



The Impact of Technology on Education: Issues and Concerns

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Abstract

Technology has had a great impact in the field of education and has received considerable attention in recent years. More and more schools are filling their classrooms with computers. Technology entails using computers and advancing technological discoveries to create more in depth learning within classroom. The goal is to improve education with the use of technology. Obtaining this goal depends on several key factors such as the technology plan of the district, professional development of the staff, funding, the suitability of the physical plant for the technology, and the personal commitment to the plan by everyone involved.

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Introduction

In today's classrooms, the use of technology seems to be a growing trend, a trend that presents several challenges to both administrators and teachers. Technology is an increasingly popular activity in American classrooms. Students can learn from technology and they can learn with technology. Technology has been introduced into schools because it is believed that it can have positive effects on teaching and learning (Reeves, 2006). As technology becomes more sophisticated and as its cost per unit goes down, its accessibility as an instructional tool in classrooms has increased. Moreover, widespread conventional wisdom indicates that our children will grow up to inherit a world that will be linked by technology, so that it is important that they are familiar with it. Not only it is a challenge to schools and districts to procure the latest hardware and software for classroom use, it is also necessary to train teachers in its effective use. However, the goal is to improve education with the use of technology. Obtaining this goal depends on several key factors: the technology plan of the district, professional development of the staff, funding, the suitability of the physical plant for the technology, and the personal commitment to the plan by everyone involved. With these thoughts in mind, this paper examines the above factors.

Technology Plan

Every school district should have a vision when it comes to technology. This vision is most generally in the form of a "Technology Plan." According to Shelly et al (2002) a technology plan is an outline that specifies the school district's procedures for purchasing equipment and software and training teachers to use and then integrate technology into their classroom curriculum. Each organization, whether it be a district or an individual school, need to spend time developing and updating a comprehensive plan, starting with its vision, mission, and goals. Every decision made should be one that supports the districts vision. The degree of success that a school has in implementing technology will depend, in part, on the quality of its technology plan. This plan should be a well thought out guide of how technology is going to be implemented within the district. The technology plan should contain the ideas of an entire school community and is connected to the overall goals of the school.

In order for a plan of this nature to be successful, there has to be simultaneous bottom-up (teacher level) and top-down (school administrator level) approach, to produce significant and long lasting educational improvement. Leadership is the single most important factor affecting the successful integration of technology into the classroom. This is true at both the state education and school education levels. Research has shown that states with the most successful technology programs are those that have had "visionary governors, legislators, and Department of Education staff" who are committed to the use of technology as a tool for teaching and learning. Similarly, those schools that have made the most progress are those with energetic and committed leaders. The principles must have a clear idea about how technology can support the best practices in instruction and assessment, use technology fluently, and participate actively in the professional development opportunities available. The principal who expects to



see technology used in the classroom but does not know how to use the technology, sends a mixed message to everyone else.

Professional Development

Many plans lack a detailed component or a plan for professional development that covers the broad range of skills teachers and administrators need. Professional development is also a key factor to the success of any program, especially one involving technology. Many schools have invested heavily in information technology hardware facilities, but have failed to provide appropriate amounts of professional development for their teachers. This still seems to be a major stumbling block associated with the growing use of technology. If our teachers are not adequately trained, then our students are not going to receive the full benefit of the technology at hand. Schools are still making the big mistakes of putting thousands of dollars toward technology (hardware, software, etc.), but not providing enough professional development for their staff. One error that is common amongst schools is the fact that they tend to develop more technology programs or courses, instead of concentrating on increasing integration of technology throughout their current programs through professional development. All the technology in the world will not make a school or curriculum any better if the staff is not adequately trained to use it properly.

Truly integrating technology into teaching and learning is a slow, time-consuming process that requires substantial levels of support and encouragement for educators. According to Haugland (2000) integrating technology into classrooms may make a significant difference in students' developmental gains or it may have no effect at all or actually reduce students' creativity. Research has shown that in technology poor schools, the process of integrating technology takes even longer. There seems to be a correlation between the amount and level of technical assistance provided and movement along the continuum of technology integration. The schools that receive the most attention are making the most progress.

Funding

Another major factor in the process of applying technology to education is the amount of funds available to a school district for technology. Technology is not a cheap venture and advances so quickly that purchases have to be made, year-in and year-out, to stay current with technology needs. There have been many programs put in place by both the state and federal governments to help districts off-set the cost of technology. The price for computers, software, staff training, Internet access, and wiring can quickly add up. In 1996, the federal government came up with the "E-Rate" national initiative to make Internet access affordable for schools and libraries (Goodman et al, 2001). Since 1996 the E-Rate program has given out technology discounts with worth more than a billion dollars. Some districts used these funds to hire technology directors to oversee the equipment and apply for such grants. For most schools, though, a grant writer or technology director is someone that they cannot afford, so they rely on interested teachers and parents instead (Halpert, 1999). Some districts turn to local businesses for some extra funding for programs and equipment that they would not otherwise be able to support. The business world is also quite interested in schools learning to make more effective uses of technology. Local businesses donate millions of dollars a year to support these programs which they will ultimately reap the benefits of by having better trained and more qualified applicants to choose from.

Suitability of Physical Plant for Technology

Many districts have had to make on extensive reconstruction projects in order to get their building infrastructures to a point where they can now handle the impact that technology has put on them. Most of these buildings were constructed prior to the on-slot of the technology age. Widespread implementation of computers in schools began in late 1960s and of microcomputers in the 1970s (Ely, 2008). By 1994, the percentage of schools with Internet access was significant – 35 percent – and by 1999, the percentage has risen to 95 percent (Means, 2000). In 1994, only 3 percent of United States classrooms had Internet access. By 1997, the proportion of connected classrooms had grown to 27 percent. Sixty-three percent of United States public school classrooms had Internet access by 1999, according to National Center for Education Statistics data (2000). According to the United States Department of Education (2002), in fall 2001, 99 percent of United States public schools had computer equipment and access to the Internet. The same report indicated that in 2001, 51 percent of United States schools with access to the Internet made computer available to students after regular school hours; 75 percent of public schools had a school Web site; and 85 percent of schools used broadband connections.



The need for more electricity and wiring for data becomes a must as more and more computers begin to populate student teacher desktops. All of this is a must or it is a waste of time and energy to provide technology training when teachers do not have the resources, opportunity, and support needed to apply their knowledge and skills.

Personal Commitment

The biggest of all challenges, integrating the technology into the classroom curriculum, is a continuous and expensive process. Over the past few years the need for integrating technology into classrooms has been gaining widespread attention. In fact, the ISTE Foundation Standards were developed to ensure that all educational professionals are up to speed with fundamental technological applications. "The International Society for Technology in Education has produced a set of standards related to what teachers should know and be able to do concerning technology" (Schwartz & Beichner, 1999, p. 4). It becomes important for teachers to meet these standards so they are equipped to educate students on cutting edge technology, while enhancing their own methods of instruction.

A component to the integration of technology in the classroom has been the implementation of distance learning. Distance learning "takes place when the teacher and student are separated by physical distance and technology (i.e., voice, video, data, and print) is used to bridge the instructional gap" (Levitch, 2003, p. 42). In recent times we have seen the development, improvement, and progression of distance learning practices. Robertson (2000) states that there is a five phased way of integrating technology into a classroom. These five phases are planning, research, development, refinement, and implementation. Using these five steps can help integrating technology into the classroom. Unfortunately, in most schools, teachers have only had access to the basic types of training in which they learned to use a single application. And, like the general population, there are some teachers who embrace change, while others resist it. There are some research-based practices and common sense strategies that can be implemented to enhance the likelihood that teachers will begin using technology. Marra (2004) suggested that online classes may be helpful in providing current, up-to-date professional development training in the area of technology integration. Teachers have a difficult time applying technology skills in the classroom unless it is directly linked to the curriculum, teaching strategies, or improvements in achievement.

World Wide Web

There are a number of entrances onto the Internet. One is through e-mail. Another is through the World Wide Web (WWW). In 1992, there were only 50 pages on the Web. As of February of 1999, there were at least 800 million web pages containing more than 6 trillion characters. Just a year later in February of 2000 it was estimated that the Web had grown to one billion indexable pages with at least 67,000 new sites being added each day (Maddux et al, 2001; Bitter & Pierson, 2005). The Web became an important educational aid to communication as well as storage and retrieval of information. Students and teachers have increasing access to almost limitless amounts of information on the World Wide Web. In addition, the use of such application packages as word processing, spreadsheet, and database software for school assignments has grown considerably since 1980s. Many teachers are requiring work to be done using word processing and spreadsheet type of software. More and more, students are building Web pages and using multimedia presentations to present the projects that they have completed. With this type of technology readily available, teachers are able to assign projects to students that they otherwise would not have been able to assign. Students, through the Web, have access to all kinds of information, as well as having the ability to chat with researchers and other professionals directly related to the topics of study (Cafolla, 2006).

The Web, as good of a resource as it is though, does not come without its drawbacks. The requirements to connect to the Web, sometimes presents a problem to many people, both in and out of the classroom. System requirements, such as the size of the computer, the speed, types of writing, etc. all may present accessibility problems. The World Wide Web is disorganized, overrun with advertising, and also may even be susceptible to people of malicious intent. With the business and entertainment world out in front driving the network technologies, the rate of increase in Internet access and use within the United States schools has been phenomenal. Early on, few schools did not have enough equipment or knowledge to supply their classrooms with the Internet. By 1999, approximately 95 percent of the school districts throughout the United States had Internet access in each and every classroom (Means, 2000). In addition,



according to Garcia and Rose (2007), most faculty see the web as an electronic database or library, and while they themselves may communicate with colleagues electronically, they rarely see the web as a place for their students to collaborate interuniversity. They further state that consideration of the web as a venue for publication or opportunity for electronic mentoring is limited.

Discussion

One of the greatest challenges facing tomorrow's teachers to use technology is to make a link between educational technology innovations, promising practices for teaching and learning with technology, and increases in student achievement. This may be replicable in other educational institutions, including schools, districts, and institutions of higher learning. However, participating teacher must be able to clearly identify the standards they are addressing in their instruction; articulate the specific knowledge and skills that are to be fostered by using technology; and carefully observe student behavior in creating and refining their work.

The minds of the educators have been going in various directions with implementing technology into the curriculum. Teachers are using technology as not only a teaching aid, but as a major source of information for both themselves and the student. Some teachers have gone as far as modeling their curriculum around the everyday philosophy of the business world. Breaking down assignments and approaching them using the technology processing cycle to achieve the final result. Technology provides conditions conducive to meaningful learning: real-world contexts for learning; connections to outside experts; visualization and analysis tools; scaffolds for problem solving; and opportunities for feedback, reflection and revision.

There are programs such as "The Global Learning and Observation to Benefit the Environment (GLOBE)", "The Knowledge Forum" formerly known as "Computer Supported Intentional Learning Environments (CSILE)" (Means, 2000). These programs help elementary and secondary school students learn science by involving them in real scientific investigations. By using these types of programs, students gather and submit data from all over the world to a central archive, where it is combined with data from other students to develop a wide range of conclusions. This data may also be used by scientists who participate with the students on projects where they may visit classrooms or exchange e-mails with students. Taking the classroom beyond the doors of the schoolhouse is becoming more and more beneficial as technology advances. There are software packages such as "Thinker Tools", which is a middle school visualization and analytical software. As students progress, they are exposed to more complex simulations, in this case underlying Newtonian mechanics (Means, 2000).

Although such technology is prominent in educational literature, this does not represent the entire mainstream educational practice within the United States. Still the most commonly assigned use of technology is still the world processing. Students are still asked to retrieve information from CDs provided to the class. Approximately 70 percent of all teachers have high-speed internet connections in their classroom. Despite that number, interactive uses of the Internet are still relatively infrequent. With the insurgence of "Distance Learning", it is now conceivable for a student to graduate at home by taking courses online. As Shelly et al, (2002) state, online courses help prevent overcrowding and provide instruction for homebound students. Online courses also allow less-populated districts, and schools in rural areas, to share teachers. By pooling resources and linking students from more than one school into an online course, school districts can expand the number and type of classes they offer. Furthermore, growth in online education causes schools to invest "huge resources" in online education (Reid, 2003, p. 17).

Many teachers now are Web-enhancing their classes. By Web-enhancing their classes, teachers provide their students with resources to enrich their learning experience. Another benefit of using distance learning in the classroom is having students interact with subject area experts using Web resources, including real-time Web resources. Many scientists want to increase educational opportunities for students, who someday may decide to become scientist. The Smithsonian Institute, for example, permits teachers and students to interact with the actual scientists who work for the Smithsonian via the Web. With this type of education being offered, it opens up the doors to a truly unlimited amount of knowledge. Children have the ability to take courses that may not be offered in a particular school district.



Conclusion

Computer-based technology has profoundly changed the world we live in, and will continue to do so as it continues to evolve and is made accessible to more people. Today's classrooms are much different than they were only decade ago. With increasing access to almost limitless amounts of information on the World Wide Web and the power of today's equipment, what teachers and students can use together may be truly remarkable. Education of today and the future will become more and more challenging for educators. With the technological advances in society, the educational process becomes more and more crucial everyday. Today's student has an unlimited knowledge base, even if living in the most remote areas of the world.

One can also see that just having all of this technology in ones classroom or school district is not going to make a teacher a better teacher. Today and in the future, educators will have to be and more proactive. They have to be willing to go out and learn on their own. The more ways they can find to integrate technology into the curriculum, the more successful both themselves and the students will be. This will also make the job of an educator easier because students will be more willing to learn and expand their knowledge.

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