Developing a Learning Organization Model for Problem-Based Learning: 
The Emergent Lesson of Education from the IT Trenches

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EXECUTIVE SUMMARY

This case describes the initiative to develop a learning organization model to support the pedagogy of problem-based learning (PBL) as an approach to conduct teaching in the author’s undergraduate curriculum development. Specifically, an organizational scenario is described to support introducing the PBL method of course delivery. This is based on an action research depiction on some of the experiences and issues involved in conceiving and developing a Web-based course-support environment called REAL (Rich Environment for Active Learning). Our case then deliberates on the idea of setting up a Center for PBL Research as an important mechanism of institutional innovation. This center could be considered as an essential effort to encourage individual organizational units within the university to provide suitable electronic services toward the realization of a virtual university. The dilemma of this effort, however, remains the emergent changes of organizational behavior in education, which is essentially subjective, eclectic, individual, context-specific, and often one-off, making it traditionally the most difficult to support with technology.

Keywords: collaboration; information and communications technologies (ICT); learning organization; online education; problem-based learning (PBL); rich environment for active learning (REAL)

ORGANIZATION BACKGROUND

The Department of Computer and Information Science (CIS), one of the six organizational units of education under the Faculty of Science and Technology at the author’s affiliated university, is installed to offer degree programs in both the undergraduate and graduate levels in Software Engineering. The department has a current population of about 150 undergraduates and about 30 graduate students, mostly part-time. It has to coordinate per academic year the enactment of about 20 graduate and about 40 undergraduate courses. The department is headed by a
full professor, who manages the work of an academic team composed of other full professors, associate professors, assistant professors, lecturers, research and teaching assistants, as well as laboratory technicians. There are currently five laboratories installed for the IT education of our students: Software Engineering Laboratory, E-Commerce Technology Laboratory, Distributed Systems Laboratory, Computer Graphics and Multimedia Laboratory, and the Motion Capture Laboratory. Besides, there is a computer barn with more than 200 PCs provided by the university to offer 24-hour computer service to our students, including Internet access. To help to manage our course delivery, the university also has provided the WebCT to our teaching staff since the beginning of 1998. Currently, we are using WebCT Version 4.1 Campus Edition. The means of education delivery in our department has been largely didactic; yet, we are open enough to blend the best of our old values of good teaching through the instructivist approach with the constructivist way of thinking, such as problem-based learning (PBL). We also are interested in the continuing efforts to extend our curriculum and instructional practice over the Internet through our continually renewed Web-based course support, both for the teaching staff and for the students.

SETTING THE STAGE
As an organizational unit of our university, the Department of CIS has always relied on the mainstream IT resources continually made available for the utilization of our staff and students. To set the stage for our case discussion, it is important to understand the build-up history of IT infrastructure in our university.

Campus Network with Internet Access
Starting in 1993, our university was the first in Macau to introduce fiber-optics and structural cabling system to link all the campus computers. In 1998, our university laid the first high-speed ATM (Asynchronous Transfer Mode) network in Macau with a speed of 622Mbps, the highest standard of ATM network technology at that time. In 2000, we also got an upgraded campus network of Gigabit Ethernet with the backbone speed up to 8Gbps. Meanwhile, in about March 2000, the university launched the Net-Port service to install network outlets in all classrooms, meeting rooms, and library auditoriums throughout the campus. Teachers and students could then connect their notebook computers to the campus network. At the beginning of 2001, our wireless campus network had been incrementally put in place. Our wireless coverage is currently over 90% of our campus, and is the largest wireless local area network (LAN) in Macau, allowing both teachers and students further mobility with the notebooks. To allow remote access to the campus network, we also enjoy a modem pool of about 270 dial-up lines, so that teachers and students working at home can connect their computers to the campus network with Internet access. Our Internet access service could be traced back to 1994, when the university established the first leased line to the Internet in Macau before the establishment of any local Internet Service Providers (ISPs). In 2003, our university launched the Net-VPN (Virtual Private Network) service for students and teachers, which supports the execution of secure applications at home through broadband services provided by the local ISP. This VPN service is essential to accessing valuable e-journals to which our university library has subscribed. Currently, there are about 560 computers installed in the various computer rooms and computer laboratories distributed throughout our different faculties and institutes. With the adoption of smart-card access control and digital surveillance system, our computer rooms are open 24 hours a day, seven days a week to provide the maximum access time possible for students to use the computer facilities.
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