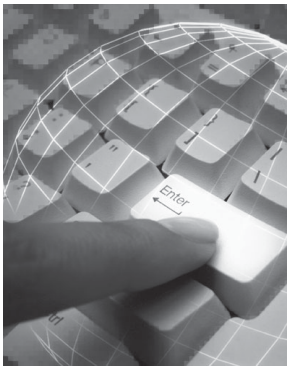

Technological Thinking and Practice in the Social Studies: Transcending the Tumultuous Adolescence of Reform

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Abstract

The authors reflect on the evolving role of technology in the field of social studies and compare the tumultuous adolescence of technology integration with future trends in teaching and learning. The discourse contrasts the past developments with ongoing innovation and efforts to promote the diffusion of emerging applications in the social studies. Suggestions to transcend the pubescent state of technological thinking in the social studies and nurture its dynamic potential are explored.

The discipline of social studies has had a precarious relationship with technology, simultaneously touting its potential benefits and critiquing its limitations in facilitating social studies practice. The integration of technology tools and resources into instruction has been accompanied by an interest in the power of technology to affect changes in social, civic, and economic functioning. Some of this impact has been beneficial to the construction of global connections among diverse people, while other components of technology diffusion have highlighted and accentuated inequities in access and quality of exposure.

Historically, we have many examples of the simultaneous predictions of the utopia of technological progress (Hudson, 1997) and cautionary views which question the value and worth of technology (Postman, 2000; Stoll, 1999). Educators have been fascinated by the potential of technology to make our lives more enjoyable, more efficient, and more productive. In the social studies, the application of technology as a tool to ameliorate work products has become firmly entrenched in curriculum, based on the premise that technology-based products can promote integrative learning, exploration of ethical and social policies, and active engagement in authentic activities. However, many schools have not kept pace with technoculture, either as a tool of instruction or as a focus of investigation and exploration (Berson, Lee, & Stuckart, 2001). Furthermore, the mere act of placing a computer in the classroom does not seed reform. Students may access data and receive up-to-date information from top researchers in any area of specialty; however, effectiveness requires more than the facilitated access to knowledge. Technology is merely a "means to an end" (White, 1997b), and necessitates a broader understanding of its role and application by teachers and learners.

Technology is a dynamic resource and tool that continues to develop over time, and subsequently has acquired an increasingly prominent role in society. Although the prohibitive cost of technology had initially inhibited widespread access for students in many schools, observations of the activities of children and youth today continue to bear witness to a generation that is immersed in computer technology for recreational purposes and more reliant on this global medium for information and social interaction (Berson, 2002).

Technology has facilitated accessibility to vast resources. Yet the promise of technology has not only been the ability to access information but also the opportunity to "command the inherited knowledge of the ages" (Ayers, 1999). It is the connections between remote pieces of information that can amplify patterns of thinking that were previously overlooked. This amplification is intensified through dissemination of acquired insights to others across remote distances. As archives of past knowledge expand, the focus turns to the creation of new associations and interpretations that may further enhance our understanding and contribute to the richness of the field. This process necessitates recognition that we only identify a sampling of the nearly infinite hypotheses possible through alternative combinations of knowledge. However, in an environment that is replete with an endless assortment of content, it is critical to evolve a discerning ability to grasp the complexity of information and justify the rationale for the way we structure and analyze data and synthesize its meaning (Berson & Berson, 2003). Multiple voices, perspectives, events, and implications are possible in this techno-environment, but what of the impact on teaching and learning?

Educational reform must take root in the classroom setting with informed and active participation by educators in modifying the teaching and learning process. In 1996, Berson examined the existing literature on the use and effectiveness of technology in the social studies and observed that "computers (in social studies classrooms) have served the primary function of facilitating students' access to content and have been relegated to being an appendage to traditional classroom materials" (p. 495). Little empirical evidence existed to support computer integration in the social studies, and most experiences were based on anecdotal information to substantiate the positive benefits of technology.

Subsequently, a body of research has accumulated that examines specific constructs in the social studies (Whitworth & Berson, 2003). *Social Education*, a journal of the National Council for the Social Studies, introduced a regular feature in 1996 that presented Web-based resources for social studies educators (Risinger, 1996; Risinger, 2002). This feature reflected a trend among other leading professional journals, such as *Theory and Research in Social Education* and *Social Studies and the Young Learner*, to include technology research through special themed issues. The College and University Faculty Assembly of the National Council for the Social Studies has co-sponsored an online journal, *Contemporary Issues in Technology and Teacher Education*. These resources have provided a forum for ongoing dialogue about policy and practice for technology in the social studies.

Over the past decade the conceptualization of technology in the social studies has evolved from an atheoretical integration of a collection of tools to a constructivist orientation for advocating the integration of technology. Additionally, Web-based instruction (Donlan, 1999; Fontana, 1997) and the facilitation of multicultural awareness through telecommunications (Fabos & Young, 1999) have achieved prominence. Johnson and Rector (1997) also reinforced the importance of the Internet in social studies for developing and involving citizens in an information age.

Nonetheless, Diem (2000) contends that the "promise of technology is not so much its cutting-edge advances as its innovative and imaginative applications" (p. 494); however, social studies classrooms have been especially reticent in applying uses of technology to instruction (Pahl, 1996). Shaver (1999) similarly notes that technology has little potential for stimulating instructional reform within the social studies, especially in a context that has been relatively devoid of thoughtful deliberation and careful attention to instructional details.

The intention of this paper is to accumulate the collective knowledge on educational technology in the field of social studies and assess its relative effect on teaching and learning over time. As we reflect on the evolution of the field, it is important to note that the rapid proliferation of new technologies necessitates recognition of the adolescence of the past discourse and the need for a reflective perspective that does not merely track the integration of new technological developments, but also reflects on the future trends toward innovation and diffusion of emerging applications in the social studies.

A Useful Tool

Researchers claim that technology has not appreciably changed the instruction of social studies in the last twenty years (Diem, 2002; Glenn, 2002; Martorella, 1997; White, 1997a), despite anecdotal assurances of substantial progress over time. We have experienced the initial euphoria of the promise of technology, followed by a pessimistic disillusionment, and subsequently a new pragmatic perspective on its potential. Hardware and software have continued to evolve with greater power and versatility. Drill and practice programs are now accompanied by interactive software, and innovations in hypermedia, telecommunication, and peripheral devices allow teachers to develop lessons "that enhance student skills in information retrieval, the presentation of data, the comparison and evaluation of different perspectives, and critical reflection and decision making" (Rose & Fernlund, 1997, p. 160). Although software companies continue to generate new titles, classics such as *Carmen Sandiego* and *Oregon Trail* retain a popular status in classrooms. Many teachers continue to rely on productivity tools, such as word processing programs, datagraphing, time line generators and spreadsheets, while reference products maintain widespread use as well. Software has gained increased visual appeal as advances in programming and larger memory capacity have led to expansive use of graphics to capture the attention of a visually oriented youth audience. This phenomenon is exemplified in simulations that provide rich learning environments and allow students to engage in activities that would be otherwise out of their reach (Harper, Hedberg, Corderoy, & Wright, 2000). In addition to software options, the Internet has especially gained prominence as a communication tool and resource for information available worldwide (Berson, Cruz, Duplass, & Johnston, 2004).

Technology has been conceptualized as a tool to achieve goals specific to the social studies. Proponents have noted its usefulness in actively engaging students in learning with the opportunity for instruction that is multidisciplinary, inquiry-oriented, student-centered, and multisensory (Eaton, 1999; Frye & Frager, 1996). Specialized areas that previously received sparse treatment in textbooks and supplementary materials can now be explored in-depth through online resources that combine updated information with appealing visuals (Berson, 2000b). Current events and evolving areas of interest in the social studies can be more easily explored with online access to information (Berson & Berson, 1999). Technology can facilitate an instructional partnership in the social studies classroom, creating venues in which students' creativity and competency can be developed with a rich variety of resources (Saye, 1998).

Moreover, there is a growing body of knowledge on the use of e-mail, the World Wide Web, and Web page construction to foster global understanding and cultural insights while engaging students in a range of educational telecollaboration activities (Ady, 1999; Harris, 1999). Similarly WebQuests (Donlan, 1999) and simulations (Frye & Frager, 1996) have been used to encourage students to explore historical and contemporary perspectives while

constructing their own learning with a visually stimulating and interactive tool. The lessons often rely on Web links and other technology to promote students' research, analysis, and critical thinking skills.

However, the tool-based approach is limited in that it reflects what may soon be obsolete and often lacks a broader connection to educational objectives and curriculum. The promise of profound change as traditional classrooms are replaced with interactive cyber-environments—a limitless world of resources that incites students to become efficient processors of information—may describe a utopia, but not reality. The innovative use of technology has not incited a transformation of curriculum and instruction, but it has provided the opportunity for experiential learning that broadens students' understanding of nations, cultures, and languages (Gragert, 2000). Curriculum directors have increasingly sought assistance in aligning digital content with the curricula, often necessitating expensive modifications to software collections to coordinate with state standards and testing (Hoff, 1999). Although teachers are generally interested in the acquisition of technology, this is perhaps the easiest step in the expensive and demanding process of integrating technology into teaching and learning. The decision-making process requires sound pedagogical judgment on the educational benefits, appropriateness, and logistical feasibility of computer-based learning (Harris, 1999).

Educators may erroneously focus the experience of students and model in their classroom teaching the use of technology as a tool to access information and knowledge as developed by others, but they may simultaneously fail to evolve skills in critically and creatively constructing ideas and thoughts that may transform the function of society (Berson, 2000a, p. 127).

Constructing Knowledge and Inquiry through the Retrieval and Analysis of Documents

An educated citizen is not necessarily an individual who has been exposed and formally instructed in every possible mode of accessing information. Given the development of new modes of information retrieval, this is not even a fathomable task. Instead, it is more critical for educated citizens to be engaged in any activity that requires them to be critical thinkers, problem solvers, creative visionaries, and accurate appraisers of benefits and risks.

Constructivist practice is associated with collaborative student-initiated tasks in which the teacher models the use of a diverse array of resources and equipment to process information in a meaningful context that relates learning to students' prior knowledge and experiences. This authentic model of problem solving relies on engagement in a social context that can be facilitated through cooperative learning situations. Students have been particularly enamored by the role of researcher and archivist (Carr, 1999) as memorization tasks are replaced by analysis activities. The Web and CD-ROM activities have offered these new possibilities for sharing and using information (Bass & Rosenweig, 2000). Digital materials are often utilized to structure inquiry learning processes that engage students in research, analysis, and interpretation of primary sources to understand the complexity of the past and the intricacies of social knowledge.

The constructivist movement is based on the assumption that problem-centered instruction can be achieved through an engaged approach to learning. Student inquiry and problem solving can be facilitated through electronic technologies; however, inquiry based instruction has languished as student use of technology overshadowed teachers' understanding of these resources. Although technology may expose students to alternative perspectives and seed empathic responses, students often rely on simplified models of thinking unless they can utilize metacognitive strategies that require the application of existing knowledge to novel situations to build more complex associations. Focused instruction to orient learners to the process of making linkages between the specifics of the problem and broader knowledge can be facilitated with electronic resources (Saye & Brush, 1999). Conceptual understanding is reflected in students who exceed the mechanics of reading and writing. They act like scientists, think like mathematicians, and see connections among events today and in the past (Dockterman, 2002).

Technology and Authentic Learning

The transition from print resources to the widespread availability of primary source documents on the World Wide Web has promulgated the dissemination and access to source information. The choices for researchers have been expanded as card catalogs and archival records have been augmented by search engines and Boolean logic (Anderson, 1999). Yet some also lament that the increased expansiveness of readily available resources is reliant on the discretion of research institutions and governmental organizations to select pertinent material, resulting in a significant underrepresentation of the extensive volume of information that is available in repositories worldwide.

Although many activities of social scientists can be simulated through the Web, educators and students need an understanding that cyberspace may augment research by providing an alternative venue in which to locate information critical to a research project, but it is not a replacement. The experience of clicking on a primary source online cannot replicate the sensations associated with holding a coveted resource after seeking it out, touching the paper, examining the ink used, observing the details on the binding, and smelling the age of the document.

Achieving a balance between online and traditional readings may be helpful in navigating the adaptation process for integrating advanced technologies into classroom instruction and learning (de Syon, 2000). Students may need encouragement to utilize print resources in conjunction with Internet material so that they do not overlook important aspects in their research and have quality information to gauge the credibility of information encountered online.

Additionally, although some (Cantu, 2000a) contend that the Internet facilitates access to historical resources and minimizes the role of the teacher as informational gatekeeper, there is a risk that intellectual curiosity will wane in the mass of information. Without adequate critical thinking and analysis skills, communities of learners may wallow in the midst of dubious material that is easily accessible and succumb to mental passivity when it becomes too much of a bother to seek out esoteric resources that are invaluable to the learning process.

Multiple responses to the availability of online resources have been noted, including those who reject the Web as an information source, those who indiscriminately tout the wonders of online resources, and those who are optimistically cautious that the development of students' critical evaluation and search skills can overcome the weakness associated with cyber-resources (Ehman, 2002). Faculty who promote a prohibition against the use of electronic sources by students often desire a preservation of the nostalgic process of discovering resources in the library through searches that may necessitate creative reconceptualizations of topics, drawing linkages and associations as an unexpected find takes place when the eye glimpses a book on the shelf that was not part of the original search but nonetheless offers important insight into the topic. The cost-benefit assessment often leads opponents of online resources to observe that few useful pages of information are acquired after students devote enormous amounts of time on the Web, when a library search may have yielded many more nonelectronic resources with less time allotment. Moreover, the volatility of material on the Web combined with the difficulty of finding verifiable information necessitates the guidance of teachers who can assist students in the process of becoming active learners in an online environment.

Proponents of online sources note that by simulating the activities of social scientists, students can be challenged to critically evaluate information. Activities that are enhanced by technology are based on recognition that desired skills can be achieved by the opportunity to utilize knowledge and information in a simulated context with real world applicability (Cox, 1997). Student achievement as measured by the goals and objectives of social studies learning standards can be promoted through technology integration (Danker, 2000; Johnson & Rector, 1997).

The process of accessing and interpreting information optimizes individual's capacity for effective citizenship (Berson & Berson, 2003). The ability to manage the barrage of information facilitates informed decision making. Moreover, examination of the complex interrelationship between science, technology, and society reveals imbalances in power and inequities in the diffusion of knowledge.

"The Web offers an exciting and authentic arena in which students can learn to become critical consumers of information" (Bass & Rosenweig, 2000, p. 5). Multimedia technology has enhanced the access to diverse resources that enrich the learning experience and provide an opportunity for students to not only visually examine archives of information, but also to engage in creative searches of resources so that patterns can be explored, information can be manipulated, connections can be discovered, and students can synthesize resources with their expressive capabilities to transform their connection to the material. What often has been overlooked in this process is the necessary step of instructing students to acquire a set of progressive skills that may guide their use of online resources, including technology skills, search techniques for accessing databases, and criteria for evaluating the content, presentation, and value of the information found.

Another authentic learning activity is the class field trip. Computers cannot replicate the "tactile, olfactory, visual, and dialogical experience of an actual field trip" (Bellan & Scheurman, 1998, p. 38), but they do provide an opportunity to counter the potential pitfalls associated with real life excursions outside the school setting. Virtual field trips offer a cost-effective means of exposing students to places and people around the world. They also are helpful when they precede actual field trips. The virtual trip can prepare students in advance by exposing them to the sites and sounds associated with a historical place.

However, there are limitations to electronic field trips when used in isolation. Ill-prepared students can aimlessly surf the Web, achieving only a cursory overview of information. Educators also are cautioned that virtual field trips lose their educational value when they are primarily used as a means to entertain students without regard for achieving curriculum objectives. Conversely, authentic learning is enhanced when the virtual field trip is used as a resource to develop students' prior knowledge and facilitate question formation. Necessary elements include a comprehensive information gathering process that is accompanied by advance preparation and subsequent follow up by the teacher.

Digitally Enhanced Writing and Electronic Dialogue

Writing and discussion enable students to be active participants in the learning process. The exchange of ideas allows students to evolve their skills in articulating information and extending their understanding of concepts. The digital media has expanded the possibilities to create new learning opportunities that require connecting with others at a geographic distance through written communication. Electronic interactions foster connections between content and literacy skills while simultaneously promoting guided dialogue. This online dialogue involves students in constructing discussion, practicing public communication skills, and creating public projects, such as Web pages.

The formation of e-mail learning communities has facilitated the connection between diverse groups of individuals and highlighted their commonalties while promoting understanding of their cultural diversity (Baugh & Baugh, 1997). Merryfield (2000) has applied electronic technologies in social studies teacher education and noted that threaded discussions enhance culturally diverse learning communities by expanding worldviews and changing patterns of voice and dominance in the interactions. Although

electronic technologies facilitate meaningful discussions in which controversial and sensitive issues such as prejudice, privilege, and discrimination are explored in depth, cross-cultural learning is simultaneously hampered by the loss of vital contextual cues (i.e., body language, facial expressions, etc.) that uniquely define face-to-face communication (Fabos & Young, 1999).

Bridging the gap between face-to-face interaction and threaded discussions is the use of telecollaboration to bring together geographically distant communities that also may represent cultural diverse settings (Sembor, 1997). In this era of globalization, the Internet provides social studies teachers the opportunity to expose their students to multiple perspective and contexts beyond the textbook through participation in many telecollaborative projects. These interactions can extend to authentic living history projects, in which artifacts and resources, which are stored and maintained within online collections and virtual community museums, are analyzed.

Additionally, digital learning activities are especially well suited for motivating students with a variety of learning styles. Cantu (1999) suggested that an Internet-based model works well with teaching strategies in the history classroom that incorporate Howard Gardner's theory of multiple intelligences. The resources of the World Wide Web offer access to information and learning experiences that serve as a pedagogical platform for multiple intelligence lessons, including verbal linguistic products and interpersonal interaction through e-mail, class chat rooms, and Web site development. Technology facilitates a multisensory approach that accommodates varying learning styles through rich and diverse online materials and experiences. By structuring instruction to appeal to different learning styles, students can be engaged and motivated for extended periods of time, and educators can enjoy the flexibility of offering a new way to bring relevant first-hand experiences into social studies content.

Portable Technology

Technology in the social studies has potential as an instructional tool in teaching students both content and processing skills. Nonetheless, initiatives have often lacked the perspective of children who are helping to forge the technology landscape through their ambitious participation in this global medium.

Portable devices offer the opportunity to fully engage children and youth with direct applications of the technology in applied contexts. Among these technologies are handheld devices, digital cameras, and mobile phones. Additionally, the evolving area of wireless computing offers the potential of inspiring different educational experiences that are free of the traditional constraints of the classroom or lab setting.

The technologies used in handheld devices have evolved during the last decade, while digital cameras and cell phones have emerged from technology that is over a quarter-century old. These tools have increasingly become affordable for consumers and schools. For example, in the digital camera market, approximately one-third of cameras sold in 2001 were digital (7 million), and analysts predict digital cameras to outsell film cameras by 2005. Flash memory card readers have significantly simplified transfer of images from camera to computer or printer. The operating systems of both the PC and Macintosh now include multimedia programs that facilitate digital storytelling.

Similarly, handheld technology offers a means to maintain the physical structure of the classroom while enhancing content delivery and student productivity. Since learning is not restricted to a lab setting, handhelds allow versatility for application in authentic contexts. This is especially true when the handheld technology is designed explicitly for use by teachers and students in the classroom. Beyond organizational skills within the classroom, students can use the handheld for survey and data collection, notation on field trips, networked communication, collaborative writing, and tracking of chronological events (Whitworth, Owings Swan, & Berson, 2002). The devices offer value, utility, and portability.

Through the effective and appropriate use of handheld technology, early implementers are anticipating a paradigm shift in how technology is integrated into the teaching and learning process in a constantly changing world. Teachers will be able to spend more time teaching students to be critical thinkers, effective communicators, and responsible citizens. Additionally, by using handheld technologies built specifically for education, less time will likely be spent adapting the technology for use in the classroom.

By sending students into their world with portable technology in hand, teachers provide opportunities for children and youth to bring their lives into the classroom, creating a rich, authentic authoring space. Writing notes, developing timelines, and arranging pictures as artifacts within a digital space allow students to explore events from multiple perspectives. As an extension or adaptation, students might create digital movies about an event, place or individual, using the various portable technologies to capture scenes, artifacts, and observation notes that would be woven together to tell a particular story.

In an era of increasing educational accountability, new innovations in education must be linked to content standards in order to succeed. Current national standards in social studies lend themselves to work with portable technologies. The *National Social Studies Standards* (1994) designed by the National Council for the Social Studies specify that students are to "analyze and explain the ways that groups, societies, and cultures address human needs and concerns; and demonstrate the value of cultural diversity, as well as cohesion, within and across groups" (Standard I: Culture). Additional standards require students to "articulate personal connections to time, place, and social/cultural systems; identify, describe, and express appreciation for the influences of various historical and contemporary cultures on an individual's daily life; and analyze the role of perceptions, attitudes, values, and beliefs in the development of personal identity" (Standard IV: Individual Development and Identity). There are strong potential connections in all the areas of social science education as educators focus

on the common goal of enhancing and enriching social studies curricula by building from the base of quality pedagogic practice.

All state and national educational standards have literacy at their core. Today's students spend more time immersed in an image-laden culture of television, movies, and video games than with static, printed text. The most recent NAEP Reading Assessment reported that only 32% of the nation's fourth graders were reading at a proficient or higher level, while 43% of these same students watched two or more hours of television each day (NAEP 2000, online). However, portable technologies can serve as a bridge to literacy and social studies.

Multimedia tools included in the operating system of the latest versions of Macintoshes and PCs allow students to seamlessly combine word and image to create powerful digital stories that are authentic and robust. For example, digital storytelling finds a natural home in the social studies classroom, where personal narrative can be used to explore community-based history, politics, economics, and geography to convey effective meaning. These projects offer students the opportunity to bring their home lives into school while also working as "scholars" at home.

The use of portable technologies can be used to enhance students' perspective of local history, economics, geography, and politics. They can acquire literacy skills for critically examining historical, geographic, and cultural information captured in images and applied contexts. Topics students might explore with these tools include:

- Representations of regional artifacts that depict the history/age of the community
- Regional geography
- Environmental issues (i.e., population, pollution, drought)
- Economic issues (representations of wealth and poverty in the community)
- Representations of government and politics in the community
- Cultural diversity in the community
- Issues representing children in the community

Skills in digital analysis further assist students in understanding that history exists through interpretation. Through these applications students can learn to recognize representations of point of view (e.g., social, political, economic) and bias in images, assess the reliability of sources of information, discuss divergent interpretations, and support their conclusions with evidence.

Artificial Intelligence in Education

Just as the classroom teacher's role has evolved from "sage on the stage" to "guide on the side," a similar shift in the role of artificial intelligence in education has been recommended, replacing computer-directed learning with software that supports the learning processes of students engaged in collaborative critical inquiry (Suthers et al., 2001). Students using technology that is void of software that enables rich explorations and investigations are often simply learning the same material as those students not using technology, and they are often learning it in a similar fashion. Even with systems that provide cognitive tools and open environments for exploration, students could still construct knowledge in order to satisfy some machine expectation instead of the knowledge specific to the intended problem situation (Balacheff, 1993).

With regards to artificial intelligence (AI), we are still far away from being able to achieve the versatile cognitive skills of humans. Therefore, research will continue along a number of paths—each with its ardent proponents (Wagman, 1997). We anticipate a convergence with these paths in the next decade. Already, the proponents of cognitive tutors are realizing the importance of building open learning environments supporting explorations into their integrated tutoring systems (Anderson, Corbett, Koedinger, & Pelletier, 1995). Educational technology is gradually moving away from being a distinct object of attention to an integrated tool used in the teaching and learning of social studies. In fact, studies such as those undertaken by Nathan, Koedinger, and Tabachneck (2000) on teachers' knowledge and beliefs emphasize enhanced programs of teacher preparation and development of theoretically and empirically rooted approaches to classroom instruction.

Teacher Education

The establishment of technological best practice is in its infancy, yet social studies teachers need examples of methods that they can model. To date, many teachers have used a limited knowledge base to guide instructional decision making. Subsequently, student computer use often has been relegated to word processing and the retrieval of factual information from electronic resources.

Additionally, the effective implementation of computers has been adversely affected by the extensive time required for social studies educators to reconceptualize their instructional repertoire to integrate technology. Teachers tend to feel most comfortable with applications that can be assimilated into their current repertoire of functioning. Time is a scarce resource in classrooms, and the challenge of time to expand the use of technology in the classroom is an issue of critical importance. Both preparation time and class time for implementation are of concern to teachers when asked about problems in integrating software and Web-based instruction. Yet Saye (1998) contends that technology can extend productivity and requires only upfront learning that is then easily transferred to other tools, minimizing the drain on available time.

Constructing effective technology-based activities is critical and necessitates knowledge of the topic, available multimedia resources, and the ability to engage students in the inquiry process. It also requires developing a discerning skill to understand the best times to employ technology versus traditional materials in instruction (Braun, 2002). After all, technology is not a panacea for social studies education, and print resources can also provide opportunities to evaluate information, assess conflicting evidence, and develop an analysis.

Professional development should model ways to apply technology to nontechnical settings and across emerging forms of electronic medium (Berson, Mason, Heinecke, & Coutts, 2001). As technologies and applications change, teachers need instruction on how to adapt and innovate in new learning environments. In particular, cyberspace has augmented the expansiveness of information accessed by teachers and students (Becker, 1999). Moreover, because the Internet erodes the isolation of classroom instruction, social studies educators require skill in assessing the worth of knowledge gained through Web–based learning and interactions (Braun, 1997). Preservice teachers must not simply acquire skills that make them proficient at using technology, but also learn how to use technology to make their teaching better than it would be without it (Mason, Berson, Diem, Hicks, & Lee, 2000). Therefore, preservice instruction enabling teachers to integrate technology seamlessly into lessons is more productive than technology instruction that merely teaches preservice teachers how to use specific computer skills.

Despite perceived benefits of technology, including improved data collection, enhanced student computer skills, instructional variety, and communication across distances, many preservice education programs in the social studies have lacked adequate preparation in technology integration (Cantu, 2000b). Notably absent has been integrated training of technology into methods courses (Rose & Winterfeldt, 1998). In contrast, technology-rich institutions have focused attention on emerging teachers and the benefits of and barriers to technology integration (Keiper, Harwood, & Larson, 2000). Efforts have been made to collaborate across courses within a university and across educational environments to model effective technology use (Mason & Berson, 2000; Bolick, 2002; Rose & Winterfeldt, 1998). These initiatives highlight the necessity of ongoing professional development and support.

Mason et al. (2000) offer five principles as guides for the appropriate infusion of technology in social studies teacher preparation programs: (1) extend learning beyond what could be done without technology; (2) introduce technology in context; (3) include opportunities for students to study relationships among science, technology, and society; (4) foster the development of the skills, knowledge, and participation as good citizens in a democratic society; and (5) contribute to the research and evaluation of social studies and technology. They propose training that focuses on the integration of technology to enhance instruction in contrast to the acquisition of isolated technology skills.

> The challenge in preparing social studies teachers to use technology begins by highlighting how technology can be used to encourage inquiry, perspective taking, and meaning making, and thus facilitate "civic learning, deliberation, and action" (Cogan et al., 2000, p. 50). This begins with demonstrating the power of technology to support specific social studies activities and projects that together center on the development of children's (a) "personal civic beliefs," (b) "capacity for social and public action," (c) "ties to their localities and the world outside," and (d) "awareness of past present and future" (Cogan et al., 2000, p. 50). Providing such examples of what is possible when teachers within their social studies classrooms utilize emerging technologies is a vital first step in preparing teachers to fulfill the mission of the social studies. (Mason et al., 2000, p. 112)

Conclusion

Criticisms of the education system have reflected that students continue to receive an archaic education while attending school in the 21st century. Although the social studies has existed as a discrete discipline for over eighty years, traditional, teacher-, and textbook-centered methods of instruction dominate the classroom learning experience (Dunn, 2000). Technology has typically been assimilated into existing roles and functions of social studies instruction, and little in the way of transformations of teaching and learning occurred during the formative period of its use (Cuban, Kirkpatrick, & Peck, 2001).

New developments are contributing to a dynamic modification of technology integration in which the classroom becomes a site of active learning and thinking, fostered by the technological resources available. Yet this encouraging approach to the use of technology is still based on anecdotal experience, and needs further time for the educational impact to be assessed for its influence in facilitating inquiry-based learning, encouraging constructivist pedagogies, and disseminating an exchange of knowledge representations across regional settings.

In educational settings, effectiveness must also take into account the facilitation of students' learning. When social studies students put impressive pictures into a report and cite the latest information, the experience does not necessarily equate with the ability to formulate an original thought, engage in critical analysis, or avoid problematic cyber-activity. Direct instruction in online procedures to promote safe and effective educational outcomes has often been overlooked (Berson & Berson, 1999; Berson, Berson, & Ralston, 1999). The investment in the creation of technologically competent students necessitates modifications in the social studies curricula so that tasks are combined to facilitate students' utilization of their critical analysis skills to uncover bias and discriminate between quality information and tainted data (Berson & Berson, 2003).

How much progress has been made since 1996 in integrating technology into instruction? The World Wide Web, in particular, has expanded as a resource for the social studies classroom. However, the promise of the increased access to information has not been harnessed for purposes of optimizing its educational application. There is still a need for exemplary models that demonstrate innovative applications as well as guidelines for creative use and infusion of technology into instruction.

Martorella (1997) has warned of the "rapid obsolescence of both our technology and our discourse related to it" (p. 512). The life span of technology is brief, although education institutions

have attempted to extend the usability of their limited resources. The discipline of social studies has often disregarded its unique position to not only enhance education with advances in technological resources, but also to reflect on the impact of technology on our society. We have not yet identified what is beneficial, effective, or informative about the current use of technology in education (Berson, Lee, & Stuckart, 2001). We have lacked universal constructs regarding the integration of technology into the social studies and struggled to identify a theoretical basis to guide the selection and application of technology in the classroom.

The current marginalization of computers as a means to facilitate students' access to content does not take into account the potential role of technology in developing students' process of inquiry. Students may encounter online information that lacks authenticity, accuracy, and importance. Preparation of students to accommodate the challenges of online interaction necessitates more than mere technical proficiency. The expertise of a well-trained educator is crucial for evolving a disciplined inquiry of social problems by students (Saye & Brush, 1999).

This process includes recognition of the impact of technology on the development of society. Criteria for effective citizenship have changed due to the influence of technology, and the demands on students' learning and teacher instruction have been altered by the expansive access to information and subsequent processing required of technology-driven forms of knowledge. Concern about the social consequences of technology have driven some to suggest de-emphasizing technology in education (Postman, 2000; Stoll, 1999), while others have argued that effective instruction (particularly social studies education) must include a range of computer technology skills (Martorella, 1997). Yet the field of social studies cannot ignore the influence of technology on our society and is obligated to at least consider its political, sociological, psychological, historical, geographic, and economic effects.

The required shift in pedagogical style and perspective will only be accomplished by modifications in the training of social studies teachers with technology that provides a framework for integrating it with instructional practices to improve teaching and learning. Moreover, this training will not be forthcoming unless social studies teacher educators have empirical evidence of effectiveness to guide their reconceptualization and implementation of best practice. Empirically validated research focusing on the effects of technology in social studies classrooms is needed. The literature lacks longitudinal perspectives on technology and its impact on students or instructional performance in the field. There is a void of metacognitive studies, and many articles continue to be impressionistic or rely on data that tend to involve short-term analyses of single concepts.

Technology is at an exciting crossroad. The adolescence of technology integration into the social studies has been tumultuous. Some educators have made a stronger connection with computers and their curricular application, touting the opportunity to enrich students' learning and critical skill development. Others have cringed at the influence asserted by a tool whose power is largely based on the dream of its promise. The potential of technology in the social studies is still being realized, and patience combined with nurturance of its application must occur if social studies educators are to be responsive to the requisites of the electronic or knowledge age. If we unwittingly make excessive or disorderly demands on our technological resources, we will block the dynamic emergence of its potential. On the other hand, social studies educators have the opportunity to discover, activate, and channel these resources to evolve social studies technological thinking and practice, transcending its pubescent state to a mature level of development.

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