

Sherman, G., & Hicks, D. (2000). Using a historic site to develop virtual reality-enhanced web-based instructional material: Learning to use technology as a partner in the classroom. *Contemporary Issues in Technology and Teacher Education*, [Online serial], 1(2), 244-257.

Using a Historic Site to Develop Virtual Reality-Enhanced Web-Based Instructional Material: Learning to Use Technology as a Partner in the Classroom

GREG SHERMAN and DAVID HICKS

Virginia Tech

The computer has the potential to facilitate widespread access to ideas and information. Information that might otherwise be unaffordable can be reviewed, and students can explore the world on virtual field trips that would otherwise be impossible (Berson, 2000, p. 127)

Over the last decade a growing number of social studies educators have mirrored Berson's contention that interactive technologies hold a great deal of potential for transforming the teaching and learning of social studies (Braun, Jr. & Risinger, 1999; Diem, 1999, 1997; Martorella, 1998, 1997; Hope, 1996; Klenow, 1992; Mason, et al, 2000; NCSS, 1994; Saye & Brush, 1999; White, 1999; Yeager & Morris, 1995). Today, social studies teachers wishing to use computer-based technology to help them develop, define, and support effective learning environments have many options at their disposal. Some of the more obvious choices teachers can make surrounding the instructional use of computers include selecting potentially effective commercially produced social studies content applications, using the World Wide Web (WWW or Web) to access resources and conduct research, and authoring text-based as well as multimedia instructional material. However, research continues to suggest that despite the perceived potential of technology, many social studies teachers are currently reluctant or unable to utilize content specific uses of technology in their professional practice (Ehman & Glenn, 1991, Berson, 1996; Freiwald, 1997; Martorella, 1998; [National Assessment of Educational Progress](#), 1999).

Although a variety of factors ostensibly contribute to the actual decisions that teachers make about the role computers might play in the instructional process, one important factor common for all teachers is their level of awareness regarding the instructional uses of computers (Hardy, 1998; Roblyer & Edwards, 2000). If technology is truly going to play a role in transforming/reforming a subject that has been observed by generations of researchers and students as clinging to a pattern of didactic teaching (Baxter, Ferrell, & Wiltz, 1964; Goodlad, 1984; Shaver, Davis Jr., & Helburn, 1980; Wiley & Race, 1977), the challenge for teacher educators today is to provide opportunities for preservice and inservice teachers to use technology as a partner within and through their teaching so they can begin to independently

make decisions surrounding the type of instructional material to be developed or augmented with computer-based technology, as well as define the role that computers themselves will play within the instructional experience (Allesi & Trollip, 1991; Grabe & Grabe, 1996).

The types of different instructional material available as well as the different ways in which computers could be used within various learning environments represent important areas within the professional practice of teachers that need to be continuously and consistently updated in order for them to make the best possible decisions about the instructional use of computers in the classroom. In an effort to address the needs of practicing educators concerned with improving their ability to use computer-based technology more effectively in the classroom, a week-long intensive course was facilitated through the instructional technology program at Virginia Tech during June, 2000. This course was designed to help make teachers more aware of one specific, emerging area of computer-based technology: virtual reality (VR) on the WWW.

The overall purpose of the course was to provide an overview of the different ways in which VR is currently used within web-based environments in general, to examine the possibilities of web-based VR within effective instructional experiences, to instruct the participants in a variety of ways to construct VR for web-based instruction, and finally to immerse the teachers in a project that used the contexts of a local historical site and the Virginia Standards of Learning (SOL's) to generate a VR enhanced instructional website for their classrooms. Although the course was open to all educators, the nature of the course activities and make up of the class led to a series of projects that were social studies-focused, and subsequently the results (teacher-generated projects) of the course were examined from a social studies/instructional design and development perspective. The purpose of this article is to describe the project development experience and reflect on the results of the course in light of the way the participating educators generated VR-enhanced web-based social studies instructional material.

Description of the Course

The overall goal for the week-long instructional VR course was the following:

After experiencing the week-long course, the students will be able to create websites that incorporate the use of VR within an instructional experience. Specifically, the course project website created by each student will present one or more aspects of a Virginia historic site and it will support in some way the learning of specified Virginia Standards of Learning. In the process, students may also learn how to utilize a variety of software packages to develop web-based VR material.

The historic site referred to within the goal statement was Yellow Sulphur Springs, a piece of property located less than three miles from the Virginia Tech campus in the surrounding Blue Ridge Mountains. Today, Yellow Sulphur Springs includes a hotel and springhouse constructed in the early 1800's, a series of row cottages constructed throughout the past 150 years, the remains of a two-lane bowling alley, and various foundations from other hotels and structures occupying the property throughout the past 200 years (see Figure 1). The property was used as a health spa in southwest Virginia from antebellum times to the early 1920's. Following the Civil War, Yellow Sulphur Springs entertained a number of famous Confederate military leaders, including Generals Jubal Early and P.T. Beauregard (Cohen, 1981). After falling into disrepair during the Great Depression era, the property was used by the Virginia Transient Bureau to house up to 400 hobos in the late 1930's. A number of stonework structures, including the

prominent fairy garden, were constructed by transient men learning masonry trade skills (Fishwick, 1978).



Figure 1. This picture presents the old hotel at Yellow Sulphur Springs in the background, with a portion of the Fairy Garden presented in the left foreground. June, 2000.

The course began with a brief electronic presentation of the history of the Yellow Sulphur Springs property, complete with digital pictures of some of the structures and artifacts located within the historic site. Following this overview, the students were presented with a brief description of the project that each student, working alone or with a partner, would need to accomplish by the end of the week. Students were informed that they were going to tour the property at the end of the first day of class, and that their entire project would involve the creation of an instructional website that incorporated the use of VR files to represent Yellow Sulphur Springs visual content to support the learning of specific Virginia SOL's. These standards can be accessed at the following site: <http://www.pen.k12.va.us/go/Sols/home.shtml>. The following outline depicting the major steps involved in the project was provided:

Project Development Outline

Step One: Decide on a partner if desired. Consider existing technical and ID experiences before making such a decision.

Step Two: Decide which SOL(s) the instruction will address. The website can address any of the Virginia SOL's. Single outcomes are fine, as well as any combination from the various content areas.

Step Three: Identify a meaningful learning context for the facilitation of the SOL(s).

Step Four: Determine which instructional components will be addressed within the VR-enhanced web experience. Websites do not need to be a complete instructional program; they can address any of the instructional components representing good design (introduction, activity, practice/feedback, review, assessment, transfer).

Step Five: Describe the role of the VR files within the instruction experience, and decide the location and type(s) of images to capture. Note: A good idea in planning the development of VR files is to sketch a bird's-eye-view of the Yellow Sulphur Springs site and then mark on this map the locations of all the panoramas and/or objects to be created.

Step Six: Capture the images. This may also involve scanning in existing historical images from print sources.

Step Seven: Create the VR files using one of the applications provided: Quicktime VR Authoring Studio (Apple Computer, Inc.), VR ToolWorx (VR Toolbox, Inc.), Canoma (MetaCreations Corp.), PhotoVista/Reality Studio (MGI Software Corp.).

Step Eight: Create the website that will display all the text, image, and VR files. Place all files in assigned folders on the server.

Step Nine: Make sure the final project includes the following information regarding "Notes to Educators" is somewhere within the site:

- SOL's addressed are clearly identified.
- Instructional context that is defined by the website is clearly identified and described.
- Instructional components of the website are clearly identified.
- Conditions for each type of SOL or outcome supported by the website are clearly identified.
- Suggestions for implementing the instructional website within a classroom setting (directions for group assignments, external resources needed, pre- and post-implementation activities etc.).

Step Ten: Present the final project on the afternoon of the fifth day of class. Once the nature of the instructional design project was made clear, the course proceeded with the presentation of some of the important vocabulary associated with VR, starting with the term "virtual reality" itself. Although many different definitions for virtual reality exist (McLellan, 1996), the following definition was used as a starting point for the presentation of VR as an instructional tool:

Virtual Reality represents a computer-based, highly interactive 3-dimensional (3D) approximation of something that is designed to be perceived as real as possible, and/or represent reality in as concrete a manner as possible while enabling users to freely explore the represented environment and/or those objects contained within the VR environment.

Following the presentation of this definition of VR, information and examples were presented that illustrated the concrete manner in which VR is currently used within web-based environments (and the manner in which the students might choose to use VR in their own projects). These examples included the most common ways in which VR content is represented on the WWW: the presentation of panoramas, objects, and scenes. A panorama VR file is usually a 360-degree (though it can be a partial circle) display of a photorealistic scene as viewed from a

stationary point in the “middle” of the display (see Figure 2).



Figure 2. A sample virtual reality panorama file depicting a room in an art museum.

Objects are usually photorealistic 3D renderings of discrete objects. The user can manipulate the object by clicking and dragging to display the object from virtually any angle. Objects can also represent audio files that appear to emanate from a fixed point within a panorama. In addition, objects can be high-resolution photographs displayed within a fixed point inside a panorama (see Figure 3).



Figure 3. A sample virtual reality object file depicting an ornamental clock.

Scenes are combinations of panoramas and objects, usually linked together as “nodes.” Nodes are normally accessed by clicking within a hotspot designated as a geometric space inside a panorama. Nodes within a panorama typically represent links to other panoramas, other websites, high-resolution digital picture files, animated digital picture files, object files, digital movie files, or digital audio files see Figure 4).

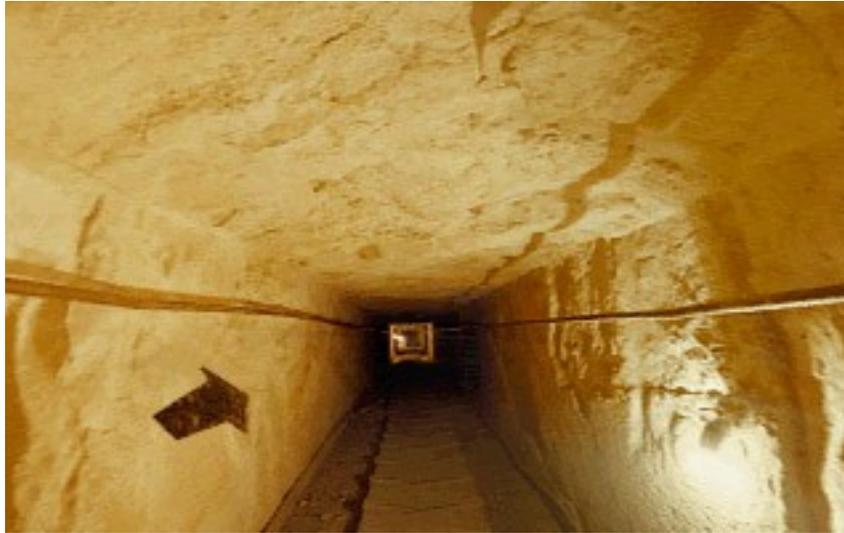


Figure 4. A sample virtual reality scene representing many files linked together to depict the various chambers and passageways within one of the Great Pyramids.

Once the basic terminology associated with web-based VR content was presented, the students received a brief overview of the types of VR files that are typically authored for the WWW. To date, there are two popular ways in which VR files are written and delivered across the Internet: Virtual Reality Modeling Language (VRML) and Quicktime Virtual Reality (QTVR). VRML represents an international standard file format for delivering and presenting 3D objects and scenes (Hartman, Wernecke, & Carey, 1996). Created by Silicon Graphics, Inc., VRML files usually contain rendered images, rather than digital photographs, along with the VRML code controlling the activity of these graphic files. VRML files bring together objects, frames, textures, and sounds and present them within scenes or virtual worlds” ranging from simple rotating 3-D artifacts to complete video game-style environments. Creating VRML-based worlds are fairly labor-intensive and generally require programming knowledge. Apple Computer’s QTVR is a cross-platform file format standard which allows extremely high-quality photographed or rendered 3D environments or objects. Although other photorealistic VR file types exist, QTVR generally represents the standard for this type of VR file and will be used throughout this article as the definitive example of this type of VR. QTVR technology allows computer users to quickly and easily create and view either a panorama from a 360-degree perspective or an object from all sides. Most QTVR panoramas or objects are created from digital photographs with little or no programming required, and can be used without corresponding code files if desired.

Once the nuts and bolts of VR files and content were presented, the students in the course were provided with an overview of the different ways in which both VRML as well as QTVR have been used on the WWW throughout the past couple years. As might be expected, the most widespread use of VR on the web throughout the past 5 years has been within commercial applications. Real estate property previews, online auctions, architecture and landscaping proposals, and automobile advertisements represent some of the different ways in which products are displayed in detail within VR files across the WWW. In addition to a variety of business applications, VR is also used on the Web to display 3-D data within scientific web environments, such as molecular modeling and topographical renderings. VR content is also used to enhance websites designed to promote artistic, entertainment, and educational interests. [Table](#)

1 presents a variety of examples describing the different categories of VR use on the WWW, including some corresponding links to VR-enhanced websites.

After the students were oriented to the different ways in which VR has been used on the WWW in general, they were presented with some specific information about the manner in which VR might be used specifically for instructional purposes. This information was based on the different roles that interactive computer-based media play within the instructional design and development process. Since the class project involved the development of instructional material to support the learning of specified outcomes, the entire development process was placed within the framework of a prescriptive, systematic instructional design (ISD) model. The ISD model presented to the students in the class was based on the Dick and Carey (1996) model of instructional design. Within this model, instructional goals are defined and then analyzed to determine the scope and sequence of subordinate outcomes to be facilitated by the instruction. Once the goal and objectives are clearly articulated, instructional experiences are designed to facilitate all or some of the objectives defining the goal. In the case of the assigned project, students were compelled to include the Virginia SOL's of their choice as the goal and/or subordinate objectives. The instructional experience itself needed to include one or more of the components constituting a complete instructional plan in accordance with the Dick and Carey model employed: introduction, activities, practice/feedback, review, assessment, and transfer. [Table 2 VR Within Instructional Components](#) presents a description of the different elements included within each instructional component. In addition to simply listing the elements for each component, Table 2 also identifies which elements could be readily supported through the use of VR technologies within an instructional experience. This information was presented to the class in great detail, with an emphasis on the different ways in which VR might be used for instructional purposes. For example, a website introducing learners to an instructional experience about ancient Egyptian culture could use a QTVR scene to present the inside of a pyramid. As presented in the list of elements for an effective introduction (Table 2), the VR pyramid tour might serve to gain learner attention, present a "Big Picture" for the entire lesson, or help establish relevancy for learning the outcomes intended by the site developers (i.e., after the tour, the instruction may ask "why" or "how" questions pertaining to pyramid construction). The students were provided with examples of the instructional uses of web-based VR for most of the elements indicated within Table 2, and were encouraged to imagine how different VR representations of Yellow Sulphur Springs might be used within an instructional experience.

Just addressing specific, discrete instructional elements does not represent the only way in which VR, or any other form of mediated message presentation, could be used to support and define an instructional experience. Helping to establish a meaningful, purposeful context for learning and/or applying an instructional goal is also one of the roles that media play within instruction. For example, because VR is highly interactive and controlled by sophisticated computer software, it can be used to structure simulations that enable users to make decisions about the development and subsequent operation of a simulated environment or situation. As informational tools, VR files can readily be implemented within reference exploration as well as more traditionally instructional tutorial contexts. [Table 3: Classification of Technology-Supported Educational Contexts](#) presents all the different types of instructional contexts that were presented to the students in the course.

Following the brief presentation of the different ways in which VR has been used within web-based environments, and the manner in which VR could be used for instructional purposes through context definition as well as through the delivery of one or more types of instructional

components, the students were presented with the specifics of the course project. The major activities surrounding the development of the course project included planning the instructional website and constructing the VR content to be used within the website. Based on the information and examples presented, the students were provided with the project grading criteria before entering into the planning stage. The following list describes the three different categories of project grading criteria presented to the students:

General Instructional Nature of Website

The website must present “information for educators” that should, at a minimum, include the following information:

- SOL’s addressed are clearly identified;
- Instructional context that is defined by the website is clearly identified and described;
- Instructional components of the website are clearly identified;
- Conditions for each type of SOL or outcome supported by the website are clearly identified; and
- Suggestions for implementing the instructional website within a classroom setting (directions for group assignments, external resources needed, pre- and postimplementation activities, etc.)

Instructional Use of VR

VR is present and is used to improve the effectiveness of the learning experience in one or more of the following way(s):

- Define motivation-meaningful-purposeful context;
- Introduce the instruction;
- Provide meaningful-purposeful-motivation discrete activities;
- Present information in as concrete a manner as possible;
- Provide practice/feedback over specific skills;
- Help learners review instructional experience;
- Assess the learning of specific skills; and
- Provide an opportunity for students to transfer or apply previously-learned skills to new environment.

Creative Use of VR

VR used in creative ways to address the learning of specific SOL’s. For example:

- Site navigation;
- Presentation of multiple bodies of information (history, biography, art, architecture, science, culture, literature, writing etc.);
- VR as interactive art;

- VR as a way to compare/contrast times, places, people, and so forth;
- VR as a game; and
- VR to encourage exploration.

Once the particulars surrounding the evaluation of the final products were presented, the course participants were given a tour of the actual Yellow Sulphur Springs property and then left to their own devices to proceed with development of their instructional VR project. Many students had already selected partners by the end of the first day, and most of the teams attended one of the informal sessions on using digital cameras during the evening of the first day. Throughout the week, individual tutorial sessions were facilitated through the on-campus educational technology computer lab at Virginia Tech. These tutorial sessions included panoramic camera operations, using various VR software products, and constructing basic web pages. Participants were encouraged to attend those sessions addressing skills that they needed help learning outside the independent route of trial-and-error and consulting user guides and manuals. In addition to the on-campus support, the course instructor as well as a graduate assistant remained available at the Yellow Sulphur Springs site to answer questions and troubleshoot technical problems, of which there were many.

By the afternoon of the last day of the course, all project URLs had been submitted to the instructor, and links were made on a menu displaying all course projects. The current URL of the course itself, along with the menu of projects, is: <http://www.learning.ed.vt.edu/webvr>. (Note: the address of the project menu is http://www.learning.ed.vt.edu/webvr/projects_menu.htm).

Projects were presented to a panel of judges consisting of the course instructor, a distance learning faculty member, and the owners of the Yellow Sulphur Springs property. The results and discussion section that follows describes the projects in more detail and summarizes some of the more common features between the different projects.

Results and Discussion

Eleven interdisciplinary VR projects were developed in the course, with most students choosing to work with a partner throughout the weeklong experience. Two of the final projects were specifically designed for elementary school, one for middle school, one for high school, and four for middle and high school. In almost every case, the primary instructional objectives/outcomes were based upon the Virginia SOL's, with the majority falling into the social studies/history category. [Table 4: Number of Projects Addressing Different Outcomes Types](#) displays the number of projects addressing all the different discipline-specific outcome types addressed. The only project not specifically addressing at least one social studies SOL was a website that focused on art history and the work of a specific folk artist. Objectives from the visual arts were represented within this project.

[Table 5: VR Course Project Activity and Outcome Descriptions](#), provides a brief description of the projects developed, including each project's context type classified from Table 4, as well as a listing of the general social studies outcomes addressed. What becomes clear in examining each project is that the nature, history, and location of Yellow Sulphur Springs led different groups to use particular sets of social studies objectives to drive their projects. Five projects were developed along the theme of people, places, and environment. Two of these in particular focused on the influence of urban development and the environment in direct response to the

location and impact of the building of a nearby freeway extension on Yellow Sulphur Springs. The other three people-place-environment projects used the historical site to either examine how humans influence or are influenced by their environment in relation to the use of the springs. [Table 5](#) also describes five different projects that focused on more history-based outcomes.

These five projects used Yellow Sulphur Springs as a historical source that could be examined, explored, and analyzed by students to make generalizations about life in Virginia. Three of these projects sought to layer the history of Yellow Sulphur Springs within the context of ideas and events in the 1920s and 1930s.

It is also worth noting that while the teachers were introduced to a range of instructional context types for their VR project, upon categorizing each project it became evident that the teachers favored specific context types. [Table 6](#) presents a tabulation of the different context types structured by the VR-enhanced, web-based instructional material. These data indicate that nine projects used creation as a key guiding principle within the learning experience, in which students were provided with opportunities to create something as they worked with the various resources presented within the site. These creation activities predominantly involved writing papers and journals. The use of writing may explain the emphasis given to language arts SOL's in conjunction with social studies SOL's within many of the projects as depicted in [Table 4](#). One particular project, "Pieces of the Past," is noteworthy within the creation cluster because students experiencing this website are expected to use the teacher-generated VR project as a foundation or template in the development of their own VR project focusing on a local historical site of their choice.

The data in [Table 6: Number of Projects Incorporating the Different Content Types](#) indicate that six projects provided students with the opportunity to explore and access references and gather information by way of the use of historical scrolls or dictionary definitions as they moved throughout the sites. The data in [Table 6](#) also specify that four projects provided students with an opportunity to freely explore the Yellow Sulphur Springs site within a contrived situation; examples of "situation exploration" context types. For example, in the website titled "My Walk Into the Past: Journal Entries from Yellow Sulphur Springs," the intended users (middle- and high-school students) were presented with the following directions at the beginning of the web-based experience:

On your summer vacation, your family traveled through Southwestern Virginia and spent a few days exploring Yellow Sulphur Springs Resort in Christiansburg, VA. The resort is now abandoned, however, your parents recall their grandparents (your great-grandparents) recounting visits to the resort during their younger years. Use the following links to explore the resort and develop your personal journal of your walk into the past.

This constitutes an excellent example of a structured learning environment in which learning and applying targeted outcomes are given meaning and purpose when facilitated within the context of a pretend situation. Situation exploration contexts are also used frequently in combination with game contexts. One such project, "Yellow Sulphur Springs VR Visit," incorporated the use of a motivating game within the context of situation exploration by encouraging students to complete a series of puzzles as they moved through the simulated environment of Yellow Sulphur Springs. It is also worth noting that, while incorporating VR files of Yellow Sulphur Springs into the information presentation display, four projects served no other purpose than to present information on aspects of the site's history.

It was not easy to readily categorize every single project into one or more of the different context types, and it was even more difficult to clearly identify which instructional components the websites themselves were addressing within a complete instructional experience. This was due in part to the limited amount of time the participants had to design and develop their VR-enhanced, web-based instructional material. If they had enough time to generate a complete instructional program, it would have been easier for the students to describe the specific instructional components addressed by their projects. However, the participants were asked to briefly describe how and where their web-based material would fit into a complete unit of instruction. Readers are encouraged to examine the “teacher notes” within each site to discover how the participants chose to describe the instructional role(s) of their web-based material.

Conclusion

The variety of completed projects developed within the one-week intensive course illustrates the potential uses of VR for teachers who want to use local historic sites and locations to study such themes as Time, Continuity, and Change; People, Places, and Environment; and Civic Ideals and Practices. The VR course described within this article provided teachers with an opportunity to collaborate with colleagues and teacher educators to learn the mechanics of web-based VR, as well as learn how and why they might choose to integrate VR technologies within their own professional practice. As one participant noted:

The whole process was very enlightening for me. I can understand now exactly how some of the VR is created and I felt like it gave me the opportunity to be a voice in the development of a program and purchase of equipment for our school...I think there is much potential for helping students to experience places and things that they would have little opportunity to see or visit. Whether it is a historical location or simply a part of world culture they might be studying. VR presents an incredible opportunity to experience of visit somewhere with a sense of first hand impressions.

A similar perspective was shared by one of the developers of “Pieces of the Past” who, upon completing the course, stated ‘ I can see a variety of applications within the classroom that would help enhance learning in the social studies ...’

In terms of instructional contexts, the range of projects developed within the course does highlight the importance of helping teachers move away from learning how to use technology simply for the sake of using it toward learning how to use various technologies to transform their teaching. Such projects as “Spring into History: Yellow Sulphur Springs” uses the power of computers to establish a rich situation exploration learning context. As one of the site developers commented,

Virtual Reality has many possibilities in the classroom. One of the most significant is that it creates a situation exploration environment in which the students can travel to and through different time periods. Here, students can experience firsthand what life would have been like to live during a specific time period. They are not only reading about the given topic but placed within the environment so that they must make decisions concerning that context. For the visual learner, this type of historical context helps them remember what they need to know. To begin to do this in terms of encouraging and motivating students to begin situation explorations etc., to create and to.... As one participant pointed out learning the technology was only the first step in integrating technology into

her teaching. Integrating such technology for her involved having her students develop their own VR projects 'I teach 8th grade students. I don't believe that they would have any trouble creating the web-based VR content given a little bit of instruction.'

Although most of the projects supported and defined situation exploration, simulation, and reference exploration experiences as their principle history-related contexts, they all incorporated the use of a creation context as well (generating reports, journal entries, stories, etc.). The three projects that simply defined the presentation of information as their context did not include creation as part of the learning experience. Upon closer examination, these projects did little more than transmit information to students while providing VR shots of the historic site. Although these linear-based information presentation sites could be used in conjunction with other material to produce a more meaningful learning experience, as stand-alone instruction these projects reinforce the instructionally incomplete information delivery genre of traditional social studies teaching.

Based on anecdotal evaluation data, many teachers not only saw the potential and possibilities of using such technology within their teaching, but also gained both a degree of comfort with, and feeling of control over, how VR technology could be used within their classrooms. It is important to note, however, that practical concerns such as the availability of hardware and software within the participants' schools were seen as stumbling blocks that would need to be overcome. This situation was clearly explicated by one participant who noted,

If given the software and several digital cameras, I could easily use my community and school to create a VR environment. It would be a wonderful collaborative learning experience to have my students create VR. I would use this in context with the Virginia SOL's in a number of ways. The students could create VR while learning good computer skills, the targeted SOL's, group skills, and how their community fits into our state and the country as a whole. I feel that teachers need to have experiences with the learning material before it can be truly successful in the classrooms.

Such comments punctuate the legitimate need for the development of supportive networks within and through institutions of teacher education, including on-going technology training, collaboration and adequate technical support. Without such support, it will continue to be difficult for teachers to truly learn how and why to integrate interactive technologies like VR into such content-rich subjects as social studies. In addition, the danger remains that teachers, while ready, willing, and able to learn the mechanics of technology in teacher education courses, will fail to implement what they have learned when they return to their classrooms simply because the networks of collaboration and support have been broken. And on this final note, the need for resources above all else was clearly communicated in an e-mail correspondence to the instructor following the conclusion of the course:

I am certainly glad I have had this experience. I definitely think my 6th grade students could create web-based VR. I would have them use the school and community environments to create VR. The community where I teach used to be the cabbage capital of the world. There are wonderful opportunities just waiting to be explored and combined with the Virginia SOL's. I would also use VR to help my students with vital communication, decision, and group skills. But of course, money is an issue. If you have any extra copies of a VR program dusting up your office, just let me know!

References

- Allesi, S., & Trollip, S. (1991). *Computer-based instruction: Methods and development*. Englewood Cliffs, NJ: Prentice Hall.
- Baxter, M.G., Ferrell, R.H., & Wiltz, J.E. (1964). *The teaching of American history in high schools*. Bloomington, IN: Indiana University.
- Berson, M.J. (1996) Effectiveness of computer technology in social studies: A review of the literature. *Journal of Research on Computing in Education* 28(4), 486-499.
- Braun, J.A., & Risinger, C.F. (Eds.) (1999). *Surfing social studies: The Internet book*. Bulletin 96 (pp. 121-128) Washington D.C; NCSS
- Cohen, S. (1981). *Historic springs of the Virginias: A pictorial history*. Charleston, W. Va.: Pictorial Histories.
- Diem, R. (1999, September October). Editor's notes. *Social Studies and the Young Learner*, 2(1). p. 2.
- Ehman, L.H., & Glenn, A.D. (1991). Interactive technology in the social studies. In J.P. Shaver (Ed), *Handbook of research on social studies teaching and learning* (pp. 513-522). New York: Macmillan.
- Fishwick, M. (1978). *Springlore in Virginia*. Bowling Green, OH: Popular Press.
- Freiwald, W.D. (1997). *Computer use in elementary social studies*. (Eric Document Reproduction Service No, ED 418 024)
- Goodlad, J. (1984). *A place called school*. New York: McGraw-Hill.
- Grabe, M., & Grabe, C. (1996). *Integrating technology for meaningful learning*. Boston: Houghton Mifflin Company.
- Hardy, J. (1998). Attitudes toward and knowledge of computer technology. *Computers in Education*, 14(3-4), 119-136.
- Hartman, J., Wernecke, J., & Carey, R. (1996). *The VRML 2.0 handbook: Building moving worlds on the Web*. New York: Addison-Wesley.
- Hope, W.C. (1996). It's time to transform social studies teaching. *The Social Studies* 87(4) 149-151.
- Klenow, C. (1992). Electronic social studies *Instructor*, 102(3), 65-66.
- Mason, C., Berson, M., Diem, R., Hicks, D., Lee, J., & Dralle, T (2000). Guidelines for using technology to prepare social studies teachers. *Contemporary Issues in Tecnology and Teacher Education*, 1(1) [Online serial]. Available:<http://www.citejournal.org/vol1/iss1/currentissues/socialstudies/article1>
- Martorella, P. (1997). (Ed.). *Interactive technologies and the social studies*. Albany, NY: State

University of New York.

Martorella, P. (1998, Fall). Technology and the social studies or which way to the sleeping giant? *Theory and Research in Social Education*, 25, pp. 511-14.

McLellan, H. (1996). Virtual realities. In D. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 457-487). New York: Simon and Schuster Macmillan.

National Assessment of Educational Progress (1999). *Results from the 1998 civics assessment*. [On-line]. Available: http://www.nces.ed.gov/nationsreportcard/civics/civ_new_results.asp.

National Council for the Social Studies. (1994). *Expectations for excellence: Curriculum standards for social studies*. Washington, DC:Author.

Roblyer, M., & Edwards, J. (2000). *Integrating educational technology into teaching*. Upper Saddle River, NJ: Merrill.

Saye, J., & Brush, T. (1999). Student engagement with social issues in a multimedia-supported learning environment. *Theory and Research in Social Education*, 27(4), 472-504.

Shaver, J.P., Davis, O.L., & Helburn, S.W. (1980). *An interpretive report on the status of precollege social studies education based on three NSF-funded studies in what are the needs in precollege science, mathematics, and social studies education*. Washington, DC: National Science Foundation.

White, C. (1999). It's not just another new thing: Technology as a transformative innovation for social studies teacher education. *Journal of Technology and Teacher Education*, 7(1), pp. 3-12.

Wiley, K.B., & Race, J. (1977). *The status of pre-college science, mathematics, and social science education: 1955-75, Vol. 3: Social science education*. Boulder, CO: Social Science Education Consortium.

Yeager, E.A., & Morris III, J.W. (1995). History and computers: The views from selected social studies journals. *The Social Studies*, 86(6), pp. 277-282.

Contemporary Issues in Technology and Teacher Education is an online journal. All text, tables, and figures in the print version of this article are exact representations of the original. However, the original article may also include video and audio files, which can be accessed on the World Wide Web at <http://www.citejournal.org>