Preface

Various definitions of distance education exist. A summarized definition of distance education may be seen as linking of teachers and students for all different types and levels of education including K-12, higher education, continuing education, trainings in corporate, military and/or government institutions, telemedicine and those devoted to the pursuit of lifelong learning. Advanced Distance Learning refers to a certain kind of education in which academic courses are delivered to places outside the campus via voice, video (live broadcast or rebroadcast), as well as real-time and non-real-time computer technologies. The educator and the learner may be separated by time, distance, or both. Open and distance learning (ODL) is increasingly occupying a prominent place in higher education. Chapter XVI reports that in India starting with barely 1,112 students studying through distance mode in 1962, the number had crossed 2.8 million in 2006. This chapter presents the findings of an empirical research study conducted to investigate the study habits of successful distance learners of the India Gandhi National Open University (IGNOU). Every year, nearly 70,000-80,000 pass out of IGNOU. The strategies adopted by these diverse groups of students, the media utilized by them, and the modes of support preferred by them are some of the major issues addressed in this study. Chapter XXIV discusses on major e-learning research programs, delivery consortia and professional development programs based in Canada.

E-learning is a critical support mechanism for organizations and individuals to enhance their skills. Chapter V presents major features of e-learning scenario, the ontology on which it is based and discusses on how Semantic Web technologies can be applied to e-learning system to help learner in selecting appropriate learning course or retrieving relevant information. It also illustrates the scenario ontology with the training domain and the application domain. Semantic Querying and Semantic Mapping approaches are also presented.

Assessing learner's knowledge in e-learning is an important issue. Due to the necessity of evaluating a large number of learners in short times, objective tests are gaining more popularity in the assessment of learners' performance. Chapter XVII presents an On-Line Testing system for evaluating learner's knowledge, named e-Workbook, which is suitable within the academic environment in a blended learning approach and can record and visualize, in a suitable graphical format the learner's interactions with the system interface during the test session to provide better understanding of the learner's behaviour. While some such systems implement fully automated marking for multiple choice questions and fill-in-the-blanks, but most systems are insufficient when human critiquing is required. Current systems developed in isolation have little regard to scalability and interoperability between courses, computer platforms, and learning management systems. Chapter XIV presents an enhanced set of the IMS Global Learning Consortium's open specifications for interoperable learning technology lack functionality to make it useful for computer assisted marking standards to address the issue.

Scores or grades obtained by a student in these evaluation processes reflects the learning status of that student, but is not capable of identifying students learning problems on areas of the subject, which

might help him/her to further improve. In Chapter XXII the authors propose an intelligent English tense learning and diagnostic system that is capable of identifying student learning problems on English verb tenses and be able to provide personalized learning suggestions in accordance with each student's learning portfolio. The proposal has shown superior results from experiments conducted on hundreds of college students.

The use of online delivery management systems is gaining popularity in most campuses. The Athabasca University, - Canada's Open University - developed evaluation criteria (as detailed in Chapter XIII) for three learning management systems (LMS), namely WebCt, LotusNotes, and Moodle. Moodle was ranked first with 11 first places and only one third place rating, while Lotus Notes was second with five first place ratings.

Though some definitions of distance education emphasize on technology and others do not, it is obvious that technology is the most important vehicle for effective and quality distance education. In recent years, technologies have advanced at an amazingly fast pace. With the incredible development and pervasiveness of wireless, mobile and networking communication, and sensor technologies in our daily life we tend to focus on the task at hand without even noticing their use - making the technology effectively invisible to the user resulting in a paradigm shift known as ubiquitous learning (u-learning). Chapter XVII discusses various investigations those have been undertaken for applying the new technologies to distance education to make it more active and adaptive to the real world.

Several researchers claim that the paradigm of networked learning, with its passive nature, usually discourages learning engagement and creates strong student isolation. This environment is unable to engage student in active learning. Chapter XXIII outlines a new paradigm and its underlying rationales for implementing networked learning environments that is emerging from new technologies such as multi-user platform, virtual worlds, virtual learning community, and intelligent agents. The proposed paradigm of the networked learning environments, known as inhabited virtual learning worlds (IVLW), is a shared learning space in 3-D format and populated with avatars that are the representations of learners who are geographically dispersed around the world. The virtual learning worlds are also composed of objects such as intelligent agents and learning materials. A pilot system is created based on the discussed rationales of inhabited virtual learning worlds. Also a preliminary empirical study focusing on the selected learning behaviors in young learners has been conducted with this pilot system. The results of the empirical study and suggestions for enhancing the pilot system are discussed in this chapter.

One important area of research is to apply computer vision (CV) technologies to various automated e-learning multimedia systems. Chapter XX discusses the importance of a synchronous, peer-to-peer-based application of computer vision technologies to e-learning and introduces the schematic of a progressive work in Intelligent Video Detection Agent (IVDA) that supports an instructor's interaction with non-computer teaching equipments. Some most recent advancements in the interactive PTZ camera control from both the instructor and remote student is discussed and results that successfully address different challenges are illustrated.

Use of human motion animation in e-learning applications has the potential to create significant interest from the users. Chapter XI in this book discusses on the development of efficient techniques for delivering human motion information over the Internet to the collaborating e-learning users and revealing the motion information in the client machines with different rendering capabilities that include mechanism to extract human motion data at various levels of detail taking into consideration the available network bandwidth.

Distance education created new challenges regarding the delivery of large size isochronous continuous streaming media (SM) objects. Chapter XV considers the design of a framework for customized SM presentations, where each presentation consists of a number of SM objects that should be retrieved and

displayed to the user in a coherent fashion. A retrieval optimizer (Prime) that captures the flexibilities and requirements imposed by the user query, user profile, and session profile is described. A cost model for evaluation of each proposed plan to impose user query script against the continuous media (CM) server to reduce contention has been developed. Preliminary experimental results show the feasibility and effectiveness of the proposed model and techniques in generating near optimal retrieval.

The dynamically changing social and economical environment where we live claims for new Agile/Virtual University approaches with individualized continuing and post-graduate education; Chapter XIX discusses a framework and a specific supporting environment, a Market of Teaching Resources necessary to the implementation of the Agile/Virtual University concept.

Motivation and independent learning are very important factors in students learning processes. Independent learning involves students meta-learning in a framework of goal-driven learning. Knowledge of learners related to interconnection and interrelationship between different components of the curriculum plays a vital role in both motivation and independent learning. In Web-based learning curriculum, especially for distance learners, it is often a challenge to conceptualize how different modules are related to one another and how the curriculum corresponds with their personal wills and objectives. Chapter XXI presents approaches and tools that can help learners to address such challenges of a Web-based learning curriculum and encourage them to become active participants in their learning. The proposed generic architecture is designed to be used in the context of an already existing Web-based learning system. The approach is based on a detailed modeling of the curriculum and intends to equip the learners with different computer-based tools facilitating a multiple point of view perception of the curriculum, while promoting self evaluation and self regulation of the learners' curriculum performance.

An effective tool in distance learning is possibility of forming "study groups" among students who can view the lecture videos together and pause, rewind, or fast forward the video to simulate the pedagogically valuable discussions that occur during on-campus lectures. However, conventional Internet video technology does not yet support collaborative video viewing by multiple geographically dispersed users. It is particularly challenging to support What I See Is What You See (WISIWYS) when some users are relatively disadvantaged with respect to bandwidth (e.g., dial-up modems) and local resources (e.g., old graphics cards, small disks). Chapter VI presents an e-Learning architecture and adaptation model called AI2TV (Adaptive Interactive Internet Team Video), which allows groups of students to collaboratively view instructional videos in synchrony.

Use of Learning Objects (LOs) by teachers would help increasing teaching performance, spread innovation and reduce cost through saving time by allowing reuse of potentially good teaching materials. A major obstructing factor in this is the amount of extra work that may be required by a teacher to integrate didactical resources prepared by other teachers in one's own lessons. To overcome this obstacle it is necessary to make them closer to actual teacher's work by emphasizing pedagogical aspects. To this end, Chapter X proposes a topology of LOs that allows teachers to share both content and educational competence.

Other chapters in this book focus on different research, design and implementation aspects of methods and application for advancing distance education and technologies. Chapters I to IV, VII to IX, and Chapter XVIII reports their design and development activities, as detailed below, those are very important to the advancement of distance learning initiatives.

- Development of a new automatic digital content generation system at Hosei University for students taking distance interactive classes over the Internet from overseas. The system enables the complete archiving of lectures including video/audio content, synchronized presentation materials, and handwritten traces on virtual whiteboards. The content is generated in real time and is immediately available at the end of the class. In addition, this system incorporates a unique video

search algorithm which adopts a phonetic-based search technology. This enables quick review of the video content by typed-in keywords. The system can automatically create a vast amount of digital content and provide students with an efficient learning tool for distance students and review materials for in- class students.

- Development of an e-learning platform, supporting the "anytime and anywhere" learning paradigm, that is able to manage and trace adaptive learning processes. The platform designed and created by means of a visual language based tool have a software architecture based on the use of Web Services and a suitable Middleware component compliant with the Shareable Content Object Reference Model (SCORM) standard. Experiments have been carried out to assess the usability of the proposed e-learning platform is reported.
- Implementation of a system for developing e-training courses based on a concept relationship-oriented approach. It addresses the challenging issues in developing traditional learning materials for high technical e-training courses meeting both the quality of the learning materials and also the efficiency of developing the courses. Experimental results show that this approach significantly shortened the time needed for developing e-training courses for engineers to receive up-to-date technologies in time.
- Building a pervasive learning environment to allow users to read SCORM-compliant textbooks with multimodal learning devices.
- Development of an approach to automatically generate an e-textbook by mining the ranked lists of the search engine by applying a clustering approach before the mining process.
- Development of a novel approach for learning Chinese calligraphy.
- Investigation of the use of latent semantic analysis (LSA), critiquing systems, and knowledge building to support computer-based teaching of English composition. The English composition critiquing system makes use of LSA to analyze student essays and compute feedback by comparing their essays with teacher's model essays.
- Development of a virtual interactive learning environment to teach GIS and spatial sciences to distance education graduate students facilitating student, instructor and computer interactivity using a mix of synchronous and asynchronous communication tools and students having access to a suite of passive and active multi-media tools and to a mixed Web-facilitated/hybrid architecture that stimulates their cognitive geographic skills and provides hands-on experience. The benefits and constraints of the innovative hybrid architecture of the virtual GIS computer laboratory are discussed.

The chapters in this book have demonstrated that the most essential requirements for advancing distance education for both teaching and learning are communication technologies, intelligent technologies and quality educational pedagogy.

Communication Technologies with high performance broadband and wireless network infrastructures, with quality service support, and with advanced communication tools and real time protocols are capable of supporting distributed synchronous multimedia streaming technology. The communication technologies must be supported by *Intelligent Technologies* to support high level secure personalized authentication mechanisms or in cases some degree of automation, effective and efficient authoring systems, online discussions, automated assessment, content individualization, automated response, intelligent tutoring and intellectual property and copyright protections using intelligent computation techniques such as neural network and statistical approaches with emphasis to behavior analysis.

In addition to the information technology components are also required development of quality educational pedagogy techniques that include practical and new learning models to adapt to the advancing information technologies and distance education demands and practices

The readers of this book will find answers to important issues necessary to be addressed for a successful distance education and will be reminded that the success of distance education requires effective use of instructional media, planning for instructional media use, visual communication, audio and motion media, computers as tools for learning, and evaluating the effectiveness of instructional media.

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