Preface

People have been continuously experiencing a change in work, life, play, and learn, due to the rapid development of information and communication technology (ICT). Nowadays, cloud services, social media (such as social networking or micro blogging services) and smart phones have become very popular and been widely utilized. The use of emerging ICT for learning supports and facilitates the education of global students and their instructors, and expands educational opportunities across time and distance to reach new group of learners.

On the other hand, new educational technologies and learning paradigms empowered by advanced computing, and networking technologies create new ways of teaching and learning, enable learning support to be adaptive and smarter, and make it possible to deliver learning as a service. The careful integration of ICT into instructional design of traditional curricula can improve the quality of learning and teaching for students and their instructors, and increase the breadth and depth of knowledge acquisition. Computer-aided instruction and learning with intelligent support is vital to ensure students have the comprehensive and unified skills to excel in an intricate and fast-paced technological society.

This volume, grouped categorically into four parts, collects some of the latest advances in intelligent distance education technologies and emerging studies: recent trends in intelligent learning systems, new models for adaptive and game-based learning, emerging technologies to deliver learning as a service, and innovative applications of technology-enhanced learning.

Section 1, including the first five chapters, is titled *Socially Intelligent Learning Support: Recent Trends*. As the name suggests, the chapters in Section 1 describe the most recent development and research achievement in intelligent learning systems, from the perspective of knowledge management, considering social influences to their practical application and a case study taking human factors into account.

Chapter 1 (*Modeling Social Influences in a Knowledge Management Network* by Giacomo Franco, Paolo Maresca and Giancarlo Nota) describes a distributed knowledge management framework that can augment learning and cooperation capabilities through knowledge sharing and effective communication, and can be used in several application domains. After characterizing the dimension of social influences in terms of identity, negotiation, and trust, it discusses a particular instance of the presented framework to handle the problem of risk management in enterprise alliance partnership, as a case study that shows the practical applicability of the proposed approach.

Chapter 2 (*Adapting SCORM Compliant LOs in a Knowledge Engineering Scenario* by Pierpaolo Di Bitonto) follows upon the knowledge sharing and management issue discussed in the previous chapter from the engineering perspective, focusing on the problem of personalizing for both teaching and learning sides, including tailoring the teaching strategy in the context of knowledge sharing communities, and further tailoring it to the user's cognitive and learning styles in order to supply the didactic material in the form best suited to the user, and thus facilitate learning in the knowledge sharing environment.

Chapter 3 (*Ontologies in Intelligent Learning Systems* by Boryana Deliyska and Peter Manoilov) examines the variety, relationships, and conceptualizations of ontologies used in intelligent learning systems. In this chapter, the conceptualization of the domain ontologies is presented by the upper levels of its taxonomies, and a method and an algorithm that are used to generate the application ontologies of structural learning objects, such as curriculum, syllabus, and lesson plan, are developed. Finally, examples of curriculum and syllabus application ontologies are given.

Chapter 4 (*EduTutor: An Intelligent Tutor System for a Learning Management System* by Joel J. P. C. Rodrigues, Pedro F. N. João, and Binod Vaidya) presents EduTutor, an intelligent tutoring system built for a web-based learning management system called Aulanet, and describes the system architecture and its main characteristics in detail. EduTutor has been proposed and developed with an intelligent tutor system to facilitate the perception of the learning process of each student, individually, in a virtual environment, and as a study guide. It can be easily integrated in higher levels of studies, different subjects, and different languages, and has been validated with a large set of real cases and is being used with success in the Portuguese primary education system.

Chapter 5 (*The Preliminary Investigation of the Factors that Influence the E-Learning Adoption in Higher Education Institutes: Jordan Case Study* by Maen Al-hawari and Sanaa Al-halabi) investigates the factors that influence e-learning adoption in Jordan universities, which is a pioneer country for e-learning systems in the Middle East. Factors, such as Internet, legislations, human factors, and Web content are defined through the analysis of unstructured interviews with developers and users of the e-learning systems, and specific content analysis software is used to analyze the interview's content.

Section 2, called *Adaptive and Game-Based Learning: New Models*, contains Chapters 6-11. These six chapters details two most promising learning paradigms: adaptive learning and game-based learning. While the first three chapters describe adaptive mechanisms for course generation, unified learning style model that takes individual differences into account, and multimedia authoring tool based on ontology, the remaining three chapters offer integrated approaches of adaptive learning and game-based learning. Among them, the last two chapters contain emerging studies on application of adaptive and game-based language learning.

Chapter 6 (*An Adaptive Course Generation Framework* by Frederick W.B. Li, Rynson W.H. Lau, and Parthiban Dharmendran) proposes an extensible framework based on the concept space and the concept filters to support adaptive course generation where comprehensive student characteristics, such as learning styles, course material annotation and programming-based decision rules, are considered. The concept space is a data structure for modeling student and course characteristics, while the concept filters are modifiers to determine how the course should be delivered. One of the major advantages of the proposed framework is that it does not require instructors to have any programming skills when they create adaptive e-learning courses.

Chapter 7 (*Integrating Individual Differences in Adaptive Educational Systems: The Unified Learning Style Model Case* by Elvira Popescu) overviews the individual differences that have an impact on the learning process and that are currently integrated in adaptive educational systems, focusing on learning style, one of the important human factors. It gives a critical analysis of learning styles and their use in technology-enhanced learning settings, motivating the need for a Unified Learning Style Model, which integrates a carefully selected set of learning preferences extracted from several traditional learning style models, related to perception modality, way of processing and organizing information, as well as motivational and social aspects. The practical applicability of the model is demonstrated by prototyping

an adaptive Web-based educational system built on it, and its use in the Web 2.0 context is envisioned with an additional dimension of social learning.

Chapter 8 (*Ontology-Based Multimedia Authoring Tool for Adaptive E-Learning* by Lawrence Y. Deng, Huan-Chao Keh, and Yi-Jen Liu) presents a multimedia authoring tool for adaptive e-learning by using media streaming technologies, based on an ontology-based model. The proposed system is developed to provide a feasible method to record and represent a lecture/presentation simply using a browser with the Windows Media services. A new approach to flexible support for the modeling of reusable and adaptable multimedia content has been proposed. A comprehensive system for advanced multimedia content production has been also developed. The proposed approach significantly improves the multimedia presentation authoring processes in terms of methodology and commercial aspects.

Chapter 9 (*Enhancing Adaptive Learning and Assessment in Virtual Learning Environments with Educational Games* by Ángel del Blanco, Javier Torrente, Pablo Moreno-Ger, and Baltasar Fernández-Manjón) discusses the importance of the integration of digital games in virtual learning environments (VLE) and the need of standards that allow the interoperable communication of games and VLEs, which has been widely accepted and utilized in e-learning in recent years. It further describes a middleware architecture to integrate video games in VLEs that addresses the technical barriers posed by the integration, and shows a case study with the implementation of the architecture in the so-called e-Adventure game authoring platform along with three examples of video game integration in educational settings.

Chapter 10 (*An Educational Game Helping Learners to Distinguish Similar Chinese Characters while Minimizing Human Efforts in Game Content Creation* by Zhi-Hui Hu, Billy H.-W. Chiu, Howard Leung, and Yun Xu) presents design and development of educational games to train learners to distinguish similar Chinese characters of quite different meanings, which is considered to be one of the most difficult learning tasks for Chinese language learners. A method to identify similar Chinese characters has been proposed, so that the game content creation can be made automatically, thus minimizing the human efforts. Learners need only to understand the concepts rather than memorize the answers in order to perform well in the games. The proposed educational games can reduce the workload of teachers for delivering language lessons.

Chapter 11 (*Development of Adaptive Kanji Learning System for Mobile Phone* by Mengmeng Li, Hiroaki Ogata, Bin Hou, Satoshi Hashimoto, Yuqin Liu, Noriko Uosaki, and Yoneo Yano) describes an adaptive mobile learning system to support learning of Japanese Kanji (Chinese characters). It puts emphasis on using the adaptive learning technique to resolve one common problem of the mobile-based email or SMS language learning systems. Three main efforts have been made: sending the contents to a learner following his or her interests, adjusting the difficulty level of the tests to suit the learner's proficiency level, and adapting the system to his or her learning style. Experimental evaluation results shows that the proposed approach is effective and the prototype system is well accepted by the learners.

Section 3, which contains chapters 12-15, is titled *Learning as a Service: Emerging Technologies*. This section presents some latest research and methodologies behind distance learning, utilizing the emerging computing paradigms such as service computing, social computing, and frontier information and communication technologies, such as social media (i.e., social networking services, blogs, and etc.) and cloud services, aiming at enabling learning as a service.

Chapter 12 (*Mashup of E-Learning Services: Emerging Technologies and Practices* by Neil Y. Yen, Timothy K. Shih, Qun Jin, Hui-Huang Hsu, and Louis R. Chao) provides a survey on recent development and trend in e-learning standards, systems, and technologies. Firstly, it gives an overview on the current e-learning environments and supporting tools from the perspective of both technological development

and practical application, by focusing on the system interoperability. After overviewing the current research topics on e-learning, it introduces the IMS Common Cartridge, a new e-learning standard that has attracted wide attention in the field. It further describes IMS Common Cartridge Authorization Web Service, Learning Tools Interoperability (LTI), and finally the mashup of current e-learning systems and LTI towards enabling learning as a service.

Chapter 13 (*Building Integrated E-Learning Environment Using Cloud Services and Social Networking Sites* by Mohammed Al-Zoube and Mudasser F. Wyne) presents an integrated solution that provides learners with a comprehensive and feature rich environment for building and utilizing applications and can be used for building a virtual environment both for teaching and learning, to fully utilizing the advantages of cloud computing and social networking services. An interactive tool that can be used for science education has been developed by using a variety of combined technologies. The proposed system can be used as a platform for exploring and sharing new ideas as well as for designing, modifying and monitoring educational contents. The system has a service oriented architecture that simplifies the management and increase the effective utilization of the underlying Web resources. It integrates different pedagogical approaches to both learning and teaching. To demonstrate the effectiveness of the proposed approach, two applications have been built, which use MySpace as the development platform, being composed of several services available on a cloud computing infrastructure.

Chapter 14 (*Revealing Student Blogging Activities Using RSS Feeds and LMS Logs* by Michael Derntl) discusses the potential applicability of blogging for educational purposes. It presents a follow-up case study on using blogs as reflective journals in an undergraduate laboratory course on computer science. It further addresses lessons learned and adaptations following from the first-time application, the underlying pedagogical strategy, and a detailed analysis and discussion of blogging activity data obtained from RSS feeds and LMS logs.

Chapter 15 (*Large-Scale Server-Side Infrastructure for E-Learning: Development, Design, and Experience* by Neil Simpkins) describes a scalable e-learning infrastructure for the provision of a set of server-side applications to a very large number of students in terms of design, development, and subsequent experiences. This infrastructure is intended to let students gain valuable experience of server-side technology and insight into central concepts behind server applications and management as well. A key objective of this work is to establish a framework that can be applied in both education and commerce to support very large-scale deployment of Web applications and services for these applications which themselves may have quite different purposes and properties.

Finally, Section 4, called *Technology-Enhanced Learning: Innovative Applications*, contains the final five chapters of the book, and focuses on using both advanced ICT and educational technology to enhance teaching-learning process and advance distance education and learning. Innovative applications, such as the accessibility and usability issues in online higher education for visually impaired students, acquisition of thinking and team-building skills, online learning diagnosis, diagnostic test and remedial learning, and collaborative advanced remote access laboratory, are addressed and discussed in detail.

Chapter 16 (*Coping with Accessibility and Usability Challenges of Online Technologies by Blind Students in Higher Education* by Samuel Muwanguzi and Lin Lin) examines the usability challenges and emotional reactions visually impaired college students experienced in accessing educational contents and communicating with peers and professors through online technologies. It reports the result of a case study, in which visually impaired students were interviewed regarding their online learning experiences using Blackboard. Analysis of the interviews reveals that the visually impaired students found Blackboard poorly accessible, which affected their academic achievements. However, despite

their frustrations and feelings of marginalization, the study showed that the visually impaired students were motivated and optimistic of their successes. The research suggests that academic administrators and online system designers work jointly with adaptive software developers to create enhanced user interfaces, ensure universal accessibility and usability of online technologies, and reduce educational inequities and frustrations encountered by the visually impaired students.

Chapter 17 (*The ART (Activities, Resources, Technological Supports) in On-Site and Online Learning, and Students' Perceptions of Acquisition of Thinking and Team-Building Skills* by Jennifer D.E. Thomas and Danielle Morin) reports and discusses the findings of a study that compares students' perceptions of support provided in the acquisition of various thinking and team-building skills, as a consequence of the integration of various Activities, Resources, and Technologies (ART) used in an upper level course on distributed computing. Their findings show that students perceived strong support for their acquisition of higher-order thinking skills and team-building skills from the offline resources, but moderate support from the online resources and technologies provided in the course, which was in opposition to the grades received. In addition, a deeper analysis of the results pointed to the use of cases as being most supportive of the acquisition of the higher-order thinking skills and team-building skills.

Chapter 18 (*A Research of Applying Learning Diagnosis Diagram in Online Learning Diagnosis* by Yu Lung Wu) proposes a new pedagogical method by adopting the Learning Diagnosis Diagram to obtain students' knowledge structure. According to each knowledge structure of student, this study employs a dynamic grouping approach to solve problems in the conventional once-and-for-all grouping strategy, which has been shown to be able to achieve the best complementary groups for further learning stages. It also shows that the complementary grouping method and more interaction among group members are helpful to increase the learning effects. Analysis of experimental evaluation results indicates that the proposed approach can improve the learning achievement of all learners.

Chapter 19 (*Web-Based Two-Tier Diagnostic Test and Remedial Learning Experiment* by Ah-Fur Lai and Deng-Jyi Chen) proposes a three-layer conceptual framework which adopts a two-tier diagnostic test theory to develop a web-based two-tier diagnostic test and remedial learning management system. The two-tier diagnostic test items of electro-magnetic concepts and the related multimedia remedial learning materials based on the theory of modular course have been designed for the purpose of investigating the remedial learning effects. The evaluation results show that the learners of the experimental group who received the treatment under the proposed system performed significantly better than those who took the traditional remedial class. The system can also provide learners useful remedial multimedia materials, which are necessary for them to eliminate their individual misconceptions in the remedial learning process.

Chapter 20 (*E-Learning in Engineering Education: Design of a Collaborative Advanced Remote Access Laboratory* by A.P. Jagadeesh Chandra and R.D. Sudhaker Samuel) presents a learning-by-doing environment to conduct laboratory experiments from remote locations. The proposed approach is demonstrated by handling the web interface, which supports the remote experimentation on communication circuits, power system, and an embedded board. The prototype system can facilitate users to perform the experiment remotely and efficiently using only a commonly available, user-friendly Web browser.

As Chapter 20 concludes the book, e-learning relates to not only science issues, but also engineering issues. Computer-aided instruction and distance learning is a continuously and rapidly evolving field. It needs careful utilization of a combination of information and communication technology and educational technology.

This volume offers helpful hints and insightful suggestions for present implementation and practical utilization and future research opportunities of e-learning systems and technologies. It can help researchers and practitioners to become aware of the very wide range of e-learning from interdisciplinary perspectives. In such a sense, this book should prove to be a vital reference resource to students, teachers, instructional designers, and administrators of distance learning and education.

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