DOWN TO THE NUTS AND BOLTS: CONSIDERATIONS FOR THE INFUSION OF CLASSROOM TECHNOLOGY

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Technology used effectively in teaching and learning may lead to greater academic success by students (Einsenstein, 2000; Liu, Macmillan, & Timmons, 1998; Pugalee & Robinson, 1998: Warger, 1998). In order to capitalize on the potential for greater academic success, higher education professionals should model the use of technology, provide guidance in the selection and evaluation of appropriate software and tools, and assist students as they make efforts to enhance the traditional learning environment using technology. Microsoft chief executive officer, Steve Ballmer, indicates it is necessary to provide training opportunities and software tools to teachers to allow them to creatively harness the power of today’s technology and apply it to their unique instructional settings (Macavinta, 2000). In order to prepare students to meet the challenges of the future, faculty must promote and facilitate the efforts of students utilizing technology.

IMPACT OF INFUSING TECHNOLOGY ON TEACHING AND LEARNING

The use of technology in the classroom impacts teaching and learning in a variety of ways. Several examples include changes in the curricular interactions of teachers and learners, social dynamics of the classroom, and changes in teaching and learning.

Curricular interactions are changed through increased student-teacher communication, new opportunities and resources afforded by the computer (Heflich, 1997; Liu et al, 1998), and the promotion of collaborative and cooperative learning environments. Additionally, technology’s infusion limits teaching in isolation (Heflich, 1997).

The social dynamics of the classroom change when technology is incorporated due to a shift toward constructivist teaching; the focus shifts from using content-oriented computer-assisted instruction to integrating computer mind tools into the curriculum (Jonassen, 1996; Heflich, 1997; Liu et al, 1998). Successful technology integration allows the teacher to remain in the physical classroom and benefit
from the expertise and information found in the wireless classroom (Meghabghab & Price, 1997).

Changes in teaching and learning occur with the infusion of technology. Literature indicates that most teacher-education students display very positive attitudes toward using technology; however, they are less confident about their ability to use technology. Learners may be more computer-literate than their teachers; therefore more motivated to use technology than teachers (Meghabghab & Price, 1997; Pugalee & Robinson, 1998; Willis, Thompson, & Sadera, 1999). Also, students tend to learn faster than their teachers. The infusion of technology is beneficial to students with learning difficulties as well (Meghabghab & Price, 1997; Liu et al, 1998). The greatest impact on teaching and learning will be new teaching and learning paradigms.

CURRICULUM ISSUES WHEN INTEGRATING TECHNOLOGY INTO THE CURRICULUM

Successful integration begins with an evaluation of the curriculum, learning goals, the learner, available resources and tools, techniques to facilitate effective learning, and a plan for improvement and assessment. Improving student learning must remain the primary goal of technology integration. As a result, the teacher should initiate the infusion of technology into classroom practices.

Before teachers can effectively use technology (i.e., Internet, Distance Learning, email, multimedia, etc?) in the classroom, they must be competent and proficient with technology. They must possess an awareness of available tools and their applications, have access to computer-based resources, and have a desire to use technology to support instructional goals and improve the learning environment. Both student and teacher competencies in information access and computer skills are necessary (Meghabghab & Price, 1997).

A second curriculum issue is teacher knowledge of how to integrate technology into the curriculum. A study by Baker and Ravitz (1999) suggests pedagogical practices focus on technology integration that facilitate high level learning. Teachers need to transition from traditional knowledge and skill pedagogy to critical analysis and communication of argument with a polished product. Since most technology preparation for preservice teachers is inadequate to provide such competency (Meghabghab & Price, 1997; Willis et al. 1999), preservice and inservice training should be modified to include competence, proficiency, and designing instructional plans that use technological resources for high level learning.

Other issues include student competencies based on national standards, equity and access, evaluation criteria, diversity in software and resources, the use of networked computer systems and applications software.
PRACTICES TO ENCOURAGE FACULTY USE OF TECHNOLOGY

Technology, used by a skilled, competent, and knowledgeable instructor can enhance the traditional classroom environment. Technology infusion is desirable because it can promote learning, facilitate constructivists teaching practices, support instructional goals, symbolically represent complex ideas, and expand human potential (Becker & Ravitz, 1999; Yildirim, 2000). Several practices can be employed to assist teachers in technology integration activities. These include teacher competence, positive experiences utilizing technology, preparation and planning time, adequate resources, and sufficient training and support (Becker; 1994; Ennis, Ill & Ennis, 1995-6; Ertmer, 1999; Gilmore, 1995; Hunt & Bohlin, 1993; Schrum, 1999; Strudler & Wetzel, 1999; Yildirim, 2000).

Competent technology-using teachers have experienced a measure of success incorporating technology into the curriculum. Their positive experiences in workshops, seminars, conferences, and formal college courses establish a healthy attitude toward technology and promote a sense of accomplishment or self-efficacy (Zhang & Espinoza, 1998). This empowers teachers and gives them the expertise needed to respond to student queries and questions and effectively demonstrate technology-based lessons.

Successful teachers need time to plan students’ technology experiences. As teachers plan and implement new ideas, they determine the best practices, tools, and applications that match their pedagogy. Instructors need time to experiment, to prepare computer-based lessons, and to explore options (Lawler, Rosett & Hoffman, 1998). Questions regarding implementation details, access issues, scheduling, learning outcomes, assessment, and resource acquisition are normally addressed during planning.

Access to adequate resources is another practice that facilitates technology integration. When resources are readily available, faculty can schedule practice sessions, get assistance, and create technology-based lessons. They can also ask questions of others, share ideas, and demonstrate their finished products. This type of networking encourages brainstorming, dialogue, and discussion; it can be a catalyst that stimulates faculty and provides an incentive for experimentation. Other incentives might include monetary awards, classroom hardware and software, recognition, and equipment for personal use. These may stimulate faculty to integrate technology, but continued integration occurs when sufficient training and support are present (Ennis, Ill & Ennis, 1995-6; Schrum, 1999; Strudler & Wetzel, 1999). Professional development for technology utilization should be accompanied by adequate and competent technical support; it should be lengthy and ongoing and it should be followed by hands-on practice.
EXAMPLES OF SUCCESSFUL TECHNOLOGY INTEGRATION

Strudler and Wetzal (1999), investigated four exemplary education programs utilizing technology: Vanderbilt University, University of Virginia, University of Northern Iowa, and University of Wyoming. The Office of Technology Assessment first profiled the education programs at these institutions in a 1995 report. Since that time, changes in technology, expectations for technology integration, and Internet proliferation have occurred. The authors reevaluated the institutions mentioned above to determine the common denominators that facilitated technology integration and supported student learning at these sites. Their findings indicate that all institutions have the following:

a.) the support of knowledgeable and informed leadership,
b.) adequate resources for faculty support, training, and technology development,
c.) curriculum and staff development specialists,
d.) initiatives through grant money to support technology integration projects,
e.) technical support for faculty, teaching labs, and technology classrooms,
f.) student access to technology,
g.) faculty who believe that the use of technology matches their teaching practices and beliefs,
h.) a systematic effort to encourage faculty to integrate technology into teaching,
i.) required courses in educational technology, and
j.) the point of view that technology integration is a part of a larger plan for preservice teachers' use within their classrooms.

These points are well taken; it is suggested that further research is needed on technology integration and student outcomes, the applicability of Web-based learning opportunities, methods for rapidly advancing the technology integration efforts of beginners, and strategies for teaching with technology.

CONCLUSION

Use of technology in an effective learning environment is an expectation for faculty. Teaching learners about technology is not enough; neither is just teaching learners how to use technology. The plan is for more extensive and effective utilization of computers, networking, and other technologies in the classroom in order to provide an effective learning environment.
REFERENCES


libraries worldwide. Research and professional papers presented at the Annual Conference of the International Association of School Librarianship Held in Conjunction with the Association for Teacher-Librarianship in Vancouver, Canada, 137-141.


