Knowledge infrastructure of the future (Guest Editorial)

Nian-Shing Chen
National Sun Yat-sen University, Taiwan // nschen@faulty.nsysu.edu.tw

Chin-Chung Tsai
National Taiwan University of Science & Technology, Taiwan // cctsai@mail.ntust.edu.tw

This special issue of Educational Technology & Society aims at giving the reader a highlight of current e-Learning research in Taiwan. The articles presented in this issue features the best research papers from the Technology Enhanced Learning (TELearn2007) conference held at the National Central University, Taiwan, in July 2007.

In general, to be able to offer an online course, one must first to have a learning platform or so called Learning Management System (LMS) to use, and then upload prepared learning contents for the course onto the platform, at last conduct learning activities by using the functions provided by the learning platform. However, there are two more unique features that online can do much better than its physical counterpart which are learning community and knowledge management.

Due to no time and space barriers and flexible of carry on asynchronous and synchronous learning activities, collaborative learning, peer learning and active social learning can be easily realized by running a successful learning community. The rapid developments of Web 2.0 applications and the popularity of social software further validated this argument. The challenge is how to run a successful learning community in an online learning environment; most teachers are still lacking skills and experiences and many issues are yet to be explored.

The two major drawbacks of physical teaching & learning are difficult to document teaching & learning portfolios and not easy to reuse and value-added previous materials. An online course is delivered in the form of digital format, every piece of digital material can be archived and every activity can be tracked and logged. Therefore, it is very important to incorporate knowledge management in running an online course, such that elegant materials created by previous students can be accumulated from semester to semester for beneficial later students. Teachers can document complete digital teaching portfolios for better reuse or even value-added of their online courses to enhance teaching efficiency and performance.

There are three main roles in any educational settings, which are instructor, learner and administrator; this is the same as for e-learning. Let’s propose a dual modals framework of e-Learning for better representing the context of e-Learning as shown in Figure 1. The first modal contains learning platform, learning content, learning activity, learning community and knowledge management which lying on the outer circle; the second modal contains instructor, learner and administrator which lying on the inner circle. To achieve a high quality e-learning education, all the people playing these three roles need to develop professional knowledge and know-how of how to best fulfill their roles by interacting with the five critical components surrounding around them in the context. We will use this framework to categorize the papers in this issue.

The evolution of the Internet applications has been gone through cyber community, e-learning and knowledge management. We are now in the period of transforming from knowledge management to innovation management. All these four types of applications, that is, community management, learning management, knowledge management and innovation management, need well-designed Internet application systems to carry. By examining from the system perspective, community management system and learning management system are already very mature; knowledge management system is moderate mature; innovation management system is far beyond mature yet. It seems that to develop a mature innovation management system still needs a lot of research and effort to be devoted in the future.

It is true but we observed that one cannot do good e-learning without doing learning community; one cannot do good knowledge management without doing e-learning. The same principle works for innovation management, which means one cannot do good innovation management without doing knowledge management. We can infer from these observations that a well-designed learning management system should include functions supported by the
community management system; and a well-designed knowledge management system should include functions supported by the learning management system; and a well-designed innovation management system should include functions supported by the knowledge management system. In summary, \( F(CMS) \subset F(LMS) \subset F(KMS) \subset F(IMS) \).

![Figure 1](image1.png)

*Figure 1. A dual modal framework of e-Learning*

![Function Graph](image2.png)

*Figure 2. The evolution of Internet applications from time and function perspectives*
We then argue that it is not a good idea to develop an innovation management system from a scratch, there is a more efficient way to develop an innovation management system by just adding additional functions on an existing knowledge management system. This concept can also be applied to do research related to community management, learning management, knowledge management and innovation management. As depicted in Figure 2, since innovation management system actually includes the functionalities supported by knowledge management system, and knowledge management system actually includes the functionalities supported by learning management system, and the same as for learning management system which actually includes the functionalities supported by community management system. That is to say, researchers can apply methodologies and methods which have been proved to be useful in solving community management and learning management related problems to explore knowledge management and innovation management issues.

Maiga Chang, Chin-Yeh Wang and Gwo-Dong Chen in their paper entitled “National Program for e-Learning in Taiwan” introduce an e-learning national program initiative in Taiwan, and the program is called the National Science and Technology Program for e-Learning. The research topics and issues studied in this national program cover almost every component described in Figure 1.

Ming-Puu Chen in the paper entitled “An Evaluation of the ELNP e-Learning Quality Assurance Program: Perspectives of Gap Analysis and Innovation Diffusion” examines the appropriateness of a nationwide quality assurance framework for e-learning from participants’ perspectives. The issues of this research almost cover every component described in Figure 1.

Meng-Jung Tsai in the paper entitled “The Model of Strategic e-Learning: Understanding and Evaluating Student e-Learning from Metacognitive Perspectives” constructs a model and develops an instrument called OLSS to present several future research directions. This is to address almost every component described in Figure 1.

Jie Chi Yang, Yi Ting Huang, Chi Cheng Tsai, Ching I Chung and Yu Chieh Wu in their paper entitled “An Automatic Multimedia Content Summarization System for Video Recommendation” explore how to effectively use videos for learning. This is to address the issues of learning content and learner as shown in Figure 1.

Ying-Hua Guan in the paper entitled “A Study on the Learning Efficiency of Multimedia-Presented, Computer-Based Science Information” explores the effects of different sorts of multimedia information on students’ science learning. This is to address the issues of learning content, instructor and learner as shown in Figure 1.

Nai-Lung Tsao, Chin-Hwa Kuo, David Wible and Tsung-Fu Hung in their paper entitled “Designing a Syntax-Based Retrieval System for Supporting Language Learning” propose a syntax-based text retrieval system for on-line language learning. This is to address the issues of learning platform, learning activity and learner as shown in Figure 1.

Wen-Chung Shih and Shian-Shyong Tseng in their paper entitled “A Knowledge-based Approach to Retrieving Teaching Materials for Context-aware Learning” propose a knowledge-based system to solve content retrieval problems of the context-aware learning. This is to address the issues of learning platform, learning content and knowledge management described in Figure 1.

Hsinyi Peng, Po-Ya Chuang, Gwo-Jen Hwang, Hui-Chun Chu, Ting-Ting Wu and Shu-Xian Huang in their paper entitled “Ubiquitous Performance-support System as Mindtool: A Case Study of Instructional Decision Making and Learning Assistant” propose a system called UPSS that can facilitate the seamless use of powerful new technologies in the school setting. It is a useful reference for those who are interested in conducting studies applying context-aware ubiquitous computing to educational contexts. This is to address almost every component described in Figure 1.

Chih-Yueh Chou and Hung-Ta Liang in their paper entitled “Content-Free Computer Supports for Self-Explaining: Modifiable Typing Interface and Prompting” investigate the effects of self-explaining on learning. This is to address the issues of learning activity, instructor and learner as shown in Figure 1.

Irene Y.L. Chen, Nian-Shing Chen and Kinshuk, in their paper entitled “Examining the Factors Influencing Participants’ Knowledge Sharing Behavior in Virtual Learning Communities” attempt to examine the factors
influencing knowledge sharing from the perspective of human behavior. This is to address the issues of learning community, knowledge management and administrator as shown in Figure 1.

Lih-Shyang Chen, Yuh-Ming Cheng, Sheng-Feng Weng, Yong-Guo Chen and Chyi-Her Lin in their paper entitled “Applications of a Time Sequence Mechanism in the Simulation Cases of a web-based Medical PBL System” analyze the organization of a computerized PBL teaching case and consider how a clinical teaching case can best be presented to the users. This is to address the issues of learning activity, instructor and learner as shown in Figure 1.

Jyh-Chong Liang, and Chin-Chung Tsai in their paper entitled “The information commitments toward web information among medical students in Taiwan” use the Information Commitment Survey (ICS) for an investigation of medical students’ standards of judging online information and their search strategies on the Web. This is to address the issues of learning activity, instructor and learner as shown in Figure 1.