TECHNOLOGY USE IN HIGHER EDUCATION AND FACULTY DEVELOPMENT

By

José Gerardo Martínez-Martínez
Associate Profesor
Computer Science Department
Bayamón Campus
University of Puerto Rico

Abstract

A critical need exists for teachers to be trained to skillfully integrate technology into their instruction. This paper presents the potential of technology to support teachers' education. The unique problems that arise when technology serves as a component for enhancing student teachers' learning are outlined in this discussion. The review centers on three factors impacting the quality and character of the participants' use of technology: the issues of access, training, and context. In addition, suggestions are provided regarding the successful implementation of technology in teacher education programs especially in management science after examining some pedagogical concerns in business education.

Introduction

Colleges of education and programs for teacher development do not adequately prepare teachers to use technology in their teaching or in their own professional development. New models for preparing teachers for learning and teaching in an age of technology need to be developed. The Office of Technology Assessment (OTA, 1995) reported in Technology in Teacher Education the following:

1. Faculties' significant limitations (i.e., lack of computer literacy) do not demonstrate the technology.

2. Students learn about technology, not with it.

3. Field experiences are not designed to demonstrate the use of technology.

4. Technology is isolated from the main curriculum and pedagogy of teacher education.

Technology, effectively used, has the potential to empower individuals to solve problems creatively and to interact effectively with complex information (Jonassen & Reeves, 2004; Means, 2001). Although universities must enable students to become information literate and skilled in using computer-based tools (Rakes, 2004), Collins (2004) contends that the professor shapes the eventual success or lack of success of computers in educational initiatives. Teachers are the key to putting technology in the hands of students by integrating it into the learning environment. By using technology, as a natural and necessary part of classroom practice, teachers can give students the knowledge and experiences they need. For students to become adequately prepared to learn with technology, teachers need to be well prepared to teach with technology.

Computer Access

Every effort to assure that pre-service teachers' initial exposure to educational technology (e.g., computer operating systems, CD ROMs, laserdisc players, video cameras, and e-mail) is positive and motivational and should be undertaken. Today's teachers need to be demonstrating technology usage and encouraging students to be risk takers and autonomous learners. With more and more students in K-12 schools having access to computers, it might be expected that high school graduates, particularly those who enroll at a college or university, have

some degree of computer literacy skills. Recent research suggests, however, that most college students have had little experience with a personal computer prior to entering the university (Sheffield, 2004). Students should be encouraged to embrace the technologies and the new challenges they present. Teachers, on the other hand, need to understand that using the computer and acquiring the evaluation skills necessary to determine when to use the computer, can enhance the teaching process. A report published by the National Council for Accreditation of Teacher Education (2002) explains that a transformation of the culture of the teachers' educational process is required. Technology, then, must be seen as changing relationships between students and teachers, as well as changing relationships between learners and knowledge.

Teachers should be proactive and fearless in their approach to the development of students into lifelong learners. Technology can not only help educators construct and display their knowledge, but it can also be used to plan their own teaching. The end result with this new emphasis should be teachers who are not just technologically skilled but teachers who understand how, when, and why to use technology to support their teaching and their students' learning. Another by-product of this emphasis should be a faculty who shares these same characteristics and who build upon the strengths of each other.

According to Gunter, Gunter, and Wiens (2003), as technology has quickly been changing and revolutionizing the computer industry, education and educators have continued to have difficulty embracing technology with open arms. Along with the availability and expanded capabilities of the computer and related technologies in the classroom, student attitudes toward computers remain a barrier in the learning process of technology. Faculty must close the teaching and learning technology gap between where we are and where we need to be. It is essential that

colleges and schools of education instruct pre-service teachers on how to integrate the vast resources of the Internet and related technologies into their classroom curricula. Pre-service teachers need to learn how to assess the effectiveness of the computer when it is used in the instructional scheme. Institutions, on the other hand, must develop motivational strategies to provide pre-service teachers with these evaluation skills.

While colleges have rushed to provide students' access to computers, they have largely overlooked the development of strategies to support teachers in implementing effective computer and teacher-based activities (Moore, Rieth, & Ebeling, 2001). The ultimate success of computer applications with students is dependent upon the degree to which teachers appropriately use technology. It is important, then, to recognize that introducing computers into classrooms represents a dramatic shift for teachers. If computers are to be successfully implemented, individual teachers must be involved in the change process. The development of materials and procedures for training teachers to use computers should incorporate the concerns, perceptions, and preferences of teachers in order to enhance the likelihood that the training will be responsive to teachers' needs and that the technology will be adopted and implemented.

Teacher Training

Leh (2003) states that technologies of the 21st century have changed how we live, how we conduct business, and how we communicate with each other; affecting how teachers teach and the way students learn. Teachers should feel comfortable with the new culture of the schools and colleges, and should be ready for the requirements of teaching in the Information Age. Teachers also need to understand the deep impact of technology on the nature of work, on communication, and on the development of knowledge. They must use a wide range of technological tools and

software as part of their own instruction. They must help students gain information that goes beyond textbooks and teachers. In addition, they should be fearless in the use of technology (e.g., telecommunications) and become lifelong learners.

Telecommunications offer students tremendous potential for opening windows to the world. In education, telecommunications generally refers to the use of personal computers to send and receive information through standard telephone lines. Many services are available through telecommunications (e.g., e-mail, electronic bulletin boards/conferences, research databases and web sites, file transfers, and chatting and teleconferencing). Through telecommunications, the typical classroom is no longer bound by four walls, but it is open to include students, experts, and learning experiences from around the world. A report published in 2003 by the Florida Center for Instructional Technology explains that telecommunications is changing not only the way students learn, but also when they learn, where they learn, and who teaches them. Some of the advantages that colleges can gain are that they can promote collaboration and cooperative learning. The use of telecommunications approaches may also improve communication skills, enhance multicultural education, increase motivation, save trees, increase access to experts, eliminate phone tag, provide current information, reduce isolation, increase self-esteem, supply faster communications, and aid in administrative tasks.

Teachers who use computer technologies are likely to be important models for their students (Delcourt & Kinzie, 1999). The different aspects of using technology to teach are also critical in planning and conducting in-service training for classroom teachers. The process is not hardware and software dependent, but it should be combined with the art of teaching, which adds

to the complexity of the task. Consequently, teachers must have positive attitudes about embracing technology and feeling self-efficacious in using it.

Consideration of the Context

It is difficult to use a tool (e.g., educational technology) appropriately without understanding the context in which it is used. Education students may pass exams, but still not be able to use the tools effectively in a classroom. Accordingly, Renick (1987) argued that formal teacher training should have a mixture of theoretical and practical (apprentice-like) training. Contexts (e.g., teaching in a classroom) help produce adaptive learners who can perform effectively when situations are unpredictable and task demands change. Graham (2001) suggested, even, that worthwhile contexts should help students build knowledge, which can be usefully employed in the future. Teachers who have successfully used computers, CD-ROMs, laserdisc players, and video cameras in the classroom know how educational technology can capture student's interest and generate enthusiasm for learning (Balli & Diggs, 2004).

Several universities for teacher training (e.g., the University of Illinois) are exploring a concept called teleapprenticeships, which consists of teachers and students simultaneously learning together about electronic media and teaching (Thomas, Clift, & Sugimoto, 2004). For example, an experienced teacher might help a student teacher learn how to teach using cooperative groups. At the same time, the student teacher might help experienced teachers develop lessons plans in which students use navigation software to collect information electronically from libraries and other resources. This concept also provides students the opportunity to demonstrate their accomplishments and to reflect upon their learning over the course of the semester. Moreover, students also become capable of using computerized help tools

while working in an authentic classroom (Elshout, Veenman & Van Hell, 1999). An Authentic classroom is defined as an environment where students have opportunities to practice in realistic situations.

Many educators contend that learners learn best when they are active and engaged in activities that are linked to real-life experiences. The concept of having new learning related to personal experiences or prior knowledge is the key to situated learning theory. Such activities are thought to be motivating, causing the learner to better attend by triggering prior knowledge (Leigh, 2003). Situated learning is concerned with the learning activities as well as the learning environment. According to Harley (1999), for the classroom teacher the challenge of situated learning theory becomes one of developing methodologies and course content that support cooperative activity, and reflect the complex interaction between what individuals already know and what they are expected to learn. Nonetheless, in order to use or create technology-supported environments or to incorporate technologies into daily curricula, classroom teachers need at least a basic knowledge of the operation of the technologies.

Pedagogical Concerns in Business Education

Management Science (MS) is an important element in management education, playing an important role in the analysis and solution of complex problems. MS is a requisite area of study in must business curricula, the topic of many well-attended seminars, and the focal point of much academic research. Perhaps the most important reason for its existence is to facilitate better and more objective decisions by practicing managers. According to Wren (2001) management education places too much emphasis on theory and too little on practical application, and this

applies to MS education as well. Specifically the following identified three areas of misdirected attention.

First, in classrooms, emphasis is almost exclusively on mathematical concepts. Much of this focus has come from the past, the way MS has been traditionally taught. This has resulted in teaching mathematics, not necessarily as a way to solve applied business problems (Hesse, 1990). Mathematical concepts are stressed because they are teachable; however, they do not meet practitioner needs (Gratwick, 1997). Our goal should be learning the mathematical models and concepts with a view to their applications. The result has to be student understanding of how to use the models to solve problems and how each concept relates to the business world.

Another problem that arises out of a strong emphasis is ignoring the qualitative issues in problems (Kilmann & Mitroff, 1976). Qualitative issues are de-emphasized because of the potential for ambiguity and the difficulty in dealing with these issues as objectively as quantitative ones. Obtaining the solution to a problem receives the majority of attention. Another important steps such as assumptions, data collection, validation, and implementation receive insufficient attention. Most business problems warrant a sound qualitative analysis, and the quality of the solution depends upon the extent to which such issues are considered.

Second, academicians in the MS field expend significant effort in dealing with abstract theoretical issues. Students are taught theories that look elegant on paper but do not easily transfer to real business situations. Many theories explain how managers should manage; however, they do not explain or predict actual management practices (Morgan, 1990). What happens in reality is rarely as precise as in theory, where every problem is structured to result in an exact solution. When faced with a structured problem, the application of a specific formula

will result in a specific solution. However, on chaotic world of business, situations are rarely so structured. There are always contingencies that theories are unable to address, because the data used by MS do not reflect business reality (Graham, 1992). Therefore the focus must shift form abstract theoretical issues to events that actually occur in realistic business environment (Becker, 1996).

The final problem in educational settings is the focus on solving a problem that is already formulated but ignoring those skills necessary to formulate a problem. In schools, students are presented with problems that are set up nice and neat in a textbook, with all the required inputs available in a structured manner spread over a couple of pages. The only focus is on plugging the number into the formula, usually located on the previous page, and obtaining the solution. This probably results in a serious lack of understanding of the actual problems experienced by managers. Students need to learn to look at an unstructured or semi-structured situation and be able to formulate a model by themselves. They should be able to identify the kind of problem the business is facing and which models are appropriate.

A related problem has to do with the attitude of management and scientists in analyzing and solving problems (Brightman & Noble, 1998). Their approach could be summed up as find me some problems that fit textbook models. Instead of focusing on new ways to set up the problem, management scientists look for situations where their previous techniques can be successfully applied. What is necessary is a creative approach to solve the unstructured or semi-structured problems (Evans, 1994), but the popular, conventional techniques used to train MS specialists do not promote creativity. This reorientation is crucial because problems are becoming

more unstructured, more complex, and less responsive to the model-based, specific-solution approaches promoted by early MS components (Hall & Hess, 1996).

Currently, in most schools, MS faculty is not required to have relevant work experience to teach the subject. Therefore, emphasis must switch to hiring professors who are knowledgeable about business problems. Here are four suggestions to further improve upon the situation. First, universities can begin to hire only those with actual MS business experience. This will encourage potential Ph.D. students in MS to seek some business experience before entering academia and professors will be more inclined to focus on the actual needs of businesses.

Second, practicing managers could be used to teach MS, giving students firsthand knowledge of actual business practices. However, this may not guarantee successful education unless the managers can transmit their knowledge and experiences in style students are familiar with. This could be a difficult proposition, because practitioners lack teaching experience. Another possibility is to use a combination of the two, letting practitioners work with professors in teaching a course. This might eliminate the negative aspects of having a professional working in an unfamiliar situation and help him improve his classroom performance. However, for the success of such endeavor, both must cooperate and not be defensive about sharing the teaching experience.

The third solution suggests encouraging MS faculty to work with area business to broaden their expertise. This may appeal to universities staffed with professors who lack business experience. By working with area businesses, they will be able to incorporate the practical aspects of MS and go beyond the traditional approaches they have relied upon. In addition,

professors could work with businesses to collect real life problems for their courses. Should this practice spread to many universities, professors could share case problems with each other. Perhaps, the best case problems could be published as an MS casebook and made available to interested faculty.

Implementation of Technology in Teacher Education Programs

Effective teachers use technology to participate in communities for professional development, to engage in personal meaningful inquiry, and to support teaching, learning, and assessment with their students. Laffey, Musser, & Wedman (2003, p. 2) believe that the following markers or milestones, should be expected of the undergraduate teacher education student:

1. Use technology to communicate with others, share information, reflect, and engage in professional development.
2. Integrate technology in managing and facilitating instruction, assessment and learning.
3. Use technology for inquiry in content areas across the curriculum.
4. Explore existing and emerging technologies to determine their potential usefulness.
5. Expand students' experience and understanding of multiple perspectives through use of technology.
6. Examine the educational, ethical, political, and cultural implications of technology.

Conclusion

There is no silver bullet for bringing the benefits of advancing technology to bear on improving teaching and learning. However, a technology infrastructure that enables pre-service teachers to learn in a context of computing and network services, seems to be fundamental to

developing the attitudes, values and competencies for making technology a tool for teaching. Thus, it is important to take a substantial step toward understanding how to build and support a technology infrastructure and toward providing beginning teachers with powerful new conceptions and tools for using technology. A technology infrastructure requires the involvement of all stakeholders in the process of integrating technology into teacher and administrator preparation programs. Cooperative teachers, college faculty, administrators, and the students need to recognize the importance of technology in the classroom and school, and to use it.

It is also important to encourage pre-service teachers to use technology as a mean of self-expression. When a student is able to use a tool as a mean of self-expression, the value of the tool is increased. Positive attitudes can influence the acceptance of any type of technology. Making people aware of how the technology can help them perform their job, can help change their attitudes. Involving teachers in the development phase of a computer tool designed to meet their specific needs may change their perceptions and attitudes towards technology. Direct involvement in the product's development enables teachers to envision the capabilities of the technology. As teachers become confident in using the technology that they helped create, the skills acquired during the development can hopefully be transferred to similar computer applications. When the technology is used in the context of a real life setting, teachers better understand how to integrate it into their work. As future teachers begin to feel prepared to teach in a technology-infused classroom they will hopefully help their students interact successfully in a technologically infused society, both inside and outside the walls of the classroom.

Teacher education programs face many challenges in preparing students. Technology is changing rapidly, and although prices are decreasing, the cost of technology still imposes

significant demands on university budgets. Creative and systematic problem-solving strategies involving the whole university, not just colleges of education, may lead to institutional solutions to these challenges. For example, an undergraduate computer literacy competency as a general education requirement would free the teacher-education program (and other disciplines as well) from having to focus on basic computer literacy, enabling them to concentrate on advanced educational computing. If the role of teacher education programs is to produce teachers who are able to use the new computer technologies, educational programs must take our pre-service teachers from where they are and advance them to where the technological society needs them to be.

It appears that management science has reached an important crossroads. Over time, its focus has become misdirected and its appeal to the business community has decreased. Many business faculty members lack practical real world experience. Further, there is a need to alter university reward system to encourage more applied, practical research and pedagogy. However, MS can still be salvaged if universities and businesses work together. MS must start using technology to begin focusing on unstructured and semi-structured problems that are unique to organizations and stop concentrating on the theoretically structured problems of the past. Every step MS takes must be considered in conjunction with the requirements of its customers, businesses, and practitioners, and what they expect from management science. Overall, the problems are daunting, but with some concerted effort we may be able to improve the service provided to our students and the discipline of management. In general, technology use in higher education and faculty development holds many promises, as the teacher's role may shift from

lecturing to advising students on tough issues such as choosing information materials, topics, and career path.

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