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E-Learning: Facilitating Learning through Technology

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Abstract

Many predict that the biggest growth in the Internet, and the area that will prove to be one of the biggest agents of change, will be on-line learning, or e-learning. Recent surveys show that 50% of all corporate training is being done through technology. We are seeing similar trends in certain parts of Universities and other educational institutions. However, application of e-learning in Information Systems (IS) teaching or research is limited.

The purpose of this tutorial is to provide an overview of e-learning to encourage and facilitate IS professionals' teaching and research efforts. The ultimate question is: Can technology really facilitate learning? If "yes", how do we use technology effectively to help activate and challenge our learners? To answer these questions, this tutorial:

1. *Provides a technology map of e-learning technology that can be used to support learning in a classroom or from a distance;*
2. *Outlines key research issues in e-learning focusing on those where IS research can add value;*
3. *Shares best practices for implementing and using technology effectively in IS learning situations; and*
4. *Discusses how instructor roles and skills need to change to be effective in technology-supported environments, particularly in distance learning situations.*

This tutorial is useful for the researcher or practitioner interested in using technology to improve learning. The tutorial assumes that participants have minimal technical backgrounds in e-learning technologies.

Keywords: E-learning, digital collaboration, on-line learning, best practices, implementation, IS teaching/ training

Introduction

Many feel that the Internet is perhaps the most transformative technology in history. But for all its power, it is just now being tapped to transform education. At the dawn of the 21st Century, the education landscape is changing due to the Internet. The Internet enables us to bring learning to students instead of bringing students to learning. It allows for the creation of learning teams and communities that defy the constraints of distance and time, providing access to learning opportunities that were once difficult to obtain. This assertion is true for the schoolhouse, on the college campus, and in corporate training rooms.

The most common terms used to describe technology-supported learning via the Internet are e-learning and online learning. We will use the term e-learning. The power of e-learning to transform the educational experience is awesome, but it involves many potential risks and challenges. We need to develop guidelines to ensure that e-learning technologies will enhance, and not frustrate, learning. The focus needs to be on learning and not on technology.

During the1999-2002 time frame, e-learning moved from possibility to mainstream -- from "will we?" to "how will we?" e-Learning is touted the next killer application. Many feel that e-learning soon will become as ubiquitous as e-mail. The September

11, 2001 bombings of the World Trade Centers in New York City and other events intensified the focus on e-learning. Reduced budgets and the inability or unwillingness of people to travel caused many organizations to start looking at e-learning and digital collaboration as core mechanisms for supporting and doing business. This trend will continue.

However, e-learning is not in the mainstream of Information Systems (IS) academic life. In terms of teaching, we see most faculty using only static web sites to support learning. Although e-learning is a rich research area, very few IS studies are published. For example, many organizations struggle with implementing Learning Management Systems (LMS). LMS are complex systems, similar to ERP systems, but not as complicated. The literature base in ERP implementation is rich but research on LMS is virtually non-existent.

My e-learning experience started with the project management responsibility for developing and implementing both the technology infrastructure and curriculum for an MBA program, for the Pricewaterhouse Coopers North American Consulting Group within the Terry College of Business (referred to as Terry) at the University of Georgia in 1997. This program is still going strong, now under IBM leadership. We have applied similar e-learning technology in our other MBA programs: 1-year and 2-year regular programs, Executive MBA, and part-time MBA program. Some faculty in our undergraduate program also use the technology extensively. After my initial experience in developing e-learning based programs and using technology in the classroom, I started doing research in this area. A detailed account of the development of the IBM program can be found in Bostrom, et. al. (2002). Many of the points outlined in this paper are discussed in more depth there.

The purpose of this tutorial is to provide an overview of e-learning area to encourage and facilitate IS professionals' teaching efforts as well as encourage more IS researchers to become involved in e-learning research. The tutorial is designed to accomplish the four major outcomes outlined in the abstract. The remainder of this paper focuses primarily on outcome 1, a technology map of e-learning technology. The paper will also briefly outline outcomes 2-4.

e-Learning Technology Map

One of the problems in e-learning is the different definitions of what technology is included under the label e-learning. For example, to some people e-learning is a virtual classroom, to others it is simply an electronic course repository of materials. Thus, a starting point for understanding e-learning needs to be a clear definition of what we mean by e-learning technology.

Figure 1 displays the time-place matrix typically used to classify collaboration technology. This taxonomy is also a useful starting point for understanding e-learning technology. e-Learning refers to the technology-supported learning activities in any of the four time-place environments. Distance/Distributed/Virtual Learning refers to learning in which the learner and learning resources are separated by space and possibly also time (cells III and IV in Figure 1).

The blend between distance and face-to-face education is a key to programs that involve distance learning and is one of the keys to success for our Terry MBA programs. The research and practitioner literature also highlight the importance of blending technologies to accomplish a successful e-learning program. A better view of e-learning technologies and how they can be blended together is captured in Figure 2. Figure 2 shows three primary learning environments: classroom, online anytime, and online live. These correspond to cells I, III and IV in the time-place matrix of Figure 1. The Terry programs focused on blending these three environments.

Online, anytime technologies support learning anytime-anyplace. They primarily are database-centric, creating shared information spaces for learners and faculty to work in at different times and places. Online live technologies provide same time interaction between learners and instructors at a distance through collaboration tools such as chat or a virtual classroom. Many view e-learning only in terms of online live and online anytime technology, both of which facilitate distance or virtual learning.

However, the dotted lines in Figure 2 indicate that these technologies can also be used to support classroom learning. For example, Terry-IBM MBA program uses these e-learning technologies when students are on campus and when they are back on the job. When on campus, these technologies form a "digital surround" for classroom learning. By "digital surround" I mean that the technology is used to support face-to-face classroom work. For example, we may use an online anytime discussion tool to continue or extend a discussion started in class. Another example would be using an online live tool in class to facilitate a case discussion in real-time. We found that using e-learning as a "digital surround" enhances classroom learning and provides a great way to introduce students to e-learning in our on-campus programs as well.

I Classroom	II Classroom
III <u>Online Live</u> – Instant Messaging – Virtual Classroom (Centra, Interwise, etc.) – Audio/Video Conferencing	IV <u>Online Anytime</u> – Learning Content Management Systems – Team Information Spaces – Email

Figure 1. Time-Place Matrix
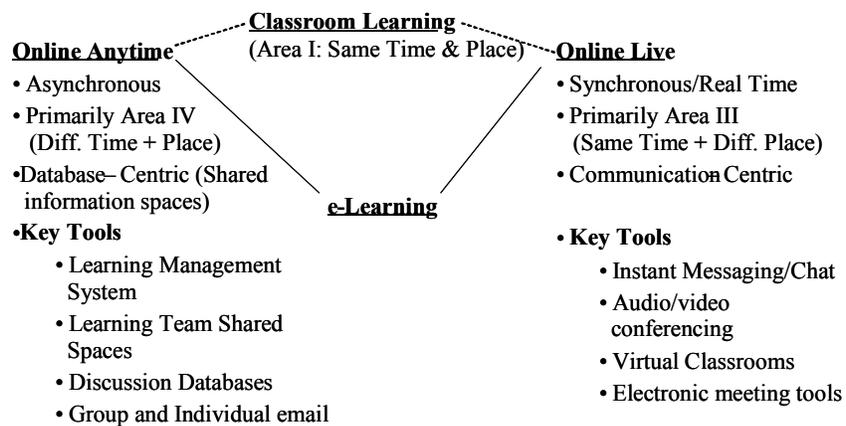
Figure 2. Blended Learning

<u>**Online Anytime**</u>
• Asynchronous
• Primarily Area IV
  (Diff. Time + Place)
• Database– Centric (Shared information spaces)
• **Key Tools**
  • Learning Management System
  • Learning Team Shared Spaces
  • Discussion Databases
  • Group and Individual email

<u>**Classroom Learning**</u>
(Area I: Same Time & Place)

<u>**e-Learning**</u>

<u>**Online Live**</u>
• Synchronous/Real Time
• Primarily Area III
  (Same Time + Diff. Place)
• Communication Centric

• **Key Tools**
  • Instant Messaging/Chat
  • Audio/video conferencing
  • Virtual Classrooms
  • Electronic meeting tools

Whatever the learning environment, the following technologies are needed to make e-learning happen:

- **Distribution Technology:** technologies that provide information distribution and exchange allowing distance learning to take place. Although the primary medium of most e-learning is the Internet/Web, sometimes CDs or other distribution technology are used. The focus on the use of the Internet is why the term "online" is frequently used in describing e-learning.

- **Learning Management or Content/Course Management Software**: technologies that simulate the experience of a classroom while studying both on-campus and from a distance.

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- **Learning Management or Content/Course Management Software**: technologies that simulate the experience of a classroom while studying both on-campus and from a distance.

- **Communication and Collaboration Software** offers a rich, shared, virtual workspace in which instructor and students can interact with one-to-one, one-to-many, and many-to-many in order to learn together anytime and anyplace. Examples:
   — **Asynchronous/online anywhere tools:** e-mail, discussion databases, streaming audio/video.
   — **Synchronous/online live (real time) tools:** Instant Messaging, Chat, Audio/Video conferencing.

- **Course Support Software** offers a rich set of tools including electronic libraries and other instructional programs to support specific courses. An example is the computer-based instructional and testing software used in our MBA statistics course.

The core software in most e-learning efforts is a Learning Management or Content Management System (LMS/LCS). An LMS/LCS manages the interaction between the learner and learning resources. The primary functionality provided is a document database repository for learning resources (e.g., syllabus, articles, assessments). The primary difference between LMS and LCS is that a LMS usually provides additional functionality such as a course catalog, a registration system, tracking and reporting learner's progress; whereas a LCS focuses on learning content management for a given course or set of learning topics. In academic environments, the typical software used is LCS, with Blackboard and Web-CT being the major vendors. The LCS/LMS usually provides a limited set of collaboration tools that needs to be supplemented with other tools.

From an e-learning perspective, collaboration technologies can be viewed as the primary tools that one can use to facilitate learning through collaborations between teacher-student and student-student. Although a majority of e-learning technology is collaboration-based, some of the technology cannot be classified as collaboration tools. Two examples are the registration and tracking features in a LMS and content software used to support specific courses. An excellent overview of collaboration technologies can be found in Munkvold (2002).

Different Levels Involved in E-Learning

One of our biggest problems encountered using an LCS is its sole focus on the "class". Most LCS focus on a class or a specific set of content, and thus do not allow for higher-level view such as MBA program view. While each class is important for the student, it is the program or how each class fits with the others that make an MBA degree valuable. As a work-around, we created another LCS course to provide program information, but this solution still lacked many important features such as an easy way for the students to see an overall picture of what assignments were due in their classes.

This problem highlights the point that multiple levels must be supported with e-learning technology. Most organizations would have the four levels described in Figure 3: Student-Team, Course, Program, and Organizational. Students work individually and often in teams within a given course. Technology is needed to support both individual-team and course levels. You also need support for overall management of the program such as integrated scheduling and program-wide discussions. Similarly, from an organizational perspective, it would be useful to have technology support the management and integration of different learning programs. In a company setting, the organizational view would most likely be managed by the Human Resource area as it schedules and tracks employees through the company's many learning opportunities.

The differences between Learning Management Systems (LMS) and Learning Content Management Systems (LCS), discussed earlier, are highlighted using the level model in Figure 3. An LCS usually focuses on course and student-team levels, while an LMS tends to provide support for all levels. Most LMS/LCS do not provide online live support or good learning team support tools. However, the trend is to provide these capabilities by allowing seamless links from LMS/LCS to other tools.
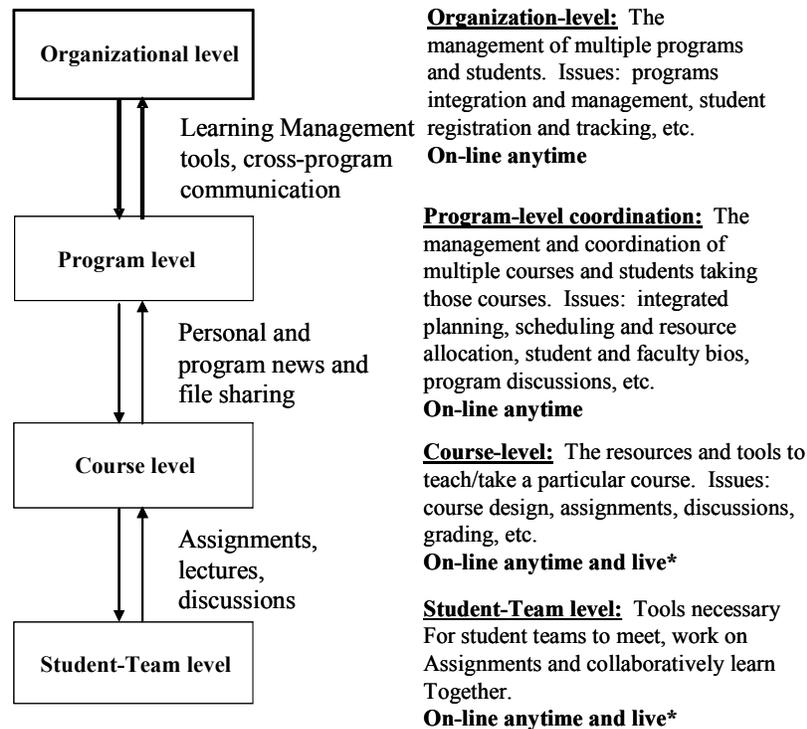
The diagram shows four boxes connected vertically by double-headed arrows, from top to bottom: Organizational level, Program level, Course level, Student-Team level. Arrow labels and descriptions are as follows.

Between Organizational level and Program level: Learning Management tools, cross-program communication

Between Program level and Course level: Personal and program news and file sharing

Between Course level and Student-Team level: Assignments, lectures, discussions

Organization-level: The management of multiple programs and students. Issues: programs integration and management, student registration and tracking, etc. **On-line anytime**

Program-level coordination: The management and coordination of multiple courses and students taking those courses. Issues: integrated planning, scheduling and resource allocation, student and faculty bios, program discussions, etc. **On-line anytime**

Course-level: The resources and tools to teach/take a particular course. Issues: course design, assignments, discussions, grading, etc. **On-line anytime and live***

Student-Team level: Tools necessary For student teams to meet, work on Assignments and collaboratively learn Together. **On-line anytime and live***

Figure 3. Different Levels Involved in E-Learning

E-Learning Research Issues

One of the outcomes of this tutorial is to summarize current research on e-learning focusing on areas where IS researchers can add value. I will begin this segment by summarizing e-learning research. This summarization will result in an initial list of broad research topics that will serve as a starting point for our research discussion. A good initial list of broad research topics includes the following:

- What blend of technologies makes sense? When? Why?
- Electronic support for face-to-face classes/courses?
- Implementation of Learning Management Systems as a complex system; integration LMS with other key technologies such as knowledge management.
- E-Learning Strategies? Relationship to IT and Business strategies?
- E-Learning applied to IS training and education contexts?
- How are technologies enabling emergent organizational learning structures? What managerial issues/opportunities do these create?
- Student individual differences? How to develop an active/self-regulated learner? How can technology help?
- Faculty individual differences?
- How effective (in terms of educational outcomes such as learning and socialization) are e-degrees?

This list of research topics can be investigated by IS researchers alone or in conjunction with researchers from other disciplines (e.g., Education) interested in e-learning.

Best Practices for Implementing and Using E-Learning Technologies

The summary of practitioner and academic research just discussed serves as a stepping off point for investigating potential best practices. This literature also provides insights into the changing instructor role and skills needed to be effective in e-learning environments.

Until recently, geography, logistics, and scheduling concerns severely hindered many university-company relationships. Although distance learning programs have existed for years between universities and companies, e-Learning has broken down many of these barriers facilitating new joint ventures. Organizations are realizing that learning is at the heart of a company. It is the competitive advantage in an organization. However, organizations have difficulty retaining and developing competent workers especially where a degree is needed to compete successfully for higher positions. Many organizations and universities turned to each other and e-learning to help solve this problem. The Terry-IBM MBA program is a good example.

References

Bostrom, Robert P., Kadlec, Chris, and Dominic Thomas, "Implementing and Use of Collaboration Technology in e-Learning: The Case of a Joint University-Corporate MBA", in Bjorn Eric Munkvold (ed.), *Implementing Collaboration Technologies in Industry: Case Examples and Lessons Learned*, Springer, London, 2002.

Munkvold, Bjorn Eric (ed.), *Implementing Collaboration Technologies in Industry: Case Examples and Lessons Learned*, Springer, London, 2002