

LEAP 2 Technology: A Video-Case Based Program for New Teachers

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Introduction

Teaching K-12 students how to write in a digital age means teaching them how to use technological tools in effective ways. Teaching English/language arts teachers, particularly those new to the profession (1-3 years), how to guide these learners requires more than the typical computer workshops that demonstrate how to use technological tools. Meaningful professional development offers opportunities for critical examination of practice and for thoughtful investigation of theoretical models. *Literacy Education: Application and Practice (LEAP) 2 Technology*, a video-case based program for professional development, is designed to guide new and novice teachers through the process of examining methods for teaching literacy in a digital age. The video-cases capture experienced elementary, middle, and high schools teachers who are using technology in skillful ways to teach students how to make sense of information and how to communicate their understanding in various forms of writing. The cases, which are 30

seconds to one minute in length, show teachers and students interacting in naturalistic settings; none of the interactions are staged or scripted. Approximately 25 cases are embedded in software that guides the user through a multi-layered examination of video. That is, these mini-cases can be viewed multiple times from various perspectives. In addition to the video and software, *LEAP 2* includes a collection of seminal books and journal articles regarding the teaching of language and literacy in a computer-enhanced classroom. The mini-cases, software, and accompanying materials establish a forum for rich discussion so that users can deeply examine classroom interactions and begin to situate themselves philosophically as they imagine themselves teaching writing, in its various forms, with technology. This paper will briefly describe the use of video-case methodology, the theoretical basis for *LEAP 2*, and the process of design and development as well as results of field-tests of the program.

Video-Case Methodology

Exploring the “real world” of the computer-enhanced classroom becomes particularly problematic for preservice and novice teachers who teach writing, language, and literacy and who are encouraged and sometimes mandated to adjust instruction in ways that reflect a standards-based curriculum. Despite changeable demands, their teaching might be inspired by the investigation of theoretical models and principles, which can inform practice. More often, however, practices are influenced by a perceived need for achieving high scores on standardized state tests. Juggling accountability demands, curriculum standards, varying and sometimes contradictory approaches to teaching writing, language, and literacy in particular, and an implicit urgency to integrate technology in instruction can entangle the preservice and novice teacher in a web of complexity. Studying text-based cases, a method that has been widely used in teacher education, can help to untangle the complexity. The method seems even more functional and promising when it becomes *video*-case methodology because video captures all the dialogue, actions, emotion, gestures, nuances, body language--the rich flavor of a classroom environment (Kinzer et al. 1992; Risko 1991). Close-up focus is often used to narrow the visual environment in order to more deeply examine an interaction involving a particular person or small group. Video-cases can function as anchors for reflection and

professional growth because they allow viewers to critically examine the layers of complexity in a classroom environment. The benefits of using video-case methodology in teacher preparation have been documented in a number of early studies that focused on various topics such as teaching reading (Kinzer et al. 1992; Risko 1991), classroom communication skills (Olson 1994), teaching science (George & Abell, 2002; Wallace, Loudon & Groves 2003), and teaching physical education (Tannehill et al. 1991).

Spiro (1990) advocated the use of video-case instructional support programs for teacher preparation. As with those used for the preparation of professionals in other complex domains, Spiro noted, teachers can benefit from peering through an imaginary window, controlling the image viewed, and examining it intentionally from different perspectives. In an earlier version of *LEAP*, Stephens (1997) found that English/language arts teachers examining the reading/writing workshop approach viewed video-cases of classroom experiences with critical eyes and repeatedly explored a segment in order to more clearly distinguish and evaluate its dynamics and complexities. Just as a viewer who sees a favorite film for a second or third time, each time gaining a better understanding of the story line, teachers who viewed a video case for a second or third time discovered innuendos in interactions that were overshadowed on initial viewing. They were able to examine the roles of the teachers and students and how the physical environment had an impact on those roles. For instance, a better understanding of the dynamics of the classroom was achieved by focusing on the classroom environment. Messages on posters placed on a wall, types of books on a shelf, arrangement of and access to computers, and number and types of student products displayed provided information that a teacher gleaned to make sense of the learning environment and the teacher/student roles.

The lens provided by the 1995 version of *LEAP* helped English/language arts teachers situate themselves in a classroom structured according to the tenets of the reading/writing workshop approach. Providing this kind of lens for the exploration of computer-enhanced literacy events in a real classroom could help demystify the act of teaching for preservice and novice teachers. *LEAP 2* was created to provide such a tool.

Theoretical Framework

LEAP 2's structural design is based on the principles of cognitive flexibility hypertext (Spiro & Jehng 1990), a method that has been used for the preparation of professionals in other complex domains such as medicine. Mini-cases, as described by Spiro and Jehng, are brief, edited "pieces"—as short as 45 seconds—of the video-case; they are selected to closely examine and analyze interactions. In cognitive flexibility hypertext, mini-cases that are accessed are used for a guided, nonlinear, and multi-dimensional analysis of larger cases. Themes and subthemes regarding concepts evident in the mini-cases guide the user through the examination of video. The social constructivist principle that meaning is context-specific is prominent in the theoretical underpinning of cognitive flexibility hypertext: cognitive flexibility theory (Spiro & Jehng 1990, Spiro et al. 1992). Cognitive flexibility is the ability to spontaneously "restructure one's knowledge, in many ways, in adaptive response to radically changing situational demands" (Spiro & Jehng 1990, p. 166). Cognitive flexibility theory's central metaphor extends from the work of Wittgenstein (1953): criss-crossing the landscape of information to examine an idea from multiple perspectives in order to arrive at its meaning. A premise of the theory is that revisiting the same material, at different times, in rearranged contexts, for different purposes, and from different conceptual perspectives is particularly important for attaining the goals of advanced knowledge acquisition because "knowledge that will have to be used in many ways is taught in many ways" (Spiro et al. 1992, p. 170). Ill-structured, or complex, domains are best understood in this manner—that is, by examination from multiple perspectives for multiple reasons so that the knowledge and skill internalized is flexible and can be applied appropriately within the varying contexts within which they are needed. The theory claims that transfer of knowledge entails *situation-dependent schema assembly*--not retrieval of whole, prepackaged schema.

Design and Development

A 12-month study to design, develop, and evaluate a *LEAP 2* prototype began in September 2005 and will conclude in August 2006. It is the replication of the study conducted of the 1995 *LEAP*. As with the earlier study, the role of the seven investigators on the *LEAP 2* team is one of collaborators who work closely with stakeholders, digital

literacy experts, and the users of *LEAP 2* to arrive at conclusions and assumptions that inform the following research questions:

1. What are the design features of *LEAP 2*, an interactive multimedia instructional package that (a) focuses on digital literacy and (b) is targeted for use by preservice and novice teachers?
2. What changes in perspectives related to the teacher's role, student's role, and learning environment of a classroom are revealed in the observations of and interviews with users as they interact with *LEAP 2*?

Data from the summative evaluation of *LEAP 2*, which is addressed in the second research question, will be collected in late July, when *LEAP 2* is used during a one-week summer institute for new teachers, sponsored by the project's funder, the National Writing Project. The plan for data collection and evaluation is described in the Summative Evaluation section.

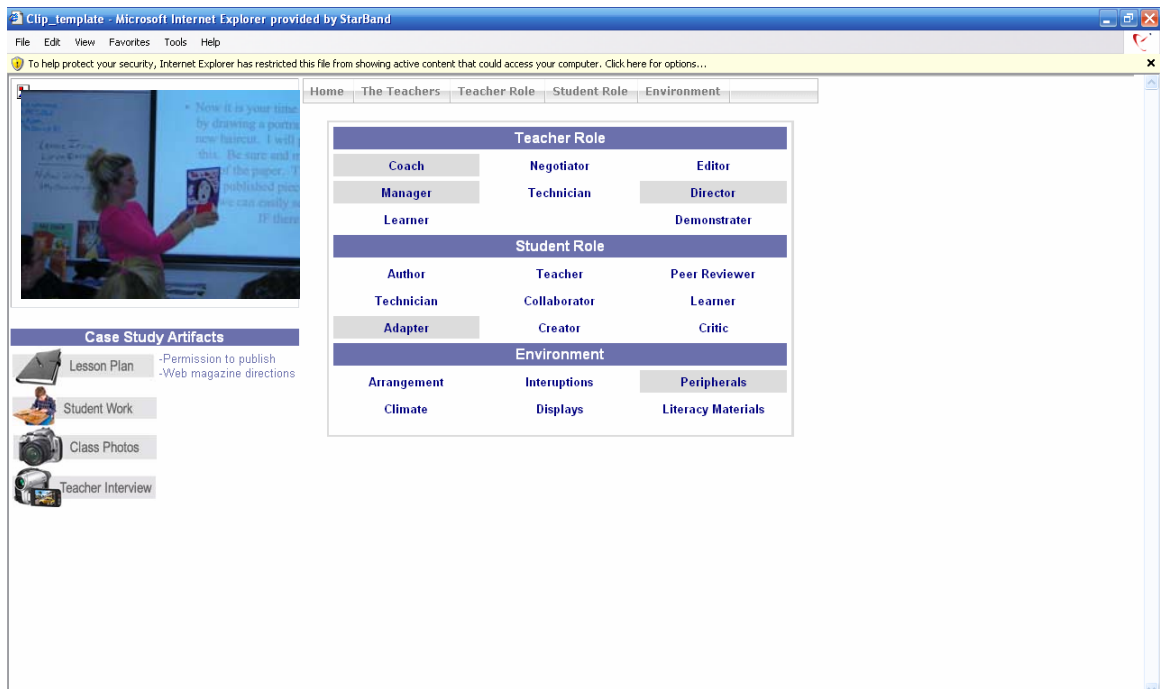
Data that attempts to answer the first research question has been collected and will be described. The goals for *LEAP 2*, the major features of the program, its structure, technical considerations, and the process of building the prototype are explained.

The vision of *LEAP 2* was, for the most part, a composite of what was learned through the review of the literature on the use of video-case methodology and the investigation of existing models as well as what was gleaned from a number of meetings with experts and stakeholders at the field site where *LEAP 2* will be tested. This process generated three broad goals for *LEAP 2*. The first was to provide thematic "paths" for exploration by which the whole class, small groups, or individuals can explore the video-cases of experienced teachers using technology to teach writing. Secondly, *LEAP 2* would provide rich opportunities for the target audience to draw from models described in texts and from observation and examination of video representations of teachers in authentic classroom situations. Finally, *LEAP 2* would provide a forum, a shared experience, for

discourse which could spawn contextualized impressions that would help to identify assumptions of digital literacy in specific and of the teaching of literacy in general.

The most prevalent feature of *LEAP 2* is the guided exploration of multiple mini-cases by three themes: teacher role, student role, and environment (see Figure 1). Subthemes within each of the themes provide information about how teachers and students interact and about specific elements of digital literacy. Subthemes for the teacher role, for instance, include teacher as editor, teacher as director, and teacher as technician. Subthemes for the student role include student as negotiator and student as creator. Subthemes for environment include arrangement of equipment and presence of peripherals. Each theme has 8 subthemes. The interface of *LEAP 2* shows the list of themes and subthemes alongside the window in which the video is viewed. Subthemes that are most evident in the video are highlighted when the video is showing. A writing-with-video feature was added to the ingredients of Spiro's (1990) cognitive flexibility hypertext. This feature provides a means for video-supported essay writing. A user can create an essay and insert segments of the mini-cases directly into the text to elaborate, justify, or explain.

Figure 1



LEAP 2's structure includes three major components, the contents of which were tested through formative evaluation studies with stakeholder groups:

1. A DVD containing mini-cases featuring five experienced teachers as they use technology in writing instruction

Five teachers who were selected because they feel they use technology effectively in writing instruction were video-taped. Approximately two hours of minicases was culled from 500 minutes of raw footage. The rough cut mini-cases were ranked by experts on digital literacy. Based on these rankings, mini-cases were selected and edited. A representative collection of mini-cases was shown to a group of 24 graduate education students, 9 educational technology graduate students, and 7 experienced teachers, several of whom provide professional development for English/language arts teachers. The mini-cases were shown linearly (not as they are intended to be viewed in *LEAP 2*) and dialog that followed the viewing was recorded and analyzed for depth of comments and evidence that the stakeholders were engaging in the formation, or reformation, of concepts and opinions regarding how technology could or should be used to teach writing. The quality of the dialog indicated how useful the selected mini-cases were for generating rich discussion.

2. Software that allows learners to randomly explore the mini-cases and to analyze and critique teaching practices from various perspectives

Design of the software was guided by the goals for *LEAP 2* and reflected the function of the interface in the early 1995 *LEAP*: to allow the user to easily access mini-cases from within a guided environment. After viewing the footage multiple times, the designer-investigators brainstormed possible themes and subthemes to include as guides in the software. Two members of the *LEAP 2* team explored design elements and programming options in order to make the use of the program as intuitive and effortless as possible.

The technical obstacles and considerations facing the team as it finalizes the software are discussed later in this paper.

3. A collection of seminal literature (books and journals) concerning the underlying theory and current practice related to integrating technology in writing instruction

A broad-based search for websites, articles, and books related to ways in which technology can be used for writing were found and included in a database. Various topics from a specific technique such as digital storytelling to broad ideas such as visual literacy are included. Resources describe how students research to find information which will be synthesized and organized in various ways including word processing, multimedia, and/or desktop publishing.

Technical Considerations

LEAP 2 attempts to recreate an interface enabled in the original *LEAP*, which used Apple HyperCard and video disk technology. That interface allowed for hypertextual reading of the videos along with the capacity to write in a multi-modal way (writing text as well as including video segments within the text) from within the same interface. Importantly, writers were able to select small segments of video to include within their text by tagging their clips and inserting tags. While merging these two capabilities--hypertextual reading with multi-modal writing—within one program remains a challenge for this project that has not yet been completely resolved, it now appears that the development team has found several promising solutions.

To provide easier and more readily available access to *LEAP 2*, the team has decided to deliver and develop the case studies in a web-based format. This will allow for the media to be distributed via the internet or CD/DVD using standard html format and a web browser. Several different methods of encoding the video cases for web delivery were researched and tried. First was the Flash video format which seems very promising in both file size and download time, but common FLV players and encoders seem to need more maturity for reliable performance. Also tried were the Real Video format, Windows

Media format, and finally the Quicktime video format. While all were good and offered their own set of advantages and disadvantages, Quicktime was decided upon because it met several critical needs. Since the videos needed to be fairly small in viewing size (320 x 240), sharpness and detail were very important qualities. The new H.264 video codec in Quicktime is MP4 compliant and is newest codec which offers sharp video compression and very small data rates. The resulting video with comparable file sizes appeared sharper with more detail than other video formats. The H.264 codec has been adopted by many DVD and digital video broadcasting organizations as the future standard for file compression. The second critical attribute that Quicktime provides was the need for small file sizes that could be stored and used on a normal server. QuickTime supports progressive downloads of movies which allow part of a movie to be displayed before all of its data has been received over a network or other slow link. A feature called Fast-Start allows the video to start playing before the entire file has arrived and is simple file transfer using a normal server. Even if it appears that a more robust media server will be required in the future, Apple offers an open source version of a media server called Darwin Streaming Server which can be used on almost any server platform for no cost.

While the delivery of the case studies appears resolved, the authoring component is not. Several possibilities are MediaMatrix produced by The Matrix at Michigan State University as well as Video Paper Builder (VPB) created by The Concord Consortium. VPB is being more closely evaluated and tested and appears at this point capable of accomplishing the tasks required. *LEAP 2* will likely have two user interfaces—one for the hypertextual viewing/reading of the videos which is either web or DVD based, and another for the writing from the videos which may be CD/DVD based. The resulting product from the writing component can be uploaded to the web or burned to a CD/DVD. Those users with high-speed internet connections should have no trouble uploading the product to the web while those who do not can burn the product to a CD which can then be uploaded on site.

Although it appears strange that 10 years after the original *LEAP* there seems to be no easy program for building hypermedia programs such as those made with HyperCard, it

is in some ways a positive development for the *LEAP 2* project. By moving away from a one-computer based video case program, the video-cases can now be distributed over a much wider audience and population due to the emergence of web distribution that is not dependent on a particular computer platform (which was not around during the HyperCard days).

Summative Evaluation

The final prototype will be field-tested by new teachers attending a one-week summer institute in July 2006. Subjects will complete a questionnaire that addresses their knowledge of approaches for teaching digital literacy before and after using *LEAP 2*. They will be videotaped as they use the prototype, and transcripts of their conversations will be coded and analyzed. Finally, they will be asked to use the component of the prototype that allows them to write an essay with segments of video inserted, or a “video-essay”. These will be categorized into three types: incidental, specific, and rhetorical. These types of video-essays were found in the data collected during the study of the original *LEAP* prototype. Incidental application is the parenthetical use of video. In this case, the video is not directly or significantly related to the text, and in some cases, these video clip tags are added to the end of the essay, much as an appendix is added to a paper. The content of the incidental clip usually has some resemblance to the ideas in text—such as video of students conversing attached to a line that states that groups are often used in the workshop approach. However, the connection between the video and the text is not specific. A specific application is one in which the writer refers to a particular item, person, or incident in the clip as an isolated demonstration of a specific claim that the writer has made about the assumptions behind the approach(es) used. Referring to the way that a teacher identifies her students as authors and following that statement with a clip of the teacher telling a student that she is an author is an example of a specific application. A rhetorical application is the insertion of a clip to support an argument. The rhetorically inserted clip is described before and after its insertion point. This type of insertion is the most interesting; in some cases, if the video tag is removed, the text may no longer stand alone and be meaningful even though the video, of course, is not syntactically essential in a textual sense.

Conclusion

As noted, LEAP 2 will be completed in August 2006. Data collected will provide an indication of the impact that using video-cases of teaching writing with technology for the professional development of preservice and novice teachers will have on this target group's understanding of the classroom and of themselves.

The study is funded by the National Writing Project's New Teacher Initiative. The seven-member team conducting the study includes two university faculty, a community college professor, a middle school instructional strategist, an elementary school technology coordinator, and two technology-savvy classroom teachers. All are affiliated with the Central Texas Writing Project, a site of the National Writing Project.

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