Web-Based Intelligent e-Learning Systems: Technologies and Applications
(Book Review)

Reviewer:
Charalampos Karagiannidis
Assistant Professor
Department of Special Education
University of Thessaly
Volos, Greece
karagian@uth.gr

Textbook Details:
Web-Based Intelligent e-Learning Systems: Technologies and Applications
Zongmin Ma (ed.)
Idea Group Inc.
2006, 388 pages

Introduction

Web-Based Intelligent e-Learning Environments (WILE) attract considerable attention worldwide, since they bear the potential to improve the quality of e-learning applications and services: WILE can overcome the main shortcoming of e-learning technologies (all learners receive the same learning material, activities, etc; “one-size-fits-all” approach), by facilitating personalized learning experiences, adapted to the particular characteristics of each learner.

The book focuses on the technologies and applications of WILE, aiming to present latest research, development and application results in the field.

Chapter Summary

The book includes 17 chapters, organized into two major sections. The first section discusses theories, key technologies and designs of WILE, while the second section covers implementation and application issues.

In particular, Chapter 1 presents a framework of adaptive support for inductive reasoning ability in virtual learning environments, based on research on cognitive science; the framework accommodates adaptive navigational paths, adaptive content (amount, concreteness, structure) and adaptive information resources. Chapter 2 discusses one of the most challenging issues in WILE: adaptive authoring; it then presents a solution (MOT) based on the LAOS model, as well as a couple of WILE which have been created accordingly. Chapter 3 addresses the selection and sequencing of Learning Objects (LO); it presents a utility-based model which is based on learning technologies specifications and standards, aiming to adaptively select and sequence LO, according to the learners’ profile. Chapter 4 addresses virtual learning communities (VLC); it discusses the essential criteria for their setup (social context, shared learning goal, technology and facilitation), as well as how to build culturally-inclusive VLC. Chapter 5 presents a conceptual architecture for the development of interactive educational multimedia; the architecture is open to further extensions, integration to other frameworks and standards, and adaptations to particular learner needs. Chapter 6 focuses on students’ emotions in learning environments; it reviews the state-of-the-art in this field, as well as the challenges and main difficulties in accommodating students’ affects in learning environments. Chapter 7 introduces how to use a web-based recommender system, developed with a collaborative bookmark management system approach; the system is able to effectively filter relevant resources, taking advantage of the common interests of users. Chapter 8 presents MetaLinks, a domain-independent authoring tool and web server for adaptive textbooks; the tool supports active reading, which is appropriate for novice and advanced readers, and can be coherently read from a number of thematic perspectives. Chapter 9 discusses knowledge representation in ILE; they define the requirements concerning all stages of the ILE lifecycle, different types of users, and different system modules. Chapter 10 deals with adaptive tutoring for case-based ITS; it proposes a formal approach for the development and evaluation of ITS with reusable components. Chapter 11 addresses the use of ontologies in WILE;
ontologies serve as shared knowledge representations that can be used to obtain enhanced learning object metadata records, towards the selection of LO according to learners’ profile. Chapter 12 addresses the role of learning technologies specifications and standards in WILE; it provides an overview of standards, as well as their utilization in existing systems. Chapter 13 presents AWLA - a writing e-learning alliance; AWLA is an organised set of interactive web-based utilities that, when applied in a technologically enhanced learning environment, allows learners to develop their writing skills and fulfil writing activities.

In section II, Chapter 14 describes a number of interactive virtual environments (IVE) which are developed at the North Dakota State University; these IVE aim to increase student achievement and scientific problem-solving in a real-world context. Chapter 15 presents an integrated platform for educational virtual environments; the platform aims to support educational communities, synchronous online courses in multi-user 3D environments, and the creation and access of asynchronous courses through a learning content management system. Chapter 16 describes a number web-based instructional tutors that support active and engaging learning; these tutors reason about the students’ knowledge and teaching strategies, in order to adapt to them. Finally, Chapter 17 introduces the concept (and discusses the implementation and evaluation) of special purpose e-learning environments (SPELE), which aim to accommodate learners’ individual learning differences.

Evaluation

The book includes an interesting mix of chapters, addressing both theoretical and development issues, as well as specific WILE systems and their use. Moreover, the chapters cover different aspects of WILE, including adaptive authoring, adaptive selection of learning material and activities, knowledge representation and reasoning for adaptive behaviour, etc.

On the other hand, some of the chapters are not directly related to WILE - readers focused only on WILE may not be particularly interested in them. Also, the large-scale implementation and evaluation of WILE is not thoroughly covered by the book chapters - this is a very challenging issue for WILE to become mainstream.

In summary, I would recommend this book to anyone who is interested in WILE. The research domain is not new (research on ITS started in 80s), however a very limited number of WILE have been tested in real, large-scale implementations. The ideas presented in the book can contribute towards a better quality of e-learning systems, which can be a catalyst for the citizens of the knowledge society and knowledge-based economy.