

Developments in Business Simulation & Experiential Learning, Volume 27, 2000
CREATING A COMPREHENSIVE WEB-ENHANCED CLASSROOM

Sharma Pillutla, Towson University, Towson, MD 21252

ABSTRACT

The introduction of the World Wide Web in 1993 and its subsequent rapid proliferation in all areas of business and education has resulted in the technology being used simply because it is available. Distance education courses have mushroomed the world over. New universities catering primarily to distance education courses have sprung up. In addition, many courses have started using the WWW as an enhancing tool in their technology-mediated classes. This paper discusses one such application of the WWW as an enhancer for an introductory course (Principles of Operations Management). We discuss the theoretical underpinnings that form the basis for creating such an environment. The paper discusses the dual aspects of instructional and delivery methodology and how a web-enhanced classroom addresses these aspects.

INTRODUCTION

Dramatic changes in the business environment over the past few decades heralded new changes in academia. Forces of increased competition and globalization, rapid technological changes, changing social and economic demographics have impacted the business environment. Organizations therefore have been changing to meet these external forces. Many organizations have been reengineering to be able to survive and succeed in today's market. This has given rise to the concept of a learning organization. This has placed new demands on the type of people hired by these organizations.

Changes in demography, globalization, technological changes and changes in competition, are all factors which have direct ramifications for academia (Bailey, 1997). Changing demographics have resulted in dual

career families, increase in part-time students and an increasing ethnic mix of students among others. The adult learner and commuter student segment of the student population is increasing. Changes in technology have been so far reaching that no aspect of academia has been unaffected.

The introduction of the World Wide Web in 1993 and its subsequent rapid proliferation in all areas of business and education has resulted in the technology being used simply because it is available. Distance education courses have proliferated the world over. New universities catering primarily to distance education courses have sprung up. In addition, many instructors have started complementing their technology-mediated classes with web-based resources. This paper looks at one such application of the web as an enhancer for an introductory course (Principles of Operations Management). The web can be used as a delivery medium as well as a pedagogical tool to enhance the in-classroom *and* out-of-class learning experience. This paper addresses the dual aspects of *instructional* and *delivery* methodology. We next discuss the instructional methodology followed by discussion of the delivery methodology. We present the web-environment that was created for the aforementioned course and finally conclude the paper identifying further areas of work.

INSTRUCTIONAL METHODOLOGY

A variety of instructional methodologies exist ranging from the traditional lecture, discussion groups, self-paced learning *etc.* Scott (1997) says that the educational paradigm is changing from a "teaching model" to a "learning model". A variety of learning models exist including the objectivist learning theory (Jonassen, 1993), the

Developments in Business Simulation & Experiential Learning, Volume 27, 2000

constructivist theory (Bruner, 1966), the cooperative learning theory (Slavin, 1990) and experiential learning theory (Rogers, 1969). The objectivist theory states that there is an objective reality and that the goal of teaching is to transfer this knowledge to the student (Leidner and Jarvenpaa, 1995). The predominant mode of instruction under this model is the lecture method. The latter three theories are learner-centered theories in that they call for the students to be active initiators. Thus the constructivist theory requires the student to discover reality himself or herself by construct it based on past knowledge, experience and investigative abilities (Leidner and Jarvenpaa, 1995). The co-operative theory assumes that knowledge is created as it is shared, and thus an environment that facilitates communication between learners is a superior learning environment (Whipple, 1987). The experiential theory states that understanding is achieved not only through learner initiation of the problem but also active learner involvement (Rogers, 1969).

The web-application developed follows the experiential theory and uses simulation gaming as a tool for experiential learning - "*learning through doing*". A simple simulation game is used for this purpose.

DELIVERY METHODOLOGY

New technologies, not the least of which is the World Wide Web are having a tremendous impact on delivery of instruction. Distance education that was in the backwaters of academia has now gained prominence due to access to these new technologies. Distance education has now been broadened and is called Distributed Learning (DL). In addition to the traditional distance education format, which involves delivering instruction to remote students where the instructor and students are separated by time and place, distributed learning also encompasses traditional classroom instruction, enhanced by distance education

technologies. Saltzberg and Polyson (1995) define Distributed Course Delivery (DCD) as "an instructional model that allows instructor, students, and content to be located in different, non-centralized locations so that instruction and learning occur independent of place and time".

The Institute for Distance Education of the University System of Maryland defines three models of distributed learning (IDE, 1997). Based on the two parameters of time and place, the models they define are termed as follows:

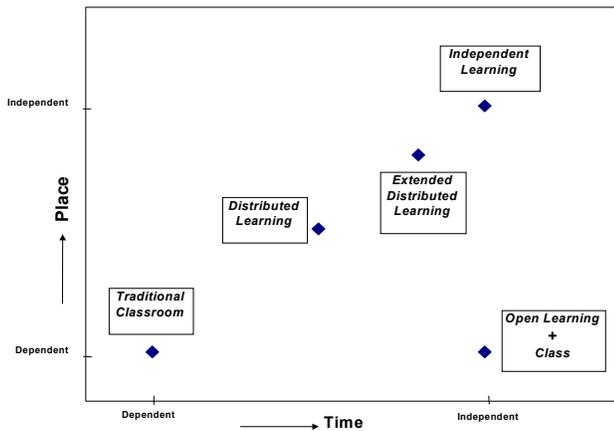
- (a) **Distributed Classroom:** extending a traditional classroom using interactive technologies – time and place dependent. Thus if there is an overflow of students that couldn't fit in one classroom and IVN (Interactive Video Network) technology could be used to ensure that students in both class are able to participate fully in the classroom learning process.
- (b) **Independent Learning:** independent of place and time. Contact between students and faculty is maintained by telephone, voice-mail, computer conferencing, electronic mail, and regular mail.
- (c) **Open Learning + Class:** Self-paced learning through occasional contact using interactive telecommunications technologies.

In addition to the above categories, we can add the following category

- (d) **Extended Distributed Learning:** extending a traditional classroom so that some portions are time and place dependent and others are time and place independent. A Web-enhanced classroom would fall into this category.

Figure 1 gives a graphic perspective of the different models of learning and the extent of their time-place dependence.

Figure 1: A graphic perspective of the different distributed learning models



A variety of technologies exist today to support most of the above models of distributed learning. Some of these technologies are still in the emerging phase. Consequently there are no standards currently in place that might permit broad application of the technology. Many universities are currently using proprietary technology. Thus, for example, University of Phoenix’s Online Campus uses a computer conferencing system called Apollo Learning Exchange (Alex) which creates a virtual campus (U of Phoenix, Online MBA, 1997). The University of Maryland, University College uses Web-Tycho as their primary technology for creating an interactive campus (UMUC, 1997). Duke University’s Global Executive Management (GEMBA) Program uses a variety of cutting-edge technologies for communication between students and faculty across the globe (Duke University, GEMBA, 1997). Some of these technologies include voice over network synchronous discussions, email, streaming audio, world wide web browsers, synchronous group discussion software, electronic bulletin boards, application sharing software, internet search engines among others.

Table I

Technological Resources	Models of Distributed Learning			
	A	B	C	D
	time + place	time		
Email	O	•	•	•
Asynchronous Discussion Groups	O	•	•	•
Synchronous Chat Facilities	O	O	•	•
Application Sharing	O	•	•	•
WWW	O	•	•	•
Internet Audio Conferencing	O	O	◐	◐
Internet Video Conferencing	O	O	◐	◐
Streaming Audio	O	O	◐	◐
Streaming Video	O	O	◐	◐
IVN	•			

• – Essential ◐ - Desirable O – Enhancer
 * The symbols in this column apply only to the open learning part and not the in-class portion.

Table I categorizes some of the commonly available technological resources and their applicability to the various models of distributed learning. The resources are categorized as *enhancers* and *essential*. A resource is considered an enhancer and represented by a O in the table if it is not absolutely essential to ensure that instruction is possible with the associated distributed learning model. A resource is considered absolutely essential (and represented by a •) if that resource is deemed necessary to convey instruction properly under the associated distributed learning model. The traditional classroom (or laboratory or training room) environment affords direct communication of many different kinds – textual, audio, images and video *etc.* The degree of communication is one-to-one, many-to-one and many-to-many. Along with the proper

Developments in Business Simulation & Experiential Learning, Volume 27, 2000

instructional pedagogy such an environment represents the best mode of delivering instruction. It is intuitively obvious that any technology-enhanced environment that replicates this broad array of communication as well as the traditional classroom would be superior. We use a  to represent that this technology would be desirable to fully replicate a medium of full communication.

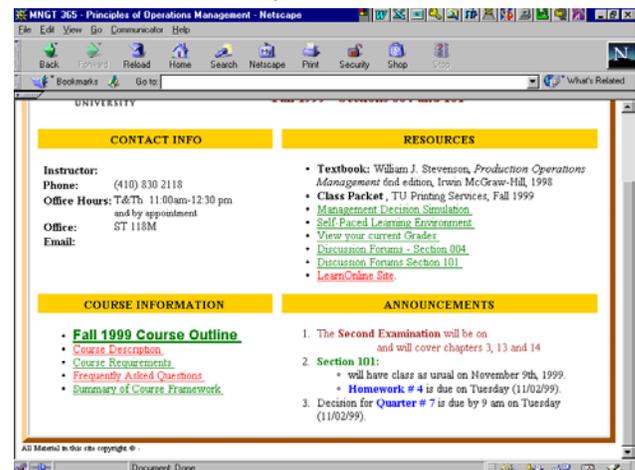
It is necessary to properly identify the kind of distributed learning environment that one would like to operate in. Admittedly, one would like to have streaming audio and video to enhance and fully replicate the full array of communication possible in a face-to-face environment. However, since such technology lacks industry standards and because the Internet bandwidth is limited, the quality of such audio or video is extremely choppy. Thus there are certain choices to be made with regards to the type of distributed learning model that is adopted and the appropriate technology that maps on to the model. Overall policy will dictate this decision. The institution needs to address the reason/s for using distributed learning: extending its public service mission, enhancing its image, reaching profitable new markets, give its faculty an additional stream of income *etc.* (Graves, 1997).

THE WEB ENHANCED CLASSROOM An Extended Distributed Learning Application

This application has created a complete online environment, which complement the student's in-class learning. There are a variety of components that comprise this web-enhanced classroom. Some of the components have a pedagogical orientation and others have an administrative orientation. The current web-enhanced classroom comprises five components. Below we describe each of the components in detail

The Web Classroom

Below we present the interface for the web classroom. As can be seen from the interface, this environment presents all of the course information in one easy to understand central location. The four major categories of the website include contact information, Course information, resources and announcements. All resources needed by the students and used in the class are accessible at the click of a button. The "Resources" section provides the rest of the components of the web-enhanced classroom including the simulation game, discussion forums, viewing their grades and the self-paced learning environment. The "Course Information" area provides the standard material such a course notes, homework assignments, homework solutions, *etc.*



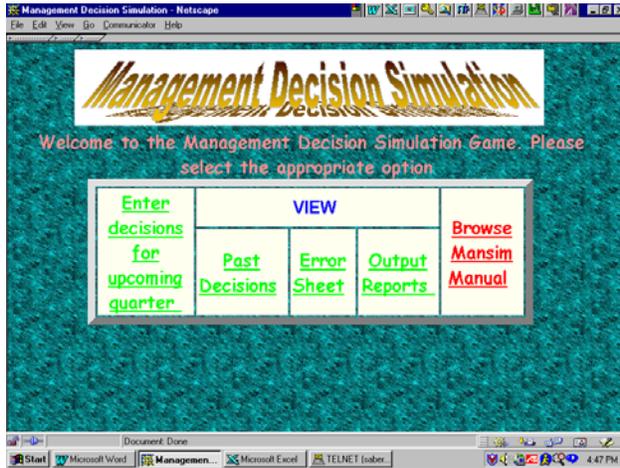
A Simulation Game on the Web

This component is accessible by the students from the "Resources" section of the main course page. Following the experiential learning theory discussed in section 2, implementation of the simulation game on the web was meant to achieve the following objectives:

- Eliciting analytical thinking
- Further *active learning* since the game is a hands-on application.
- Generating an integrated perspective of business beyond functional areas
- Makes use of and thereby reinforces the latest technology.

Developments in Business Simulation & Experiential Learning, Volume 27, 2000

As an instructional methodology, gaming has long been used for pedagogical purposes. This

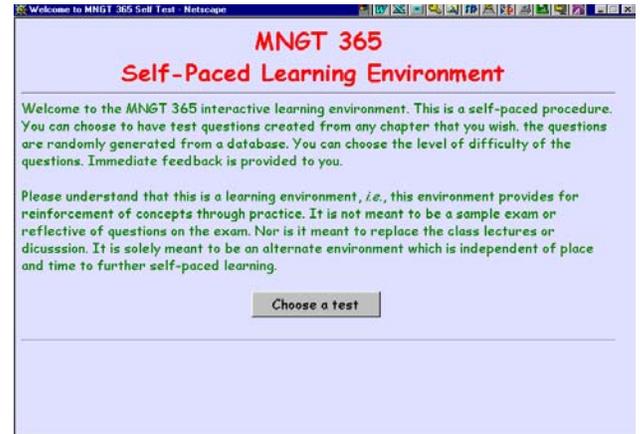


simulation game has similar objectives. However, since the delivery medium is via the web, it offers the added element of convenience and accessibility. Any student with a computer and access to the WWW is able to participate in the gaming simulation. Such a universal access is particularly essential for commuter students. Above we present the main web interface of the gaming simulation used. As can be seen, students are able to submit decisions, view their past decisions, view the results/outputs and also browse the online simulation manual.

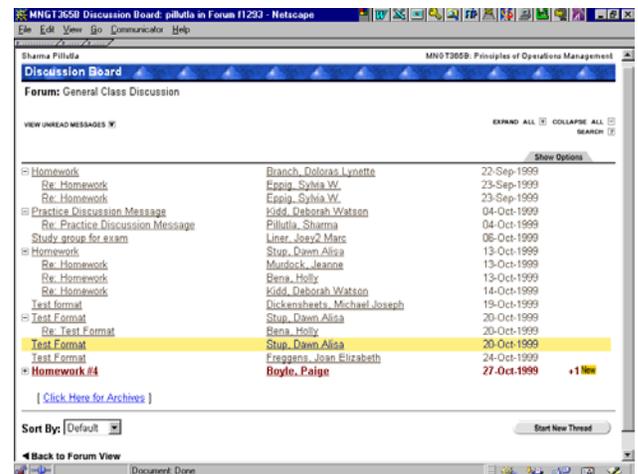
The Self-paced Learning Environment

Student learning occurs by introduction of a concept/topic, and then by constant application and reinforcement of concepts. This process can be achieved by a variety of media. Traditional lectures, case studies, group discussions, brainstorming etc. are some of the traditional media available today. However, with the hectic pace of life today and work schedules of many students, there isn't ample time for teamwork and discussions. Nevertheless, reinforcement of concepts through practice remains essential for success. Moreover, not all modes of teaching/learning are suited to all students. It is therefore desirable that an alternate environment be created which is independent of time and place to further self-paced learning.

This component of the web-enhanced classroom consists of an interactive testing environment that will be self-paced with questions and



answers via means of a computer-generated interface. The system provides immediate feedback and scoring of the student's



performance. The questions are randomly generated from a large database so that a variety of combinations of questions are possible. The questions range from easy to medium to hard. Even though the immediate feedback is in the form of right or wrong, an explanation of the answers is provided which serves to clarify and elaborate the correct process of approaching a problem. The goal of this self-paced learning environment is to augment and not replaced other modes of learning. It provides the student an alternative mode of learning potentially suited to their learning style.

Developments in Business Simulation & Experiential Learning, Volume 27, 2000

Creation of Discussion Forums

This component consists of a conference or forum where discussions pertaining to the class can take place. The role of the instructor is being the administrator of the forum. Forums can be created for the entire class or for small study groups whereby a small team of students engaged in a project will be able to get together and conduct conversations online. In addition inter-section teams can be used to foster information sharing, if an instructor is teaching more than one section of the same class. Using such a forum to engender discussions can maximize the learning potential. The web-interface for such a discussion forum is presented above. In addition to asynchronous discussion forums, this component also has real time virtual chat facilities that the students can use for discussing issues in real time with the concomitant ability to work on documents.

Creation of an Online Grades Inquiry System

Students are able to track their progress in the class by the ability to view grades online. Student privacy is protected through password protection. This is the only component whose function is primarily administrative but could nevertheless help foster motivation in the student through awareness of their class performance.

View Your Current Class Grades - Netscape

View Your Current Class Grades

Choose the section number

Also enter your Last Name, Social Security Number and Password

fall99 mngt36504

fall99 mngt36511

Please enter your Last Name only, e.g. Smith or Doe, etc.
i.e. first initial capitalized and rest in lower case

Please enter your SS # in the form 999-99-9999

Please enter your Password - the same one used for the game. Passwords are case-sensitive

CONCLUSIONS

Teaching and learning are undergoing revolutionary change with the availability of new technology. Such a technology heralds not only a change in instructional methodology but also the delivery mechanisms. Whereas the blackboard and chalk were indispensable teaching tools a few decades back, new technology such as the World Wide Web presages a bold new paradigm of the teaching-learning continuum. Even though distance learning programs are the primary end-users of such technology, the an intuitively obvious application should be to enhance the current teaching environment. This paper has delineated one such effort of creating a web-enhanced classroom, operating under the aegis of the *extended distributed learning* model.

Frequently pedagogical tools are used due to the "technology push". The issue of whether such tools have a positive effect on the learning environment is often left unanswered. Work is currently afoot to investigate the efficacy of these emerging tools. One can then draw statistically significant conclusions about the utility of such tools.

REFERENCES

- Aspy, D.N., Aspy, C.B. and P.M. Quimby, "What doctors can teach teachers about problem-based learning", *Educational Leadership*, 1993, Vol. 50, No. 7, pp. 52-81
- Bailey, Allan R., "The Future of Management Education: Gradual Transition or Paradigm Reengineering", *Keynote address at the ABSEL conference*, New Orleans, LA, 1997
- Bruner, J., *Towards a Theory of Instruction*, Cambridge, MA, Harvard University Press, 1966.
- Consortium for Educational Technology (CETUS), "Information Resources and Library Services for Distance Learners: A

Developments in Business Simulation & Experiential Learning, Volume 27, 2000

- Framework for Quality”, Discussion Series, CSU, SUNY, CUNY, 1997.
- Consortium for Educational Technology (CETUS), “The Academic Library in the Information Age: Changing Roles”, Discussion Series, CSU, SUNY, CUNY, 1997.
- Duke University’s GEMBA Program, <http://www.fuqua.duke.edu/programs/gemba>
- Graves, William, “Adapting to the Emergence of Educational Micro Markets”, Educom Review, Sep/Oct 1997, pp. 26-30.
- Institute for Distance Education, University System of Maryland, “Three Models of Distance Education”, 1997, <http://www-dev.umuc.edu/ide/modldata.html#desc-a>
- International MBA at Virtual University Online, <http://www.athena.edu>
- Jonassen, D.H., “Thinking Technology”, Educational Technology, January 1993, pp. 35-37.
- Leidner, D.E., Jarvenpaa, S.L., “The Use of Information Technology to Enhance Management School Education: A Theoretical View”, MIS Quarterly, 1995.
- “Lucent technologies and University Team for Solutions”, T.H.E. Journal, September, 1996, pp. 24-25
- Ohio University’s online MBA (OUMBA), <http://oumba.cob.uohio.html/oumba>
- Rogers, C.R. & Freiberg, H.J. Freedom to Learn (3rd Ed). Columbus, OH: Merrill/Macmillan, 1994
- Saltzberg and Polyson, Distributed learning on the World Wide Web, Syllabus, 1995, Vol. 9, No. 1, pp. 10.
- Scott, D., “Faculty Roles and Rewards Change as Distance and Technology-Delivered Education Increase”, Linkages, IDE, University System of Maryland, Vol. 6, Number 1, Fall 1997.
- Slavin, J.M. ‘InterChange: Patterns of Interaction in Classes Using a Real-Time Conferencing System as a Medium of Instruction’, working paper, University of Texas at Austin, 1990.
- Stinson, John E. and Richard G. Milter, “Problem-Based Learning in Business Education: Curriculum Design and Implementation Issues”, 1995, <http://sirius.cba.ohiou.edu/~oumba/paper3.html>
- University of Phoenix’s Online Campus, <http://www.uophx.edu/online>
- Vygotsky, Mind in Society, Cambridge, MA: Cambridge University Press
- Whipple, W.R., “Collaborative Learning: Recognizing It When We See It”, Bulletin of the American Association of Higher Education, Vol. 40, No. 2, October 1987, pp. 3-7.