Integration of technology in our classrooms: A divisive issue

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**Abstract**

The integration of technology in education has been the goal for many educators for many years. This integration has made great strides in the past two decades, but at the same time it faces many significant challenges for the future. This paper presents background information about the use of technology, followed by an examination of benefits and detriments that are derived from effective integration of technology. Finally, the educational goals for students are discussed.

**Introduction**

The use of technology within the classroom continues to be a divisive issue. Educators and researchers grapple with the use of technology being either a benefit or a detriment. In a 1993 forum sponsored by the Federation of American Research Networks (FARNET) and Consortium for School Networking (CoSN), participants concluded that when properly implemented and supported, technology can empower and excite students and teachers (Cradler & Bridgforth, 2005). When used effectively evidence points that technology applications can support higher-order thinking by engaging students in authentic, complex tasks within collaborative learning contexts (Haertel & Means, 2003). On average, students who used computer-based instruction scored at the 64th percentile on tests of achievement compared to students in the control conditions without computers who scored in the 50th percentile (Schacter, 1999). Critics argue that there is no worthwhile research to support claims that technology is worthwhile in schools (Salpeter, 2000).

Salomon (2002) argues that technology cannot make a difference "as long as

it is being domesticated and trivialized to be totally subservient to on going practices. Emasculated tools cannot harm, but they do not do any good, either" (p. 71). If teachers do not know how to make use of technology within the classroom then students are less likely to apply what they learn with technology. According to Earle (2002), less than half of teachers actually use computers for instructional purposes. Instead, they use the computers for word-processing, spreadsheets, or graphics for personal use only. The National Council for the Accreditation of Teacher Education (NCATE) and the International Society for Technology in Education (ISTE) have produced a set of standard related to what teachers should know and be able to do concerning technology. It is the choices of the colleges and universities to decide how to incorporate technology into the education majors' requirements. Willis and Raines (2001) notice that despite all of these efforts most education students graduate without incorporating the role of technology into their classroom pedagogy. According to Earle (2002),"teachers have to come up with a strategy or pedagogy to make it [technology] work" (p. 6).

If technology is an appropriate vehicle for promoting meaningful learning, why is it difficult to incorporate technology within the classroom? There seems to be skepticism about technology use being "glitzy toys" and "bogus stuff" in the middle of an "educational catastrophe" where children cannot read or write. Proper training is necessary to remove the skepticism. Educators need to learn how to use technology as a device to support communication and collaboration. According to Franklin (2007), relatively few teachers feel well prepared to integrate educational technology into classroom instruction. The NCES (2000. 2002, 2005) reported that

only about one-third of elementary teachers in the United Sates felt well prepared or very well prepared to use computers and the Internet for classroom instruction, and less experienced teachers felt better prepared to use technology than their more experienced colleagues.

**Advantages**

**Active vs. Passive Role**

Roles change as students use technology as a tool or as a support for communicating with others. Instead of taking on a passive role of receiving information from the teacher, students take an active role in learning. The opportunity to work on authentic, meaningful, and challenging problems is provided when technology is used within the classroom. When students interact with data this promotes student-directed learning, and builds knowledge collaboratively. Teachers are given the opportunity to act as facilitators or guides. Students are enabled to solve real-world problems, retrieve information from online resources, and connect with experts (Singh & Means, 2000).

*Increased Motivation and Self-Esteem*

A universally reported effect is the increase in motivation that occurs when students become involved with technology. Students with less initiative or facility with conventional academic tasks have shown a level of technology-based accomplishment. Some teachers report that there is a greater willingness to write or to work on computation skills. As Singh and Means (2000) state technology presents a very different set of challenges and different ways in which students can demonstrate their comprehension compared to conventional classroom settings with

verbal knowledge or multiple-choice test performance.

**More Collaboration with Peers**

Teachers cited that another benefit of using technology is that there is an increased inclination on the part of students to work cooperatively and provide peer tutoring. For obvious reasons collaboration is fostered among students working in small groups or pairs due to the limited amount of computers. When a student masters specific computer skills there is pride and enjoyment derived from helping other peer students. The style and the tone of the atmosphere facilitates more facilitating with the collaboration within the classroom (Singh & Means, 2000).

**Increased Use of Outside Sources**

Another found benefit of using technology is that 10 out of 17 classrooms observed an increase in the use of outside resources. Sources such as telecommunications, satellite broadcasts, fax machines, and the telephone were brought for use of resources (Singh & Means, 2000).

**Improved Design Skills/Attention to Audience**

When there is collaboration on multimedia product, students have an increased awareness that their peers will be reacting to the project. Students are paying attention to how an idea is being portrayed to the audience through text, video or animation (Singh & Means, 2000).

## Disadvantages

**Expense**

Funding is still a major barrier for many schools. Some 72% of large school districts say they face barriers in providing their schools with access to the Internet.

About one-third of all districts cite hardware as a barrier, while 16% report that software is a barrier. Urban school districts are more likely to report barriers to Internet access than suburban or rural districts. Equally, 16% of all school districts surveyed report that lack of time for staff training is a barrier to providing school access to the Internet (National School Boards Foundation, 2009).

**Lack of training**

According to the National School Boards Foundation, 43% of district leaders surveyed rate new teachers as only "average" when it comes to their competence in integrating the Internet into their instruction.  Thirty-one percent rate new teachers as "expert" and 26% rate them as "novice" (National School Boards Foundation, 2009)

## Educational Goals

Before technology can be used effectively within the classroom, the school needs to ensure that technology will support the educational goals for students.  A clear set of goals, expectations, and criteria of the use of technology for student learning should be developed.  Technology should support the efforts of these goals. Classes should be well designed, responsive to the learner, interactive and consistent with the educational goals of the school.  The learning goals should drive the technology use, not the technology for technology sake.

**Clear measurable goals**

- Technology is a means, not an end
- Technology is best used in teaching and learning activities that are not possible without it
- Teachers should select the best medium, and make it available to students as they guide their learning.

**Methods and Procedures**

Changes in the structure of the school are necessary for supporting effective learning with technology. Longer class periods and more time for team teaching and interdisciplinary work should be made. Daily 30 to 40 minute periods work best to find, explore, and synthesize for materials on a long-term research project. Students can make use of online resources such as artwork, scientific data, and historical documents to compile their research on a project.

Other necessary elements for effective use of technology in education as shown in Figure 1 include: suiting technology to education goals and standards; have a vision for the use of technology to support curriculum; provide for both in-service and pre-service training; ensure access to appropriate technology; provide for administrative support for technology use; provide time for teachers to plan and learn how to integrate technology; and provide for ongoing technical support for technology use (Cradler & Bridgforth, 2005).

**Figure 1. Necessary elements for effective use of technology in education**
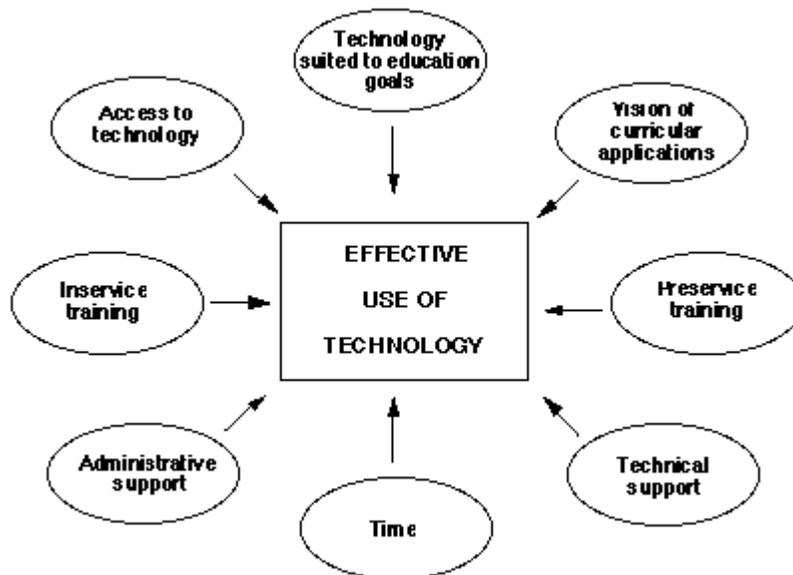
Source: Cradler & Bridgeforth, 2005.

**Needs Assessment**

Teachers need to consider the rationale, goals and objectives of the instruction. They also need to consider characteristics of the class, the environment of the learner, the materials and resources needed for instruction, and the technology resources currently available to them. Table 1 lists the percentage of how teachers use the Internet for instructional purposes.

Table 1. Teachers' use of the Internet for instructional purposes

| How do district teachers use the Internet for instructional purposes? | Percentage of respondents |
| --- | --- |
| Internet searches | 74% |
| Teacher research | 72% |
| Lesson planning | 38% |
| Demonstrations, presentations | 18% |
| Utilizing Internet services | 10% |
| Student projects | 8% |
| Student research | 7% |
| E-mail | 5% |
| Videoconferencing | 5% |
| Class Web pages | 4% |
| Student information services | 3% |
| Other (distance learning, desktop publishing) | 5% |

Source: National School Boards Foundation, 2009

**Instructional Strategies**

Educators should sketch out a lesson plan that includes the instructional goals, objectives, and materials needed for the lesson and incorporate Gagne's nine events

of instructions.

### Gagne's nine events of instruction:

1.) Gain attention – grab the learner's attention
2.) Establish objectives – create an overview that explains the lesson and informs students of the objectives.
3.) Stimulate prior recall – set the stage for the lesson.
4.) Present lesson content – provide the lesson content with definitions and examples.
5.) Provide learning guidance - give students opportunity to interact with the material with guidance and independently.
6.) Elicit performance – utilize strategies that help students internalize the new skills and knowledge.
7.) Provide feedback – allow for feedback and interpretation of the new information.
8.) Assess performance – determine best ways to assess the students learning.
9.) Enhance retention and transfer – develop ways for students to demonstrate that they can transfer their learning from this lesson to another situation. (Kruse, 2009)

**Discussion**

As a modern civilization we have grown accustomed to automobiles, calculators, telephones, mega-malls, refrigeration, television, airplanes, and computers being in our lives, at work, at home, and at school. There is no doubt that technology is an integral part of our current society, it is relatively new, but like many innovation, it is here to stay. For many years computer literacy, if not expertise, has been a requirement for a number of office and managerial positions. It is only in recent years that the same expectation has been voiced for those in the teaching profession. Many groups and individual have sought funding for and the donation of computers for school libraries and classrooms as well as the educational software to ensure students obtain the best education possible. One problem that has come to light as a result of this increased technology in schools is the lack of preparation teachers

have in terms of computer knowledge, literacy, and expertise. In response, many state governments and teacher training colleges have made courses and instruction in technology mandatory for graduation. It is most beneficial to maximize the individual learning potential of prospective teachers; consequently, their future students will also profit. The next step for the administrators who implemented this recent teacher prerequisite is to customize the courses such that students at each stage of computer knowledge can learn and excel above and beyond their current level.

The first consideration in implementing courses on technology in education programs is to assess the students' prior knowledge. Students who enter an education program with limited or no computer literacy have different needs than those who enter the same program with greater than a working knowledge of computer hardware and software. It is crucial that these students have the opportunity to learn and be able to use computer knowledge that surpasses their current level. This requires a challenging curriculum that does not bore nor discourage the students. In order to achieve this, it may be necessary to implement more than one level of instructional technology. Each student will be able to receive individual attention specific to their own needs and will accordingly achieve success based on the new knowledge they attain in the course.

In order to enroll education students in the appropriate level for a course on technology, teacher's training colleges may need to administer questionnaires. Students can answer questions related to their command and knowledge of technological uses, ethics, and related software. Using these self-assessments education program administers can effectively place students in the appropriate

grouping for learning instructional technology. A student who indicates that he or she has never or rarely used basic computer programs will benefit from an introductory course in instructional technology. Such a course might strive to acquaint students with the fundamentals of computer hardware and software, practice with keyboarding and exploration of the Internet. Another student who has extensive comprehension and experience with computers can indicate such on a questionnaire; he or she can be placed in a more advanced level course. This particular course may introduce students to more complicated software, grading programs used in classrooms, and how to develop an effective website for children. The less knowledgeable student will not be intimated by a higher level division, with more experienced classmates, and similarly the more knowledgeable student can be encouraged without feeling held back and fed up with repetitious information.

Students enrolled in instructional technology courses need more than textbooks and information, they need hand-on experience with technology. The measures that schools take to assure the comfort and success of their students could potentially have a significant impact on the students' future use of technology. According to Blair (2002), the University of Texas at Austin has made Apple laptops mandatory for their education students. The teachers in training are required to purchase the computers for $1000 as a part of the program. Critics say that the laptops are too expensive, cost post-secondary students may be unable to bear, and that use of Apple computers creates too narrow of an experience with technology. The benefits are numerous; students can explore the Internet and bookmark sites for future use, "build electronic portfolios, collect and analyze data, and communicate with one

another, faculty members, and placement supervisors" (Blair, 2002, p. 4). By providing students with portable "filing cabinets", the university is encouraging students to continually and consistently use their computers, thereby learning in the process. Students will likely feel more comfortable with technology, and will also have the opportunity to make autonomous discoveries, while still having access to support from the school's staff.

Once the course is complete and the new knowledge has formed a basis for teachers entering the classroom, it is up to the teacher to practice and implement their lessons. Depending on his or her philosophy of education, personality, and comfort with both the curriculum and computers, each teacher will employ different strategies to implement technology in his or her classroom. A study on teachers' adoption and use of computer technology is described in an article entitled "Technology integration practice as a function of pedagogical expertise" by Pierson (2001). Pierson's study "was designed to understand how teachers at various levels of technology and teaching abilities used technology, as well as how technology use related to general teaching practice" (Pierson, p. 1). The research indicates that mere knowledge of and comfort with computers does not guarantee that it will be used effectively.

What must development committees consider when detailing instructional technology courses? Some of the issues requiring attention include the goals of such classes; the expected outcomes for education students upon graduation; the needs of education students; the needs of elementary, special education and secondary students. What must students take from these courses and how can they implement their new and old knowledge in a lesson plan? It is important that new teachers

maintain and feed an open mind; apply new knowledge when possible; recognize and amend mistakes and shortcomings in their planning; assess their classrooms' needs as a whole, as well as needs on the individual level; encourage knowledge to dispel fears in their students as well as within themselves.

**Summary and Conclusion**

Technologies can support the acquisition of basic skills and should not be abandoned. The use of technologies can add value in allowing students to develop higher-order thinking skills. Increased student motivation, improved teaching and learning, and higher levels of student achievement. Actions and measures are needed to incorporate technology effectively in the classroom. Government action is needed to directly encourage the public to uphold the need for incorporating educational technology. Respect for teachers is necessary in taking the proper steps to reverse the negative attitudes of the technology.

Integrating technology in the classroom should be a growing concern within schools. The general attitude and awareness of not moving ahead with incorporating technology in the classroom is shortsighted. The public needs to be aware that their attitudes and actions do make a difference to the educational world. Movement should be taken today to work towards proper implementation of technology within the schools.

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