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Integrating technology and education

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Abstract

The following literature review challenges the idea of integrating technology into the educational curriculum. It will reveal the value of integrating technology into the curriculum, along with possible problems that might occur. Some of the problems examined in the review relate to the overwhelming amount of information found on the Internet, problems with the Internet trying to replace the current curriculum, safety issues involved with Internet use, and staff development concerns. The review also identifies what a model school integrating technology might look like and the influence it plays in the core subject areas.

Integrating Technology and Education

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Integrating Technology and Education

What is the purpose of technology integration?

President Clinton issued a challenge in the year 1996. His challenge was made to schools and educational leaders, and the goal was to prepare “technology literate” students by the 21st century. A later survey revealed that by 1999 more than 90% of schools had made significant curriculum changes (Kingham, 2003).

Many teachers believe that integrating technology into the curriculum is a key influence in their teaching, however simply having access to the internet does not ensure the same results as someone who is going beyond and creating an active learner. Kingham, (2003) identifies different levels of Internet use, with the higher levels being most reflective of best practices. Level one consists of teachers using the Internet as a resource for lesson plan activities. Level two would be sharing these resources with students. Level three is when students use the Internet as a part of a lesson. Level four is when teachers create new curriculum and projects that would not be possible without the Internet. Lastly, level five would be students creating their own projects using the Internet and the learner is self-directed. Unfortunately, a study in 1999 revealed that only 26% of elementary teachers involve their students with activities on the Internet and that the most common of these practices was simply downloading research information. Experts suggest that we must continue to encourage educators to move beyond these basic levels and support learners’ thinking at the levels of analysis, synthesis, and evaluation.

This review will examine some of the research on integrating technology into the curriculum. It will begin to identify some of the concerns with implementing internet use in the classroom and allow teachers to examine their current curriculum and make connections with

where technology might coordinate. As with any new material, it is important to examine how to assess it and identify the measures that educators will have to take to implement and stay current with the information. In the end, this review will allow professional educators to weigh advantages and disadvantages of technology use and provide examples for them to move past the simplistic levels of Bloom's taxonomy and make steps towards creating more active learners.

Methodology

This review was designed to analyze research on the integration of technology in education. Technology has become an integral part of our society and educators should be one of the key role models for implementation of this component. Unfortunately, schools are one of the last places to implement technology. This then leaves most students a step behind when closing the school doors and stepping into society and the workforce.

Current, factual information is a crucial component of any literature review. The process in finding this information has also become a step easier due to the topic of this review, technology! The research process has become a much simpler step in completing a literature review because there are now millions of resources at one's fingertips. Access to the World Wide Web has created an open library with an unlimited amount of sources and easy methods to use while critiquing the information. To begin the process, access to an online library such as Questia or HighBeam Research is crucial. These online sites create easy search engines for a variety of materials and allow a work space online to bookmark, highlight, and prepare material.

After narrowing the search to a chosen topic, it is time to choose appropriate material for the review. In order to choose the best information, it is critical to look at the source in which the material originates and the date of publication. This will allow the reader the opportunity to choose the most current information and make a decision as to whether or not the material comes

from a legitimate source. Once the reader has read the material, it is important to assess the article and make a judgment call as to whether or not this material should be used in the review. Some of the significant items to look for are; purpose, organization, voice/tone, and details. To examine each of these items, one may choose to implement a rubric similar to the one found at: <http://schools.coventryschools.net/flatrivier/Timberwolves/article%20review.html>.

This gives the reader set criteria to evaluate all articles and make the best possible choices for his or her review.

Analysis and Discussion

What is the value of integrating technology into the classroom?

Using the Internet as a tool in the classroom has led to an equity that one might not have expected. “In the past a considerable source of inequity between schools was rooted in the differences between the amount and quality of library resources they could afford. Through the Internet, assuming they have a connection, all schools, no matter what their budget or demographic profile, have access to the same amazing variety of resources” (Kingham, 2003, p. 1).

Researches feel that the Internet’s most influential tool is providing access to sources typically out of reach to students and educators. The Internet also provides numerous perspectives that surround issues. This leads into the next equity issue; bias’ dealing with controversial issues. Research done by Cramer (2005) investigates these issues and has found that implementing WebQuests are well suited to teach controversial issues with an unbiased approach. “Our view is that inquiry learning works best if teachers structure the exercise, and unavoidably imposing a degree of control, but creating a framework that allows significant scope for students to reach their own conclusions about controversial issues” (Cramer, 2005, p. 9).

Acknowledgements have been made to the fact that teaching controversial issues is a difficult task. Yet, experts encourage educators to meet this challenge as these issues play such an important role in socializing students and creating democratic civic participation. Fortunately, information found on the Internet is available to all students and is current information related to various perspectives.

While resources found on the Internet do provide equity in many areas, some may derive that these resources are not being used to their fullest potential. "Technology is a promise waiting to be fulfilled by teachers bold enough to realize its potential and seize the opportunity to bring the world into the classroom" (Hope, 1996, p. 150). Vanfossen (2001) researched how and when secondary social studies teachers in Indiana were using the Internet as a resource. Results proved to be discouraging, "nearly twelve percent of respondents indicated that they were using the Internet/WWW about as much as they desired. Interestingly, however, eight percent of respondents stated they had no desire to use the Internet/WWW in their classroom teaching" (Vanfossen, 2001, p.9). Amongst the educators using the Internet, participants were asked to indicate the degree to which they had engaged in different activities. Results indicated that the lower-order use types were those most likely to be used by respondents either "occasionally" or "frequently." Thus, it was clear that when these social studies teachers in the current study were using the Internet/WWW, it was nearly exclusively for information-gathering purposes (Vanfossen, 2001). Therefore, the goal would be to move past these lower-order categories and move up to the higher-order categories in Bloom's Taxonomy.

Using technology to construct meaningful learning is the key to technology integration. "Having access to the Internet does not guarantee that the information available will be used to construct meaningful learning" (Sunal, Smith, Sunal & Britt, 1998, p. 13). Students must be

involved in actively integrating new knowledge from the Internet into their existing knowledge. The Internet provides a means for communicating with others and for research that enhances teachers' efforts to help students construct new knowledge and reconstruct existing ideas (Wilson and Marsh 1995)(Sunal, Smith, Sunal & Britt, 1998). Active approaches to learning, in which students use technology for reading, writing, observing, using primary data, and problem solving, move away from traditional roles for students and teachers and toward a constructivist approach in which learning is centered on the students in real world contexts. Elements of constructivist learning are present when students, actively involved in learning, encounter ways to integrate their new understandings into their existing background knowledge (Sunal, Smith, Sunal & Britt, 1998).

In an attempt to continue evaluating the effects of the Internet with constructivist practices, we focus on students being actively engaged with activities that garner their own interests and experiences. These practices also offer opportunities for higher-order thinking that routinely take students beyond finding and reporting facts to forming and defending opinions and solving open-ended problems. A study by Green & O'Brien (2002) examined these questions in five fifth-grade classrooms in two schools in a district in upstate New York to see if well-supported Internet access changes practice in constructivist directions (Green & O'Brien, 2002). "The idea that students spend some time teaching others is also consistent with the constructivist theory" (Green & O'Brien, 2002, p, 2). Our study found that using the Internet promotes this type of peer interaction, and that it often allowed students to go one step further by teaching the teachers. The Internet allows students to find information not formerly known by the teachers. Students are likely to be energized and motivated as they report new information to teachers. Interviews with students and teachers allocated that this was a good thing and that students

enjoyed telling teachers things they didn't know. In this context, teaching may be defined as nothing more than sharing simple facts, although it is not necessarily limited to such a fundamental learning activity (Green & O'Brien, 2002).

To conclude this research, data indicated that the assignments using the Internet expected students to answer a number of factual questions. All but a few of the questions could be categorized as knowledge retrieval. It was clear that the addition of the Internet to the classroom had not yet increased the frequency with which students were expected to go beyond fact finding (Green & O'Brien, 2002). Nevertheless, looking at activities in the classroom that were not supported by the Internet also lacked higher-order thinking and was based on finding and reporting facts. This leads us to the conclusion that staff development regarding these practices is a crucial aspect.

What are the problems associated with technology integration?

Sifting through the information. A key benefit with technology integration is the vast amount of information that can be accessed in a matter of seconds. However, it is easy to get lost in irrelevant information while searching the Internet. This can in the end, lead to a bigger waste of time (Maroki, 2001).

Taking a closer look at information that can be accessed on the World Wide Web is also a critical step in any research process. Teachers in the Green & O'Brien (2002) study indicated that their library curriculum now contains a lesson that allows students decide if information from the Internet was reliable or biased. Unfortunately, they did not feel one lesson was enough. Many teachers understand that information on the Internet cannot always be trusted, but now the challenge is instilling that idea in the students. Teachers constantly need to encourage students

to evaluate what they find. This should be a good thing as the process of evaluating information goes beyond the simple retrieval of facts (Green & O'Brien, 2002).

Feldman expresses concerns about giving students a certain "recipe" to evaluate information found on the Internet. He feels they should instead emphasize the role of judgment, hypothetical thinking, and critical reasoning in examining data. Their prior knowledge and beliefs form the basis for expectations about what the data will show, setting the stage for them to be surprised by what they see and encouraged by what they find. Second, the ease with which students can analyze data is dependent on a number of factors which teachers and curriculum developers should consider as they select investigations for students or direct students in selecting their own. Surprisingly, we have found that teachers and curriculum developers typically do not analyze data before giving them to students. Correcting this common practice would go a long way in solving many of the problems that students, teachers, and developers encounter (Feldman et al., 2000, p.134).

Replacing the curriculum. Probably, the most major and serious drawback of the Internet is the possibility that the Internet will marginalize the core curriculum. Some educators argue that the traditional curriculum is typically not connected directly to the lives of most students; therefore, it can become outdated quickly and can seldom be individualized. On the other hand, they maintain that the Internet brings immediacy and individualization to the curriculum since the Internet brings up-to-date materials like articles, data, reports, surveys, photographs, maps and is capable of transforming the curriculum (Dyrli and Kinnaman, 1996)(Maroki, 2001). Learning should take place with information and activities involving the Internet and today's technology. The Internet should be integrated into the system but it should never replace it, rather it should be the means to an end not the end itself. Once the Internet becomes the end, then

the educational system is in a big dilemma (Maroki, 2001). The appeal of using technology needs to be tempered with careful consideration of the benefits teachers or curriculum developers expect. Technology opens many doors; educators need to be prudent in their choices about which doors to enter (Feldman et al., 2000).

Safety. While the World Wide Web may be like a huge encyclopedia (which is able to talk and break into full motion video), the Internet is the library where this encyclopedia is housed. Many wonderful things happen at the library besides reading. However, it is in this communications side of the Internet where some real dangers lie. It is here where sexual predators and persons wishing harm on children find sometimes-easy prey. Children unwittingly arrange meetings or give out personal information. While many schools are launching programs to teach students about the dangers that lurk on their home computers, very few schools venture into the communications portions of the Internet for curricular reasons because of the obvious danger there (Lynch, 2000).

Focus on Internet safety can vary with many different levels. There is now software that promotes proper use of the Internet. Generally a software company generates a master list of subjects, words, or images that are deemed inappropriate for children. These key words are fed into a program that does not allow children to view Web pages that contain the stated objectionable material. More sophisticated programs actually let the proper authority (parent, library director or principal) select the level of restriction. These programs generally allow the software to be turned off by the use of a password. Users can then readily add or delete sites from the master list (Lynch, 2000).

WinGuardian is software whose function is to monitor Internet use. This software reports Internet use to a designated e-mail so that teachers or parents can monitor children as they

browse. At pre-determined intervals snapshots are taken and stored as a graphic file in order to review what an Internet user has been viewing (Lee, 1999).

Overall, there are several steps a school district or parent can take to secure the safety of their children. A proactive approach on the school district's part is to establish an acceptable use policy. The first step a school should take is to set the ground rules for Internet use so that everyone -- from students to teachers to parents -- knows what is acceptable Internet behavior. An Acceptable Use Policy (AUP) clearly delineates how students are expected to make use of school-provided Internet access -- and how not to (Marcroft, 1998).

Looking beyond the steps of the school district, congress is also taking a proactive approach to ensuring our students' safety. In 1997, Teri Schroeder founded i-Safe America, a nonprofit foundation based in Carlsbad, California, whose mission is to educate and empower America's youth to safely and responsibly use the Internet. In recognition of i-SAFE's work, congressional leaders recently approved two earmarks for a total of \$3.5 million to launch the i-SAFE "Safe School Education Initiative and Outreach Campaign." Over the next year, the program will be introduced to schools in 25 states nationwide. Now, just as law enforcement officials have presented the dangers of talking to strangers on the street corner for years, trained professionals will enter classrooms warning children to avoid talking to strangers in online forums (Mckinley, 2002). Hopefully, all of these methods combined will allow students to safely use the Internet as the powerful educational resource it is.

Staff development. Technology has become an indispensable component in today's educational system. However, do the advantages of technology integration outweigh the disadvantages? Maroki suggests, "not enough thinking or research is conducted to explain the

way the latest technology should be integrated into the educational systems in the world” (Maroki, 2001, p. 1).

Research conducted by Green & O’Brien, (2002) indicated that teachers felt staff development regarding technology integration was a crucial component to successful integration. If districts expect teachers to use the Internet in a manner that increases higher-order thinking, they need to build this into their staff development plans. In our view, this should be part of the district's overall instructional plan rather than something that is solely relegated to the technology plan. It makes more sense from our viewpoint for the district plan for instruction to include the role of technology rather than a district technology plan that tries to change fundamental teaching practices. The key is to ensure the staff development program promotes active students facing cognitive challenges. This is at the heart of constructivist practice. Assignments should be designed to give students higher-order thinking tasks at the beginning, while showing them that fact finding is a way to solve problems and support conclusions. In the case of some of the projects that were investigated, students could have been told that forming and defending an opinion was the main task rather than the last of 10 questions. If possible, tasks should be open-ended so students will stop asking if they have the correct answer and start evaluating their efforts (Green & O'Brien, 2002).

Staff development must be more than showing teachers how to use computer applications and the Internet. Schools must model teacher professional development after workshops at institutions such as Stevens Institute of Technology. Since its inception in 1988, the Center for Improved Engineering and Science Education (CIESE) at Stevens has promoted the use of technology as a means to facilitate student learning and has conducted numerous workshops for

teachers to help them learn how to integrate different types of technology into their curricula (Mckay & Mcgrath, 2000). This model has proven to be successful for a number of reasons:

- * It promotes the integration of the Internet into traditional science and mathematics curricula in unique and compelling ways.
- * It provides a creative and stimulating experience for teachers trying to assimilate many new ideas and skills in the context of a project relevant to their own classroom.
- * It provides an ongoing support mechanism to help teachers develop and implement their projects.
- * It builds teacher confidence to a level that enables them to become mentors or to provide staff development to others in their school or district.

During the school year, teachers, working in teams of two to four per school, are released from their classes approximately once per month to attend full-day hands-on computer workshops at Stevens. To help keep teachers in touch with one another and with the CIESE staff, a listserv is set up so that all teachers can share their questions, suggestions for great Internet resources, and comments about the program via e-mail. Teachers are encouraged to read postings and to post their own comments on the listserv between workshop sessions (Mckay & Mcgrath, 2000).

In addition to work throughout the school year, a summer institute is also held to develop curriculum. Prior to the summer institute, participants and their school administrators meet for a special session. In this session, teachers, with input from their administrators, select a curriculum topic to develop into an Internet-based project during the upcoming two-week summer institute. Experience has shown that administrator input and support for the development of an Internet-based project are critical to ensuring its implementation in the classroom and its coherence with

district curriculum priorities (Mckay & Mcgrath, 2000). Finally, a 10-day summer institute is held and teachers are faced with developing an Internet-based project to enhance their curriculum. At the completion of the project, teachers are filled with renewed motivation and pride that they have completed a useful curriculum tool. As the following school year progresses, teachers return to the institute to celebrate successes and share problems with their experiences. The institute has found that this continued reflection is invaluable to successful integration (Mckay & Mcgrath, 2000).

Access to staff development at institutions such as the Stevens Institute of Technology would provide educators with many key resources to integrating technology, yet not all districts can afford training such as this. To begin in simpler steps, teachers must determine where technologies fit into their philosophy of teaching, including their beliefs about the nature of students and learning (Ross, Hogaboam-Gray, & Hannay, 2001). As Windschitl & Sahl (2002) noted, a teacher's beliefs about what constitutes good teaching and the role of technology in their students' lives all influence that teacher's technology use. According to Dimock & Boethel (1999), if these "underlying and often largely unconscious beliefs about teaching and learning" are left unexamined they can "diffuse efforts to change learning environments" (p. 38). Teachers need "opportunities to learn to be critical and reflective about their teaching" (Putnam & Borko, 1999, p. 1248). They need to collaboratively discuss "their beliefs about teaching and learning with one another, critiquing their own practice, systematically testing ideas and sharing their findings with each other" (Windschitl, 2002, p. 161)(Gibson & Skaalid, 2004, p. 578).

With this in mind, many curriculum developers have created successful models for teacher professional development to support this growth, including workshops with ongoing support, tutorials in teacher guides, online training workshops, and access to telephone and e-

mail help lines. These successful models should be emulated. The technology skills of teachers are likely the least difficult problem to solve. Teachers are starting to climb the technology curve more rapidly as computer technology becomes readily accessible, easier to use, and integrated into all aspects of their daily life (Feldman et al., 2000).

What does a model school look like?

Allen Independent School District in Dallas, Texas has focused on the integration of technology and is a prime example to other districts. This district recognizes that it can be difficult to get the right policies in place to ensure that every child has the tools to reach his or her potential. "Internet connectivity and the Web are central to the learning experience of all our students. In fact, every one of our 700 teachers has their own Web site that they use in varying degrees to support curriculum, facilitate communication and collaboration with parents and students, and extend the learning day to improve academic performance" (Jones, 2000, p. 34). Due to the success of the district's integration, they applied and were awarded an \$8.7 million Challenge Grant from the U.S. Department of Education. This money will be used to continue developing our technology initiatives, and then help integrate them into 290 other Texas school districts (Jones, 2000). The district attributes their success to Lotus Domino. The Domino Web server caught on so quickly that within one month the number of Web pages rose from 200 to 2,000!

This district attests that Domino's power and ease of use allows teachers to securely log into their sites from other browsers and instantly make changes to their page. Under Domino, the Web became an instant tool for engaging and collaborating with students, parents, and the community. This ease of use has also been seen in many of Allen's students. Students are now using Domino to build their own Web sites that support local businesses and charities in the

community. Allen representatives feel that this is a skill that will be utilized for many years after the students leave the school's doors.

The goal for Allen Independent School District is for teachers to begin putting all their professional development online. With Lotus LearningSpace, teachers will be able to access all their professional development online at their convenience, instead of having to sit in classrooms or stay after school. In addition, we're going to use LearningSpace to put our own courses on the Web. We also want to trim our curriculum and make it more dynamic, so we're taking all the good things teachers have done and putting them into Learning Village. An IBM solution based on Domino, Learning Village lets you take national standards and link them to engaging activities and authentic assessments, all in one spot. So, with a click of a button a fourth-grade teacher would know, "this is what I have to teach, this is how I teach it, and here are some valid assessments" (Jones, 2000, p. 34). We're also going to use Domino to put an annual calendar on the Web for the whole district. With so many activities going on, this would help students, teachers and parents with their schedules (Jones, 2000).

Allen officials say that in order to succeed with technology, every district needs a superintendent with a vision of how technology can make a difference. And that vision needs to be shared and made to happen no matter what. Budget can't be an issue or excuse. Try to bring in the entire community, use business partnerships to leverage your resources, apply for grants to make things happen (Jones, 2000).

How does technology influence the core subject areas?

Language arts. Literacy is primarily concerned with deriving meaning and understanding from a type or source of information. Advances in technology have added to the number of mediums students must understand--books, newspapers, television, the Internet, and

video games. Regardless of the medium, however, meaning making or comprehension is the goal. Thus educators today have the opportunity of combining new technology with their literacy instruction (Molebash & Fisher, 2003).

Technology is enabling many educators across America to work collaboratively to create information products that are useful and significant. Literacy and technology have come together in the form of READ posters and ReadingWeb projects. These activities engage children in reading, writing, and publishing as ways of responding to intermediate-level literature and sharing insights, reactions, and appreciation of books with others. The students' hard work and excitement are evident as their creations become public and serve as peer-teaching products for the school community. These projects draw upon both constructivist and cooperative learning models, allowing students to become "self-directed yet interdependent learners who can access and use a wide range of cognitive structures to transfer learning to contexts they have yet to encounter" (Kerka, 1997, p. 4)(Maslin & Nelson, 2002). The benefits lie not only in the process and creation of the final product, but also in the fact that teachers learn along with their students. As a result, educators expand their own learning by creating new opportunities for their students to incorporate technology skills. In fact, as these projects became public, teachers in other disciplines, as well as in other school districts, have applied these curriculum and technology integration techniques and replicated or adapted them for their own purposes (Maslin & Nelson, 2002).

Mathematics. "Recent studies show that the current U.S. position in mathematics and science education is inadequate considering existing competitive challenges" (Friedman, Jurkat & Pinkham, 1991, p. 1). Successful computer integration into mathematics instruction requires school systems to plan and acquire hardware and software, to establish pedagogical objectives

and curriculum strategies, to provide teacher training and mentoring, and to evaluate and revise methods (Friedman, Jurkat & Pinkham, 1991).

In the Principles and Standards of School Mathematics the National Council of Teachers of Mathematics (NCTM) identified the "Technology Principle" as one of six principles of high quality mathematics education. This principle states: "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning"(Lederman & Niess, 2000, p. 345). Technology is being incorporated into teacher education in numerous ways. It has been our experience that the most effective way to use technology to bring about enhanced student learning of mathematics is to prepare preservice teacher to incorporate into their teaching an array of activities that engage students in mathematical thinking facilitated by technological tools (Lederman & Niess, 2000).

Science. At the recent National Technology Leadership Retreat, representatives of national organizations met to consider the integration of technology into the preparation and professional development of teachers. At this conference, participants were asked to consider DRAFT standards for the integration of technology in various subject matter areas. The following is a list of the proposed standards.

1. Technology should be introduced in the context of science content. The first principle is centered on the notion that technology should not be taught merely for its own sake in the preparation of science teachers. Features of technology should be introduced and illustrated in the context of meaningful science. In other words, technology should be presented to preservice science teachers as a means, not an end.
2. Technology should address worthwhile science with appropriate pedagogy. Teaching science for understanding, rather than for rote memorization, requires students to be

active participants who are engaged in asking questions, observing and inferring, collecting and interpreting data, and drawing conclusions.

3. Technology instruction in science should take advantage of the unique features of technology. Technology modeled in science education courses should take advantage of the capabilities of technology to extend instruction beyond, or significantly enhance, what can be done without technology.

4. Technology should make scientific views more accessible. Many scientifically accepted ideas are difficult for students to understand due to their complexity, abstract nature, and/or contrariness to common sense and experience. Appropriate educational technologies have the potential to make scientific concepts more accessible through visualization, modeling, and multiple representations.

5. Technology instruction should develop understanding of the relationship between technology and science. Technologies are simultaneously tools for learning about science and examples of the application of knowledge to solve human problems (Lederman & Niess, 2000).

Social studies. Social studies instruction, in particular, can be greatly enriched through use of the Internet. For example, students can check the U.S. Census Bureau's "pop clock" to watch it continuously display the changing numbers of people in the United States and the world. With that information they can graph the rapid rate of change and discuss its implications. They can delve into some of the holdings of the National Archives (<http://www.nara.gov/nara/nail.html>). They can compare a present-day map of a region in the United States with one of the same region from a century ago. From C-Span

(<http://www.cspan.org>), they can obtain current information about the U.S. government's activities (Sunal, Smith, Sunal & Britt, 1998).

Research findings show positive results when integrating technology into the social studies curriculum, however, the key is “when it is being integrated in”. Research shows that there continues to be a lack of infusing technology into the curriculum. Some experts conclude that a lack of training is the reason behind this. “To fully utilize the technology that is available to teachers in the classroom, serious work needs to be done to train teachers in the best use of technology” (Kingham 2003, p. 7). “The presence of technology in the classroom does not automatically inspire teachers to rethink their teaching” (Vanfossen 2001, p. 1). Educators must be informed on how to utilize this tool and how to integrate it into their existing curriculum. “Indeed, national data have suggested that eighty-five percent of all teachers had less than nine clock hours in general computer training and that Internet/WWW training was therefore some subset of these nine hours” (Vanfossen 2001, p.1). Even though it is evident that access to the Internet/WWW has grown, it still appears to trail behind. Many teachers lack the training on how to use the Internet in meaningful ways, while many others lack the training on how to deal with technological problems that might stop them in their tracks. This level of discomfort may be partly to blame for the infrequent integration of technology into the curriculum. To maximize the technology that is available to teachers we must minimize this level of discomfort and begin training our teachers in the best use of technology.

Conclusions and Recommendations

While weighing the advantages and disadvantages regarding the integration of technology in the classroom, it truly becomes a personal decision. One must review the

problems associated with technology and Internet use and decide if they outweigh the advantages of this powerful learning tool.

This review identified four major problems associated with the integration of technology. The first problem is sifting through the information. The World Wide Web is a huge resource filled with an un-limited amount of information. This information can be very beneficial, and very overwhelming. One must remember to stay focused while searching the Internet and always assess the information found online. The second major problem identified was remembering not to allow the Internet and technology to take over the role of the curriculum. Some researchers argue whether or not technology will one day take over the role of the educator. The majority of these voices cannot foresee this source of medium ever being more beneficial than face-to-face instruction. Therefore, educators must remember to view technology as a tool. We must always look for ways to connect current curriculum with this tool and use it to its fullest potential. The third problem addressed was a major problem that is now being examined by law enforcement. This problem regards the safety issues accessing the World Wide Web. Access to the Internet opens many doors for students, but it also opens some doors that students should not enter. Software companies, schools, parents, and communities are doing as much as they possibly can to ensure the safety of students and continue to make access to this tool as pliable as possible. The final problem addressed in this review was in regards to staff development. Teachers, students, and parents have become overwhelmingly excited about the use of technology in schools. Unfortunately, without the backing of school officials in the district, very little of this is possible. Schools must begin to put technology on the front burners and allocate time to teach teachers. We must use this time to not only teach them how to use these applications, but how to connect it to their own curriculum. If technology is readily

available and plans are in place to integrate technology into the current curriculum, it should create a win-win situation for all involved.

After examining the disadvantages associated with technology integration, we must remember to weigh these against all of the benefits it has to offer. There are several levels of technology use, but there are also several levels of teaching. To move students beyond the basic knowledge level is a challenge whether one is implementing technology or not. Educators must remember that being comfortable with their current curriculum, might lead to a disservice to the students they are serving. In order to provide students with the best possible learning experiences, we must open our own doors of learning and be willing to challenge our own beliefs and methods.

Overall, technology opens many doors to the current educational system and provides experiences for students that will assist them in the future. The Internet is bound to become an inseparable part of all the educational systems in the new millennium. In fact, in some systems, like the American educational system, the Internet has become an indispensable part without which the educational system can not function any more (Maroki, 2001).

With this in mind, to integrate technology successfully, we must remember there are pitfalls that go along with the successes. To avoid these pitfalls, the Internet should be incorporated properly into the curriculum. The only way to achieve this is the use of the Internet as a secondary rather than as a primary means, i.e., to employ the Internet as a means rather than as an end (Maroki, 2001).

References

- Cramer, Judith (2005). Women, WebQuests, and controversial issues in the social studies. *Social Education*, 1-13.
- Feldman, A., Konold, C., Coulter, B., Conroy, B., Hutchison, C., & London, N. (2000). *Network Science, a Decade Later: The Internet and Classroom Learning*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Gibson, S., & Skaalid, B. (2004). Teacher Professional Development to Promote Constructivist Uses of the Internet: A Study of One Graduate-Level Course. *Journal of Technology and Teacher Education*, 12(4), 577+. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.
- Green, D. W., & O'Brien, T. (2002). The Internet's Impact on Teacher Practice and Classroom Culture. *T H E Journal (Technological Horizons In Education)*, 29(11), 44+. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.
- Hope, W. C. (1996). It's Time to Transform Social Studies Teaching. *Social Studies*, 87(4), 149-151.
- Jones, P. (2000). The Power of Web Collaboration. *T H E Journal (Technological Horizons In Education)*, 27(10), 34. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.
- Kingham, Melanie (2003). Infusion of Technology into the Curriculum. *Journal of Instructional Psychology*, 1-9.
- Lederman, N. G., & Niess, M. L. (2000). Technology for Technology's Sake or for the Improvement of Teaching and Learning?. *School Science and Mathematics*, 100(7), 345. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.

- Lee, A. (1999). Focus on Internet Safety. *T H E Journal (Technological Horizons In Education)*, 27(2), 80. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.
- Lynch, P. J. (2000). Curricular Management of the Internet: Beyond the Blocking Solution. *T H E Journal (Technological Horizons In Education)*, 27(8), 80. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.
- Marcroft, T. (1998). Safety First: Managing the Internet in School. *T H E Journal (Technological Horizons In Education)*, 26(5), 71. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.
- Maroki, N. (2001). The Impact of the Internet on the Educational Systems in the New Millennium. *Education*, 122(1), 36+. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.
- Maslin, J. E., & Nelson, M. E. (2002). Peering into the Future: Students Using Technology to Create Literacy Products. *The Reading Teacher*, 55(7), 628+. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.
- Mckay, M., & Mcgrath, B. (2000). Creating Internet-Based Curriculum Projects. *T H E Journal (Technological Horizons In Education)*, 27(11), 114. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.
- Mckinley, S. K. (2002). Campaign Promotes Safe, Responsible Internet Use for Students. *T H E Journal (Technological Horizons In Education)*, 30(5), 12+. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.
- Molebash, P., & Fisher, D. (2003). Teaching and Learning Literacy with Technology. *Reading Improvement*, 40(2), 63+. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.

Sunal, C. S., Smith, C., Sunal, D. W., & Britt, J. (1998). Using the Internet to Create Meaningful Instruction. *Social Studies*, 89(1), 13-17.

Using the Internet to Strengthen Curriculum. (2001). *Education*, 121(4), 756. Retrieved July 19, 2005, from Questia database, <http://www.questia.com>.

Vanfossen, Phillip J. (2001). Degree of Internet/WWW Use and Barriers to Use Among Secondary Social Studies Teachers. (Statistical Data Included)", (*International Journal of Instructional Media*, 1-18.