the following: How should students (and teachers) access and use the materials? What interface issues must be considered in the development of multimedia, Internet-based cases? Different modes of access and interface layout afford different things; how information is presented affects how the case is defined and viewed (Baker, 2000).

All of these areas were considered by our project team before shooting video to incorporate into the cases and then constructing our case interface and overall structure. Overlaid on the previously-noted questions were questions such as, "What video should we shoot?" and "How should we edit the video to make it consistent with case-based and anchored instructional pedagogy?" as well as "How should the interface present the components of a case?" "What information is most important to present right away?" and "What can be embedded further into the cases?"

In deciding on what video to shoot, an important preliminary decision was to capture footage that would allow us to design instructional cases that incorporate principles of effective reading instruction. Thus, we examined previous reviews of the literature, including national reports (e.g., Snow, Burns & Griffin, 1998; NRP, 2000), other subsequent literature not addressed in these reports, and position statements from professional organizations with regard to effective reading/

literacy instruction (e.g., IRA/NAEYC Position Statement on Early Literacy). Our review of the literature yielded 12 principles that we believe are supported by the literature as underlying effective reading instruction. The 12 principles formed the basis of the overarching curriculum covered by the CTELL cases and were used as written guidelines for filming, collecting artifacts from classrooms, and editing the classroom video that was incorporated into the finished case (see also, Teale, Kinzer, Labbo, & Leu, in press).

The expanded version of the principles that ground the video and the overarching content for each case appear in Appendix A and are summarized here: (1) teacher knowledge, insight, and orchestration skills; (2) building on home backgrounds; (3) development of foundational literacy knowledge, skills, and interests; (4) phonemic awareness instruction; (5) decoding instruction; (6) comprehension instruction; (7) independent reading; (8) developing reading fluency; (9) integrating reading and writing; (10) integrating computer and Internet technology into early literacy instruction; (11) early assessment and instructional intervention; and (12) enthusiasm for and engagement in reading. Additionally, because the research base for effective computer and Internet technology integration was sparse at the onset of the study (Kamil, Kim, & Intrator, 2000), we surveyed and interviewed 150 K–3rd grade teachers who were nominated for participation because of their exemplary use of computers in the classroom. Content analysis resulted in the identification of 11 facets of effective computer and Internet technology integration (principle 10; Teale, 2002) that were instrumental in selecting classroom cases where teachers were integrating computer technologies in exemplary ways.

It is important to note that the 12 principles are not presented as separate items or headings within a case or anchor video, but are shown as operating together in a classroom where reading instruction occurs. One benefit of CTELL cases is that they provide materials in which students see that these principles operate in a classroom over time—not all are present at any given lesson, activity, or teacher-student interaction, but rather are part of an effective instructional program. Our cases show instruction across the space of 4 days to 3 weeks, and students learn how the principles of effective practice are incorporated into effective literacy instruction over time. The ability to view instruction over time, even if edited, is a clear benefit of video over print-based case instruction.

Our next decision was to determine the boundaries of our cases. A case can be built around a single child, a single teacher, a single lesson, a single management issue, and so on. In order to teach the complexities of classroom reading instruction, we decided to focus our cases on classrooms. Thus, the cases consist of a variety of items that teachers need to consider in classroom reading instruction. They include, as much as possible, elements within a classroom (e.g., children, materials, etc.) as well as elements that impact classroom instruction but are not physically found in the classroom (e.g., parents' desires and beliefs about school and literacy, school philosophy and demographics, etc.). Some of these items are physical artifacts that have been digitized through scanning and then placed into the case (e.g., children's work, teachers' lesson plans, summaries of children's test scores, diagrams of classroom layout, and so on), while other components of the case are represented through video (e.g., interviews with parents, teachers, school administrators, experts in the field, and children, as well as video of several specific lessons). Thus, our cases incorporate video and non-video items, something that recent advances in the ability to present a wide variety of media through the Internet allows. Figure 14.1 depicts both the structure of our cases and details their specific content.

As seen in Figure 14.1, our cases are comprised of an interface and the case content. The interface includes tool functions that facilitate reflection, provide for constructivist exploration of the case environment, and allow for socio-constructivist communication with others. The interface also includes administrative functions so that a course instructor can leave messages and

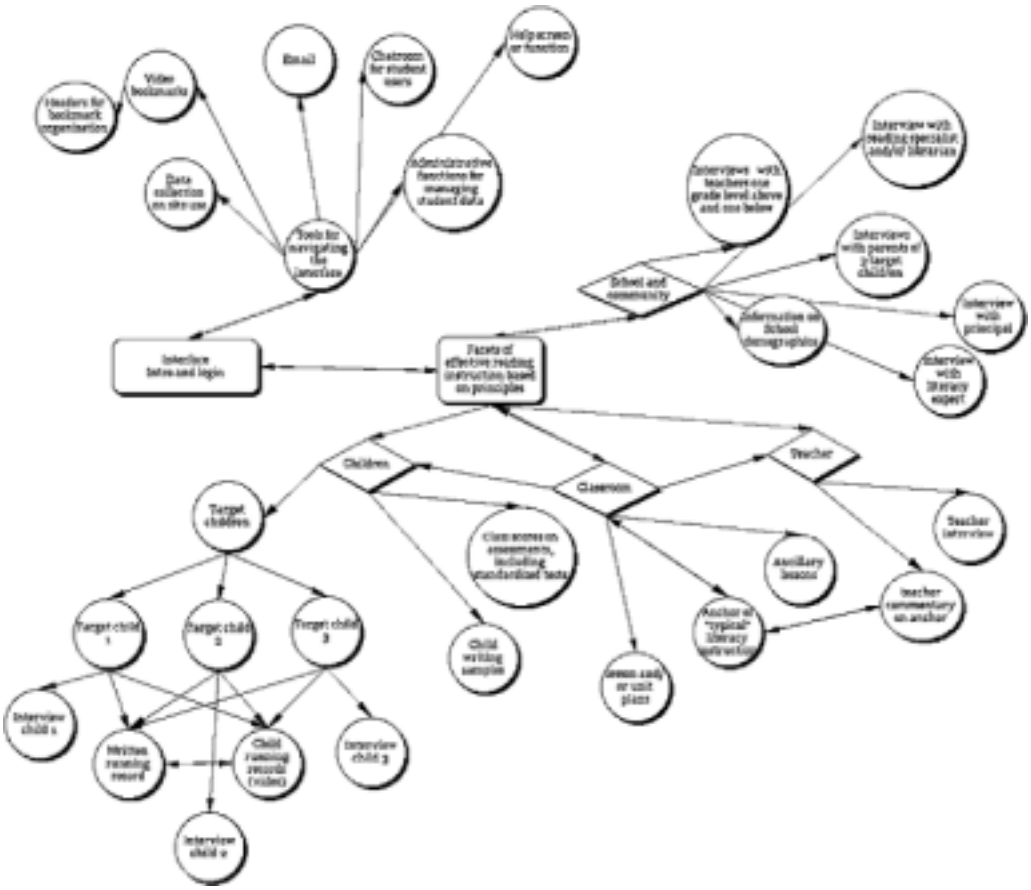

FIGURE 14.1. Design and content of CTELL cases.

assignments for students, define areas that students should look at, and so on. The tools include e-mail and chat room capabilities, help functions, and bookmark functions used to define segments of the video within a case that can be easily revisited and sent to others via e-mail. In a very real sense, the interface allows users to segment the video, revisit scenes within larger video segments, e-mail portions of video to peers for class discussion purposes, and create video portfolios for refection and assessment purposes. These interactive capabilities are what make the video powerful. Without an interface that organizes the case components and allows for repeated interactive access, video could only be viewed in linear form.

The content aspects of CTELL cases relate to facets of classroom instruction and decision making, and include school/community information (school demographics, interviews with teachers in the target school, parents, the school administrator, and literacy experts in the field), classroom-instructional aspects (the anchor segment, lesson plans, ancillary teaching segments, and teacher commentary), and student aspects of the case (three target children who are highlighted in each case, running records on these children, standardized test scores for all children in the class, and children's interviews and writing samples). In all, cases contain approximately 55 minutes of video and much additional material—from test scores to students' work, to teacher commentary. Exploring the rich content of the cases through an anchored instruction procedure

and using support tools like the bookmarking and portfolio functions provided through the interface allow students to understand the context in which instructional decisions are made and in which instructional procedures are implemented.

It is important to note that case-based instruction and the video components of cases are not used as examples (Kinzer & Risko, 1998). Cases, especially video-based, are immediate and powerful and there is a danger that preservice teachers will adopt a "do what is shown" mindset. To mitigate this and to facilitate problem solving and decision making, we decided to provide multiple cases in each of the grades—K, 1, 2, and 3. Preservice teachers are required to explore more than one case at a given grade level. This makes clear that underlying principles of effective practice can be realized in multiple ways, that teachers modify instructional procedures and practices differently, and that no two teachers use instructional procedures in exactly the same way. Thus, preservice teachers come to realize that memorizing or mimicking what is shown on a video is not the goal. Rather, they must determine how and why instructional practices are working across classroom cases to embody effective principles of reading instruction in various settings. This leads them away from using video and cases as examples to using them in a constructivist, knowledge-acquisition, and decision-making process. Examples imply that one should do what is seen; case-based instruction implies that one must come to an understanding, through the data available in the case, about teacher decisions and the reasons for and outcomes of those decisions.

We feel that current technology that permits the use of video within case-based, anchored instruction allows preservice course instructors to meet Borko's and Putnam's (1996) criteria in ways not before possible. The unique combination of new streaming video possibilities via the Internet, more readily accessible broadband connections that are replacing modem and dial-up access, higher-speed computers and CD-ROM players, and affordable, high-capacity data storage have converged to the point where the limitations of print-based, videotape-based, and even CD-ROM-based media no longer apply. Thus, as seen in Figure 14.1, the CTELL cases are able to build in tools that facilitate reflection and communication. Using the Internet as a delivery system, CTELL cases allow an instructor to house, on a university's computer server, all of the case materials pictured in Figure 14.1 for the 11 K–3 cases. Students can, from their dorm room, computer lab or other broadband-available area, connect to these cases and, after logging in with their password, manipulate the video in the cases, move through the cases, and capture segments of video for user-defined playback. They can participate in predefined or user-defined reflections, make reflective notes, go back to modify or print them, bookmark segments of video, and send that bookmark to another learner (or to the instructor or other expert) for comment and discussion. Participants can then comment on and discuss the video segment and reflect on what they are seeing and learning.

Figure 14.2 shows the main screen from the CTELL interface, which implements the design schematic just discussed. A sample anchor video and description of CTELL classroom implementation by an instructor can be seen at http://ctell.uconn.edu/.

CTELL Case Design as a Teaching Function. As part of our fidelity to an anchored instruction model, all cases begin with an anchor video segment that is central to the case. This 18–21- minute-long segment must be viewed before any other aspect of the case can be used. This anchor segment provides the common experience, and thus the shared knowledge, across the learners (and their course instructor) in a preservice class. Instruction of procedures, class discussion, and examples can be easily related to this common experience by the course instructor or the individual students in the course. Thus, when sharing a unique field experience or sharing their own primary-school reading experiences, preservice teachers can inform peers much

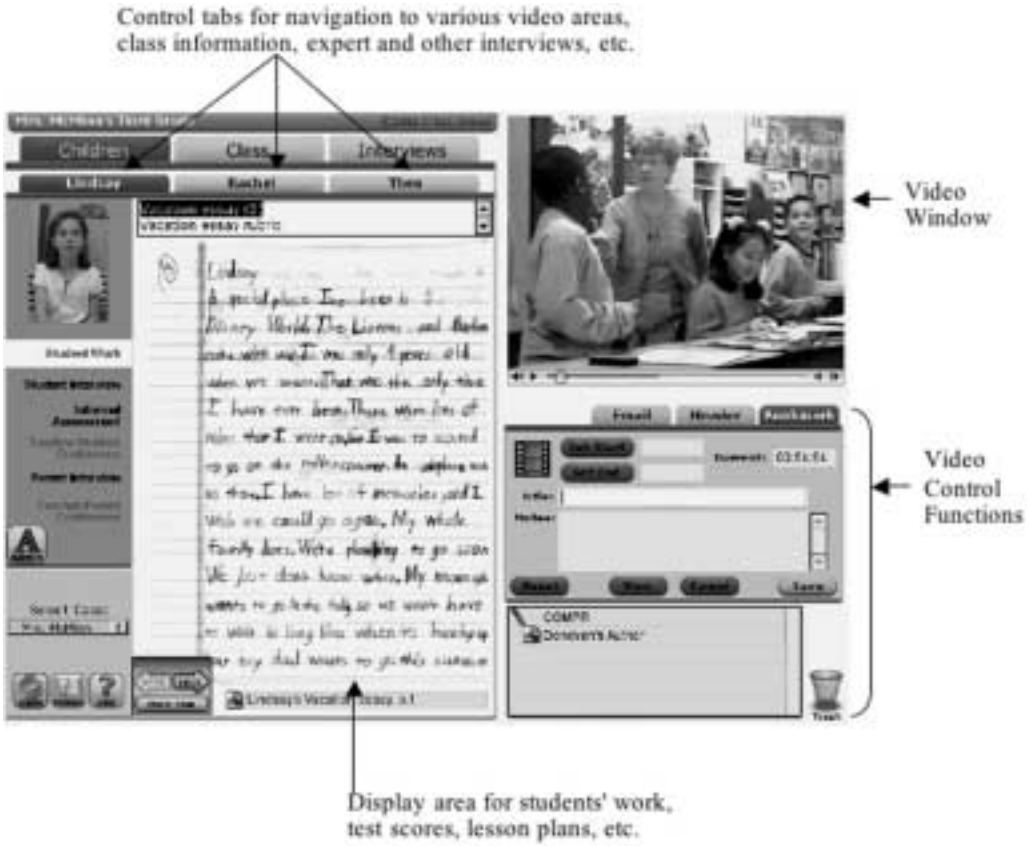

FIGURE 14.2. Sample screen from a CTELL multimedia case.

more easily, facilitating grounded discussion. Consider, as mentioned previously, the difference between trying to explain how one learned to read to someone who was not in a similar setting as a child. Without a shared experience, one is left to assume that inferences will be made that will be close to what is intended. Conversely, when shared knowledge is available through seeing an anchor, discussion can proceed along the lines of, "Remember when the case teacher had the small group discussion about the story they were reading? Well, in my situation things were the same up to the point where she . . . but then my second-grade classroom was different because . . . " Much richer, grounded, and more meaningful discussion with less miscommunication occurs when shared knowledge is provided through an anchor (Risko, 1995). Thus, CTELL cases require that the video anchor segment be the first contact with a case, so that all participants can reflect on, communicate about, and ultimately springboard beyond the cases in meaningful ways.

Of course, being able to do so implies that *all* participants in a class have seen the case's anchor segment. We therefore advocate that the first class session be devoted to viewing the video anchor segment as a group, with discussion following. Although the anchor can be viewed individually as homework, we have found that the group experience and subsequent discussion are better at building a classroom learning community around the cases and typically lead to more productive follow-up discussions.

The second phase of anchored instruction is that learners become expert enough in the anchor to discuss it, draw examples from it, and use it as a common reference in subsequent discussions throughout the course (or even the remainder of the preservice program). To reach this point requires multiple viewing and activities that involve students in thinking deeply about the structure and content related to literacy curriculum and classroom instruction represented in the anchor. One way to accomplish this deep reflection is what McLarty, Goodman, Risko, Kinzer, Vye, Rowe, and Carson (1990) have called "segmenting the case." The video anchor, by group consensus, is broken into logical sections, and labels for each segment are agreed upon. These labels become reference points to the anchor, allowing discussion to move in the "shorthand" that typically occurs within communicative groups. Segmenting allows learners to say things such as, "Remember the albatross vocabulary scene? Isn't that a counter-example to what we read about in our assigned article for today?" These common reference points, arising from shared knowledge, cannot come from only one viewing; they require focused work to gain expertise with the video anchor's content.

Once these two steps (group viewing of the anchor and analytic reflection activities such as segmenting) occur, the case is primed for exploration and can move in directions determined by the individual learner, by group consensus, or by the course instructor. If the instructor wishes to provide open-ended questions, such as "come to class prepared to discuss the make-up and needs of the three focal children in the case," then students can explore children's test scores, their writing samples, video interviews, and so on. Or, the instructor can ask a more focused question, such as "Why would the teacher have chosen to work with *that* particular group of three students?" and the preservice teacher could explore the case to explain and critique the teacher's grouping decisions. Another possibility is that in response to the question, "What are the procedural steps that Ms. Kosiba uses in the book discussion scene?" learners could relate what they see her doing in the video with the steps for book discussion outlined in their textbook or other course readings. Students might also, as a class or a small group, be asked to agree on where to start the overall case exploration once the video anchor has been viewed—do they want to begin with some information about parental support and expectations? With children's standardized test scores? With video interviews that provide information from the teacher or children in the class? With demographic information about the school? With other information that teachers use to make instructional decisions? Using projection capabilities, the preservice course instructor can use group consensus procedures to show the agreed-upon beginning point, and discussion and teaching can move on from there. Recall that random access allows movement to any part of the case, so starting points and links across case content can easily occur as students question or bring up additional issues during any discussion. Recall also that the case, delivered over the Internet, allows students to explore it as a homework assignment from their dorm rooms or using any computer with a high-speed Internet connection. Thus, due to the flexible nature of case content, navigational tool use, and communicative functions, an instructor's implementation of the cases may vary widely. A central part of the CTELL project is figuring out how instructors utilize the cases for preservice teacher education.

Lessons Learned from Initial Implementation

Four of the 11 multimedia-based cases that comprise CTELL were implemented by 20 instructors teaching preservice literacy education courses at universities in the states of Connecticut, Georgia, Tennessee, Illinois, Kentucky, and Texas, from July 15, 2002 through December 15, 2002. Instructors initially attended a two-day workshop that presented the cases, provided instructions for using the interface, shared theoretical bases for case-based instructional

approaches, and recommended instructional methods for using the cases in an anchored-instruction learning environment. Following the workshop and throughout the time that they used the cases, instructors voluntarily participated in listserv conversations where they posted and shared implementation issues and problems, asked questions, and shared strategies. This additional use of the technological capability of the listserv allowed instructors from varied geographical locations to communicate ideas, ask questions, and support one another. Although initially unforeseen, the positive qualities of the listserv were invaluable in learning to implement these multimedia cases.

During this implementation period, 230 unique messages were posted to this listserv. These messages were captured and inserted into the NUD*IST qualitative data analysis program, where each message was read and coded into categories related to the use of the multimedia cases. Standard qualitative analysis techniques were followed by coding each line according to emerging categories upon initial reading that were then refined on a subsequent pass. Analysis of the coded categories resulted in patterns of messages that are informative with regard to CTELL implementation in these classrooms, and serve to provide information that we believe other users of Internet-based multimedia cases will find valuable, as well as other users of technology more generally. Each of these patterns is discussed below in terms of lessons that we learned as a result of the listserv message analysis.

Lesson 1: The cases, especially the video within the cases, provided "value added" to the courses in which they were used. It was clear that instructors felt that the cases provided their students with beneficial, contextualized experiences that were unavailable to them in the past. Instructors frequently mentioned how students related the video in the cases to field experiences, and how this sharpened and made resulting class discussions more meaningful. Instructors also noted that random access capabilities for exploring multiple cases provided unique occasions for preservice teachers to connections between theory and practice. The following quotations, taken from the listserv dataset, are indicative of this pattern in the data:

- "I felt the video gave me [and my students] true insight of how a class is actually conducted. . . . I liked how the video showed us how Mrs. Gordon conducted her classroom routine, and how others can make an example from her teaching. . . . I felt that I was observing the classroom directly. With a click of the button we can meet parents and students and listen to their conversation. These videos are going to be a great way to observe different classrooms and get insight on some efficient ways on helping students learn." (LD, 9/16/02)
- "I have been delighted with the way the CTELL cases have worked with my classes. . . . The second time we used the cases was after lots of reading theory work. I had just done a simulation on voice-to-print matching. . . . We actually deconstructed the video and it was fabulous. . . . it deepened their understanding of exactly what the teacher does to reinforce the speech-to-print match concretely in the classroom. . . . All of this was related to theory. My students really got it! . . . Students concretely understood what went on and why it went on. Theory and practice understanding is leading their development. . . . CTELL cases allow my students to understand the theory to practice relationships in such concrete ways. I think because of this understanding, they will readily enact these literacy events in their own classrooms with a better understanding of not only how to do it but more importantly why they are designing a literacy learning event in such a way." (CA, 10/10/02)
- "The students in my reading classes typically create a literacy continuum to examine the development of readers preK–Grade 5.… This past week they worked in groups and exam-

> ined the cases for examples and evidence to add to their continuum—I was really encouraged by the number of instructional strategies and student behaviors they identified and used on their continuums. This is proving to be a very interesting way to connect our course content to the cases. I am finding that the more they revisit the cases from different angles, the more they are seeing—I anticipated this happening, but it is still exciting to see as a teacher." (WM, 11/3/02)

All instructors had positive things to say about the value of the cases for their students' learning. This is most important to keep in mind while considering the lessons learned about points of frustration when dealing with cases delivered over the Internet, as described below.

Lesson 2: When learning to use new technologies, frustrations can result—but frustrations can be dealt with successfully and the integration of new technology can proceed, if certain conditions exist. Listserv dataset indicated that instructors experienced frustration stemming from issues relating to technical support and/or factors related to using the technology or interface. The largest pattern of responses dealing with instructor frustration spoke to the need for technical support and university infrastructure that facilitates faculty if they wish to work with the new technologies required for the integration of web-based delivery of video. Most video that is delivered over the Internet requires the use of a broadband connection for each computer. Modems are simply too slow to allow adequately-sized video to be sent and received over the Internet. Computers also must have enough memory to buffer the video stream that is being downloaded, as well as the current web browsers and application software that are required to play the video as it comes in (for CTELL cases, this means that QuickTime and Shockwave must be loaded on users' computers).

To address anticipated computer configuration and software requirements, before classes began, instructors contacted their respective computer lab managers and technical support staff with specifications of their needs. Instructors provided lead time to lab managers and other technical support personnel to ensure, for example, that computers would have the appropriate web browsers and that QuickTime and Shockwave would be loaded on classroom presentation and laboratory computers. Several instructors also requested items such as headphones for each computer in a laboratory setting (e.g., "We are getting headphones for our lab since when students play the CTELL cases there a cacophony of sound erupts." (LD, 8/30/02)). Without headphones, a class of students who watch different parts of a case have difficulty hearing the audio accompanying the scene that they are watching. However, instructors who request that computers be appropriately configured or that resources such as headphones be ready for use when they enter a classroom to teach become quickly frustrated when this is not the case, as shown in the representative comments below:

- "... [there are] problems with our lab that we are working on. Finally got ten computers in the lab working ... WHAT A HEADACHE!" (RJ, 9/26/02)
- "... We have had a problem with not having enough computers and not having splitters on the headphones. Our tech. staff tells me that they can't or won't put splitters on them. Is it that difficult?" (CB, 10/9/02)

Technical support is required periodically as instructors encounter difficulties with computers or server issues in their classrooms, as well as issues related to the ability to project the video and audio from an instructors' station. A clear pattern of messages in our dataset indicated instructors' frustration with what they viewed as non-responsiveness on the part of technical sup-

port staff. Although the level of responsiveness may well be an issue of misunderstanding or miscommunication, the frustration exhibited is real. It may stem from levels of user sophistication (that is, technical staff who are well versed in computers might think a problem is trivial, while an instructor may think a problem is overwhelming), but when instructors think that their students are being disadvantaged because equipment does not work or problems are not addressed, they become vocal about these issues very quickly. The message that follows is indicative of a substantial number of messages in our database that showed frustration with what was viewed as non-responsiveness by support staff:

- "I have typically had to deal with [technical and lab issues] by myself since the technology is dropped off & there's no one around to troubleshoot immediately when the need arises. This has been the case for the past six weeks or more. I have tried accessing the videos from a computer lab that was (theoretically) configured with Shockwave and QuickTime and I have tried accessing the videos from my classroom. Both efforts proved to be fruitless and draining of my energy since I have tried to troubleshoot the technical problems personally. The typical response from tech support is that it's working from their work station . . . implying that the problem is with me or the computer I am using. I think tech support works on the principle that if the faculty member goes away, so does the problem! When asked about the problems with the server, the ready response is that it's fixed as of 'this morning.' Temporary bandages fall off and the problem still exists. I have stopped nagging but the problem is still there. . . . The class as a whole has not used them [the video cases] since we can't access them. I can show you every class agenda where the videos were part of the structure of the class and document each time that I was unable to access the videos! I have tried to use the same set of clips for THREE weeks without success. I have attached the class agendas to show the dates that we planned to use the videos but were unable to do so because of the technical problems. . . . The [university] technical staff are being sent this message & I'd ask that they be contacted directly since I am spent!" (RC, 11/3/02)

In addition to technical support, instructors also discussed university policies that they felt hindered their implementation of the multimedia cases into their teaching. For example, use of web-delivered video requires that instructors preview the video and bookmark segments for later class use or to choose appropriate readings and other experiences to parallel what is shown. Often, this preparation requires reviewing the cases at home prior to class. Some instructors felt that universities should provide some support for this professional activity, as shown in the following representative message, which discusses the need for support of off-campus activities as well as on-campus technical support:

- ". . . I was not able to convince my college to provide me with a portable computer that would allow me to work at home, so I finally had to bite the bullet and buy a new one myself. . . . [when classes started] I had no computer to use at home, the projector that I had in our 'smart room' didn't work, and I was so frustrated that I could hardly deal with it anymore. . . ." (GJ, 9/29/02)

Finally, unanticipated needs for ongoing support surfaced, even when computers were working properly and the case materials were being appropriately used. One instructor noted unforeseen problems that resulted because, throughout any given day, multiple users populated a computer laboratory. As seen in the following quotation, this multiple-user environment resulted in

unexpected changes to computer configurations. The message also points out that unexpected delays in ordering needed supplies or equipment cause difficulties:

- ". . . problems have occurred in the changes students from other classes have made to computers [in the lab] before my students come in to work!!! For example, computers that were checked and readied earlier in the day, have had the audio cables pulled out or muted, confusing my students and taking time for the techie guys to figure out. . . . The computer lab does not yet have headphones or junction boxes for all the students, so it is noisy and distracting as they all work at the same time. (Some students like noise as they work. . . . others do not. . . .). The headphones have been ordered, as have the junction boxes, but they have not arrived yet . . . maybe soon!!!!!! In short, it's all working, but it isn't always calm or exactly smooth. . . ." (FF, 10/6/02)

The need for computers in instructors' classrooms to be properly configured is something that technical support staff and university administrators must confront directly and with sensitivity. Instructors who are making a shift from modes of teaching that have felt comfortable and successful for years are likely to give up on moving to video and technology integration if this process becomes unwieldy or too difficult. Yet, even when technical support is helpful and when all equipment issues are moot, frustration can result due to users' unfamiliarity with required computer software or the technology used to implement web-delivered multimedia. For example, instructors at times planned activities and then were unable to complete tasks (such as assigning student passwords) because of unfamiliarity with the software interface, an application program or how to project the multimedia for students' viewing. These "user errors" were also a clear pattern in our dataset, as reflected in comments such as,

- "I feel incredibly stupid; I just realized I had left out one of the underscores [when trying to assign passwords] . . . yes, I had spent an entire week making the same error over and over again! I'm sorry!! I just managed to get online!!" (GJ, 9/29/02)

Additional comments in this category showed that instructors made errors in accessing the software or in requesting technical support with enough lead time for classroom implementation to occur.

Although this category of messages could be designated as representing user errors, such difficulties are real and might cause less motivated instructors to give up as they transition to integrating web-based multimedia in their courses. None of the CTELL instructors did so, but we feel that has much to do with support structures that were provided through the CTELL listserv and by CTELL project staff, in addition to support that was available to instructors through instructors' respective universities.

Lesson 3: The multimedia cases provided a motivational aspect for instructors, even when frustrations surfaced. There seemed to be a motivational aspect to using the multimedia cases, resulting in instructors' persevering in the face of the frustrations noted above. There were frequent messages on the listserv indicating that, once technical problems were solved, things righted themselves quickly. For example, GJ's message of frustration with having to purchase a new laptop for home use and being "so frustrated I could hardly deal with it" in terms of not having a working projector in her classroom continued with the following comment:

- ". . . now that I have a working computer at home, I think things will be better. Two weeks ago they finally replaced the projector in the smart room so that we can now at least see

> the image on the screen when I use the cases. Until this time, the video would flip like an old filmstrip; it was like watching under strobe lights. Well, anyway, today I spent the morning setting my first bookmarks (hurray!) and I'm very excited again. . . ." (GJ, 10/20/02)

In looking at this category of responses, it seems that student feedback and the enhanced results seen in class discussions and contextualized teaching can quickly dissipate frustration, once problems are solved. Thus, it is important that technical support personnel continue to problem solve, continue to keep in close contact with instructors as solutions are determined and implemented, and continue to respond to issues as quickly as possible throughout a semester. Instructors who feel that problems are being addressed rather than ignored seem to persevere in using these new technologies in their courses. And, once problems are solved, instructors quickly go on to teaching and to implementing effective instruction.

Lesson 4: A listserv or other method of sharing problems, solutions, and ideas fosters a sense of community, decreases isolation, and mitigates "giving up" on integrating multimedia cases into existing courses. Critically important to the implementation of the multimedia cases was the provision of a listserv for instructors. This listserv became an area where participants could share their ideas, their victories, their frustrations and their solutions to problems. As we analyzed the listserv postings, it became clear that a sense of community developed among the instructors. They used the listserv to post problems and ask for solutions, but they also posted messages about co-authoring papers or presenting their use of the multimedia cases at conferences. The listserv decreased the sense of isolation for instructors, who realized that difficulties they might be experiencing with this new mode of instruction were common within the community, and that solutions and benefits were available to them. For example, after one instructor posted that her technical support staff had solved a problem with the laboratory computers, the following message appeared:

- "Is there any way you or one of the techs can tell us . . . how it was solved? It will add to our collective experience and may help others. Glad it worked for you" (HM, 9/29/02).

Similar exchanges occurred for specific requests for information, as in the following quotations:

- "I was able to access all the parts of cases 3, 5, and 7, but I still cannot get to the administrative portion of case 1 . . . Obviously, my computer has the capabilities to handle the cases because the others work. What do you recommend that I do?" (FF, 9/3/02)
- "My students and I are having trouble viewing bookmarks. We are clicking on the bookmark we want to view and then clicking on 'view.' Am I forgetting something?" (CB, 9/12/02)
- [Response to CB's question, above:] ". . . you can either check with your technical person or see the section in the 'CTELL Case Interface Manual' under 'Information on upgrading your browser's plugins.' If you need more information, you can call me or e-mail me." (CC, 9/21/02)
- "This is very helpful information, V. I am guessing, since the cases stopped playing after a few seconds, that your connection speeds at home are too slow for the online cases. Do you have broadband (high-speed Internet)? If so, what is the rate of your connection? . . . One strategy you could try is to use an identical machine at your university (with the appropriate shockwave and Quicktime plugins) to see if the Internet connection speed is the problem. . . ." (LD, 9/25/02)

- "I am having the exact same problem as V. I am trying to access the cases from a high-speed Internet connection using Explorer 5 with Macs. All of our machines have the newest Shockwave. I am caught in this same loop. I download the newest Shockwave and it puts me in the same loop and I get the exact same message as V. I have the same problem with all of the cases. [would like suggestions] Thanks." (CA, 9/27/02)

The requests for problem solutions and the willingness of participants to share strategies resulted in a sense of community and seemed to keep instructors going, mitigating a desire to "give up" when things did not go well. The sharing of information, however, went beyond the sharing of problems to professional discussions of teaching strategies. Thus, the professional conversation through the listserv supported instructors in integrating computer technologies into reading methods courses in ways that were supportive of existing instructional strategies, transactive with established instructional strategies, or entirely transformative.

Borko & Putnam (1996) explain that when curricular techniques are new, instructors initially use the innovation in ways that support their existing knowledge, beliefs, and practices. Transactions with established instructional practices occur as instructors begin to envision new purposes for the technology. In other words, subtle changes to established instructional strategies occur as instructors go through the process of interacting with the new technologies. Thus, as some instructors began to interact with the CTELL interface, their use of various case content, navigational tools, and support from the professional listserv began to subtly shift the nature of classroom discussion and student assignments. Transformation occurs when technology is a positive stimulus for organizational and pedagogical changes in conventional instruction (Labbo & Reinking, 1999). The sharing of ideas, the sense of camaraderie, and the sense of community that developed over the listserv is clearly seen in the following representative quotations:

- "Could you tell me more how you set up the class? Did you give them discussion prompts before you had them work with the various parts of the cases or did you simply say view these segments and talk about them in terms of comprehension? Did you talk about what to look for in terms of comprehension before splitting them up into teams? I am interested in doing something like this. The three short lesson segments you referred to—are these segments from the anchor someone else? I would appreciate any input you can give me on how to set up the class for this activity. Thank you." (CB, 11/5/02)
- [Response to CB's question, above:] "CB, I will e-mail my instruction sheet from my computer at home. We had been talking about comprehension and who sets the curriculum for the last two weeks. They had already read the textbook chapter on comprehension. I think that much more can be absorbed from the anchors and other parts AFTER there has been discussion and reading. If nothing else, they are able to name behaviors that they see. . . ." (BB, 11/7/02)
- "My plan for Friday is just to allow exploration with the McCollum case individually. They have just gone out to begin their field experience with Writers' Workshop. I am anxious to see if they will begin to view the cases in a different light. Let you know." (CB, 11/19/02)
- "I just had to share what many of the students are doing with the videos. They meet after class and use the projection device and instructor's computer to watch the CTELL videos. It looks like they are watching a movie—lunch, snacks, sodas, 'happy faces'. . . . I observed a lot of interaction; e.g., instructional conversations, evaluations of strategies viewed, comparisons of case studies (textbook, CTELL, and the teacher candidate authentic case study), and much more. It's a good CTELL day!" (MS, 10/29/02)

(ED: check sentence : anchor someone else?)

The sense of community and the sharing of ideas through the provision of the listserv cannot be overemphasized in its importance in keeping instructors involved in case use. The listserv allowed instructors to deal with the frustrations that occurred because of technical support issues, because of instructors' lack of computer knowledge, or because of difficulties with the interface. Without the listserv, we feel that frustrations could well have caused instructors to give up on case/video implementation. However, being able to see that others had similar issues and were able to deal with them, and having the ability to ask a question or ask for help and quickly receive one or more responses appeared to make problems seem manageable, facilitating instructors' willingness to continue integrating the multimedia cases into their courses even when difficulties arose. In addition, the level of professional discussion about multimedia use in classes also contributed to a sense of working in an important professional area. Instructors grew and learned from each other as they implemented the video and other case material into their classes using an anchored-instruction, cases-based approach.

The ideas for teaching that came out of using the multimedia cases, together with access to the listserv, resulted in ever-expanding notions of how the cases might be effectively used. The following exchange is indicative of communication within the group that showed a pattern of an idea being shared, then taken up and extended by another participant who shared the extension possibility with the community on the listserv:

- ". . . when students do have access to the videos, the results are quite exciting. You're invited to visit one student's electronic portfolio at [address removed for confidentiality purposes] to examine how she addresses the videos in her reflections." (RC, 11/4/02)
- [Response to RC:] "I LOVE your student's electronic portfolio. It is a wonderful archive of their thinking! I am excited about trying a similar format perhaps in place of a discussion board. They could add revisions of their thinking across our course sequence." (KC, 11/4/02)

SUMMARY AND CONCLUSION

The goal of this chapter was to provide those who are interested in designing and using technology in preservice literacy education with information on creating the kind of preservice education that Borko and Putnam (1996) and others advocate. This was done from the perspective of the CTELL project, a large-scale effort that has created 11 multimedia cases, delivered over the Internet, and is examining the implementation of those cases in 20 universities across six states, as well as using other supplemental technologies such as listservs as support.

To summarize, designing any technology for instructional purposes requires a clearly articulated theoretical framework with regard to pedagogy and content, as well as the technological knowledge and capabilities. As implemented in the multimedia cases described previously, specifying a framework guides filming and editing decisions as well as decisions around the development of an interface, making it more likely that the finished product will encompass desired content and facilitate desired pedagogy. Without a clearly articulated framework and "shooting list" of instructional content and principles for later instructional use, video becomes simply a serendipitously-filmed event. Without that same framework, the interface is nothing more than a holding tank where all the information of a case can be found. This theoretical frame shaped every decision related to the development and implementation of these cases in preservice literacy classrooms.

With regard to implementation, we noted that issues related to technical support and university infrastructure are necessary factors in helping instructors use multimedia technologies,

delivered over the Internet, in their courses. In addition, providing a sense of community through a listserv mitigates feelings of isolation, helps solve problems, and provides instructors with a way to share ideas and implementation strategies.

Finally, the teaching implementation ideas and comments posted by the instructors using CTELL multimedia cases show that using video within a case-based approach can help meet many of the criteria noted by Borko and Putnam (1996), and discussed in the introduction to this chapter. Using the cases as a foundation, instructors were able to address preservice teachers' existing knowledge as related to a video anchor that was available to all class participants. The video and cases, through the random access ability provided as a function of the web-based delivery system, allowed revisiting video and thus enabled sustained opportunities for learning. Using an anchored-instruction, case-based approach facilitated instructors' ability to provide opportunities for thinking, critical analysis, reflection, and comparison of one's views to more expert "others." The multimedia cases of classroom practice allowed instructors to refer to instruction in a contextualized, grounded manner and the availability of a portfolio function and presentation capability allowed students to share their knowledge with their peers.

Of course, other valuable efforts also are underway to merge new technologies with case-based instruction and to use multimedia in preservice education. For example, Reading Classroom Explorer (Hughes, Packard, & Pearson, 2000; http://www.eliteracy.org/rce/; accessed 2/3/03), [This might be a place to reference the chapter in this volume] provides students the opportunity to explore classroom environments, reflect on the teaching of others, and provides "real world portraits of literacy teaching and learning." Baker (2000) has created multimedia cases and portfolios for preservice teachers, and an increasing amount of instructional video for preservice and in-service teachers is becoming available on the Internet (see, for example, the California Learning Interchange, http://www.gse.uci.edu/cli/vcliteracyprekunit01.html, which includes video of parents, teachers, and small-group instruction along with commentary; accessed 2/3/03). These and other projects show the interest and direction that many are taking to meet the goals of preservice education through the use of multimedia—goals that have been historically difficult to accomplish in traditional instructional formats.

We believe that technologies such as multimedia representations of cases, Internet-based communication forms such as listservs and discussion boards, and others hold great potential for restructuring preservice literacy education in ways that are more consistent with learning theory and educational beliefs about effective ways to teach and learn. To return once more to the points outlined by Borko and Putnam (1996), these kinds of technologies create opportunities for students to interact around shared experiences such as multimedia cases through random-access video and classroom artifacts. These interactions can be facilitated through face-to-face classes or through other means of communication such as classroom discussion boards, e-mail lists, or even instant chat programs that provide students with additional, supported opportunities to analyze classroom practices and deepen their own understanding while addressing their existing knowledge and beliefs. Many of these technologies, like the CTELL case interface, can be used to teach preservice teachers in a manner that is consistent with the ways these teachers will teach their students; rather than presenting preservice literacy educators with a scripted curriculum, technological resources can be implemented in a constructivist manner similar to the methods taught within the course. This symbiosis between content and pedagogy then can extend beyond the classroom through these communication technologies available online. Through the implementation and use of technologies in preservice literacy classrooms, preservice education is moving ever closer to the ideal—a better way of educating literacy teachers and, by extension, their students.

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(ED: Make sure you have permission to use all of the following as appendices.)

APPENDIX A
Foundational Principles of Effective Reading Instruction Embedded in CTELL Cases (Teale, et al., 2002).

1. Teacher knowledge, insight, and orchestration of instruction
   The teacher's knowledge, ability to make principled, insightful, instructional decisions for individual children, and the ability to orchestrate effective instruction for the group of children being taught are more influential factors in student literacy achievement than knowing particular procedures for instruction or following scripted lesson plans.
2. Language, culture, home background, and literacy instruction
   Providing school reading instruction that builds on young children's language, culture, and home background enhances their chances for success in learning to read and write.
3. Emergent literacy foundations
   Basic early literacy concepts, skills, and positive attitudes that form the foundation for subsequent reading and writing achievement are developed by immersing young children in literacy-rich classrooms.

(Ed: Delete? It's the same as the first part of the next sentence.)

4. Phonemic awareness instruction
   Instructional activities that develop children's phonemic awareness increase reading achievement.
   Instructional activities that develop children's phonemic awareness increase reading achievement, when individual children have not acquired this important knowledge.
5. Decoding Instruction
   Instruction in the sound-symbol correspondences of language (often called phonics instruction) is positively related to student achievement in reading.
6. Comprehension instruction
   Instructional activities that develop children's abilities and strategies for comprehending written language enhance reading achievement.
7. Independent reading
   The more young children read a variety of texts that interest them, the more likely they are to achieve well in reading.
8. Fluency instruction
   Fostering the development of reading fluency through appropriate instructional activities and extensive opportunities to read fluently is associated with higher reading achievement.
9. Integrating writing and reading
   Providing writing instruction linked to reading instruction enhances achievement in reading as well as in writing.
10. Technology and early literacy development
    Integrating computer and Internet technologies into literacy instruction in the early grades of school provides the foundation for continued learning of both conventional and digital literacies as children proceed through school.
11. Early assessment and instructional intervention
    Monitoring children's early literacy development through ongoing classroom assessment and providing instruction based on the diagnostic information obtained, including appropriate instructional intervention to children who fall significantly behind, enhances the chances that children will achieve satisfactorily in reading and writing.

12. Enthusiasm for reading and writing
    Teaching in ways that foster young children's enthusiasm for and engagement with reading and writing enhances the likelihood that they will learn to read and write successfully and become lifelong readers and writers.