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## Special Issue Preface

### Emerging Perspectives on Distance Learning

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As computers increasingly pervade our everyday lives, distance learning will assume a pivotal role in the educational area. Indeed, the requirements for education in the next century will be substantial, not just appreciable, as in this century. To cope with the rapidly changing environment, not only do individuals have to become learning individuals, organizations have to become learning organizations, and society has to become a learning society. It is getting clearer that the impact of network technology on education will not be less than that of multimedia or artificial intelligence. How to effectively use and incorporate these technologies to form open and receptive learning environments will certainly be a challenge to researchers in the information era.

The collection of papers in this issue fall into four groups, which I will introduce briefly. The authors attempt to provide insight into the distance learning environments of the future, from theory to experiment, from system architecture design to technique development. The papers are based on invited lectures of the Fourth International Conference on Computer Assisted Instruction held in March, 1995, at the National Chiao-Tung University, Taiwan. The main theme of the conference was distance learning. It was sponsored by the Ministry of Education, the National Science Council of Taiwan, and the Asia-Pacific Chapter of AACE. Some invited speakers are members of the editorial review board.

## LEARNING IN DISTANCE

The first paper is an overview of collaborative learning theories. Dillenbourg and Schneider review the empirical work concerning mechanisms of collaborative learning and conditions for effective collaborative learning. These findings are obtained from situations where two or more individuals work together to solve problems. Similar results are not expected from simple use of Internet information and communication tools where students talk to each other without strong intention to achieve a learning task. The authors suggest that more effort should be put into computer supported cooperative work tools for communication and information software so that individuals can engage in a convergent attempt at problem-solving.

Failures in distance learning tend to occur at the social level far more than at the technological level. In the second paper, Gunawardena discusses social presence theory and its implications. Social presence is the degree to which a person is perceived as a "real person" in computer mediated communication and involves associated concepts such as intimacy and immediacy. Gunawardena's study illustrates some notable findings. For example, in a text-based medium that is low in non-verbal cues, participants can create or cultivate social presence by projecting their identities and building on-line communities. Conferences start as task oriented and become more social; but impetus falls upon the moderators of the conferences to promote interaction and collaborative learning.

Murphy introduces an interesting concept, mindlessness and mindfulness, and the implications for distance education. Mindlessness refers to the behavior of people who blindly follow routines or unwittingly carry out senseless orders with potential grave consequences. Conversely, mindfulness possesses three characteristics: Creation of new categories, welcoming new information, and openness to new different points of views. Murphy describes the negative effects of mindlessness in both traditional and distance education. She suggests how to teach mindfully in distance education as well as teach teachers how to teach mindfully at a distance.

## EXPERIENCE IN DISTANCE EDUCATION

Hiltz's report on the results of comparing distance collaborative learning involving different modes and traditional face-to-face classroom teaching are encouraging. When distance learning is incorporated with video or supplemented by one or two face-to-face meetings, students have positive subjective evaluations of the course and their perceived difficulty of the

course is lessened. Hiltz points out that just as there is no single recipe for successful teaching in the traditional classroom, there are diverse techniques that can be employed in computer-mediated environments. Four principles for successful teaching and strategies for collaborative learning are discussed.

Davis overviews the range of telecommunications use, from information retrieval to information provision, in various sectors of education in different countries. She discusses the current pragmatics and the policies of using such technology as well as the issues of using it successfully for education. She warns that while the potential of using such technology for education has never been higher, there is some anxiety that it will fade away because most people mistakenly assumed that telecommunications are "good for" education without close examination of what they are "good for" and the issues they raise. She points out the most important issue is integration of the new forms of communication into education.

Wibe provides examples of distance learning course planning in Norway. Norway is a country with a sparse population and the country's upper secondary education is undergoing reform. They develop new curriculum and stress the use of information technology as an integrated part of education. Wibe presents the organization of a particular distance learning course and the experience the developers gained.

## DISTANCE LEARNING SYSTEMS

Computer networking among different countries has existed for many years. The first paper in this group by Wang presents an overview on the National Research and Educational Network, its potential developments and human concern. He surveys the historical background, motivation, goals, concepts, planning, and funding of the global information infrastructure as well as the implications for future libraries. As Wang puts it, many miracles of high-capacity computers, high-speed telecommunications, and the world-wide networks have already arrived, but the wide gaps between information "haves" and "have-nots" becomes wider due to the emergence and convergence of new technologies.

Turoff, based on his past work, reviews the software functionality of distance learning that has evolved over the last two decades. He illustrates activities of distance learning that are clearly dramatic improvements over traditional face-to-face classes. A simple example is the question-answer activity which is usually dominated by the same small percentage of students in a traditional class. Distance learning, however, forces equal par-

ticipation and each student has to do independent thinking about the issue. The current development objectives, multimedia and hypertext requirements, instructor's courseware server, simulation, and gaming are also discussed. As pointed out by Turoff, the key challenge is integration of most of the functionality into a single interface that is easy to learn.

Chan explores the idea of artificial agents in distance learning from different avenues of research. Artificial agents are a possible idea to further advanced software development for distance learning in the next decade. The notion emphasizes humanizing technological development from the inside out and the primary concern is to engage and help end users. There are basically two types of artificial agents in distance learning: Participant agents that assume roles in participating protocols of learning activities, and assistant agents that serve as personal assistants, cognitive tools, or surrogates on behalf of the end users in their absence. Chan identifies some of their uses and problems in distance learning.

Tsai and his colleagues discuss a prototype system that supports distant hypermedia cooperative learning. They regard learning in a hypermedia system environment as building knowledge nodes and linking them to the existing knowledge. The system provides a community of users with a single logical database, physically distributed across multiple workstations and file servers on a network. The system consists of two core parts: The hypermedia document subsystem and the monitoring and controlling subsystem.

#### MONITORING AND ANALYZING DISTANCE LEARNERS

Sun and his colleagues develop a quantitative model for hypermedia browsing pattern analysis. Navigation behavior analysis has been addressed in the past since it may answer questions about how students use the courseware in terms of routes and methods of navigation and sheds light on substantive theoretical and pragmatic issues. Most current methods rely on human expertise to divide patterns into several categories subjectively. Their attempt is to use fuzzy clustering and neuro-fuzzy classification models which emphasize quantitative aspects. They intend to incorporate such techniques to enhance the performance of the CD Title best seller in Taiwan, Studio Classroom, a series of computer assisted English learning programs.

Chiu and his colleagues study performance monitoring using causal modeling. The system consists of four different kinds of reasoning components: Event analysis, pattern recognition, chronicle analysis, and performance evaluation. Like the previous paper, this work is a quantitative reasoning mechanism that employs fuzzy logic technique. In principle, both works can be applied to stand alone and distributed systems to serve as a part of functionality of the student model, a component that tries to understand students.