OVERVIEW AND MOTIVATION

There is compelling scientific, social and economic evidence for the need to widen access to education for everyone who wishes it. The consideration of people with diverse needs, capabilities and cultural differences must direct scientists and education stakeholders to look at the world in a new light. Widening access requires reducing disabling conditions under which users of education work.

We humans are amazingly innovative and inventive, and the proof is everywhere. If necessity is the mother of invention, then diverse necessities must lead to diverse, good innovation and inventions, which are human-orientated and user-centered.

The advances in Information and Communication Technology (ICT) have made it possible to reach out to a wider audience around the globe. However, even with a low cost technology, this is not always satisfactory. Reaching out successfully, to a wide range of people, requires care in employing user-centered approaches that are derived from human computer interaction (HCI) research and principles; this issue remains a big challenge. Motivated by this challenge, the book aims to emphasize the need to take multi-disciplinary and/or inter-disciplinary views on this issue, by marrying solutions from HCI, education, artificial intelligence, interactive multimedia technology and the WWW to benefit innovation in education.

The book focuses on “E-Education” (also known as online- or e-learning). In pursuing this motivation, the book promotes the continuous need to push for technology which serve people, instead of the other way round. Facilitating e-education requires technology that is usable and a new thinking of teaching and learning. This requires a technology and innovative solutions that can adapt to support many different groups of users and, most importantly, a passion to know who the users of education are so that they or their needs are not overlooked.

MAIN OBJECTIVE

The primary objective of this book is to enforce the need to take multi-disciplinary and/or inter-disciplinary approaches; when solutions for e-education (or online-, e-learning)
are introduced. This makes innovative solutions that are user-centered possible and more effective. By focusing on the issues that have impact on the usability of e-learning, the book specifically fills-in a gap in this area, which is particularly invaluable to practitioners. The book is aimed at researchers and practitioners from academia, industry, and government, for an in-depth coverage of a broad range of issues, ideas and practical experiences on this subject. It aims to raise more awareness in this important subject, promote good practice, and share and evaluate experiences (advantages, disadvantages, problems faced and lessons learned).

DESCRIPTION OF CHAPTERS

This book includes 20 chapters, grouped into two sections. The following presents a brief overview of each chapter:

Section I: Models, Systems and Courses

Chapter I, *Engineering of a Virtual Community Platform: Realization of a Socialware with Integration of the ‘User as Editor’ Concept*, is written by Kerstin Röse, Leon Urbas, Alexander Künzer, Martin Christof Kindsmüller and Sandro Leuchter. This chapter describes “UseWorld.net,” which smoothly integrates different information services with components for collaboration and personalization into an open user adaptive scientific portal. It presents an interdisciplinary approach to software engineering, incorporating the social aspects of virtual communities.

Chapter II, *Innovative Approach to Teaching Database Design through WWW: A Case Study and Usability Evaluation*, is by Joanna Jedrzejowicz. This chapter describes the “Postcourse” project, which is an e-course on database design. The innovative part of this project is in the interactive tools created and offered to the users of this course; a usability evaluation is discussed in the chapter.

Chapter III, *A Model-Driven Approach for Synchronous Dynamic Collaborative E-Learning*, by Véronique Baudin, Khalil Drira, Thierry Villemur and Saïd Tazi, describes a graph-based collaboration model that represents the structure of synchronous groups with their dynamic evolving. The model defines an advanced and distributed e-learning scenario involving three user groups: Teachers, Students and Coordinators. Two experiments are discussed detailing this work.

Chapter IV, *Smart ProFlexLearn: An Intuitive Approach to Virtual Learning Environment*, is by Claude Ghaoui and W.A. Janvier. This chapter provides an overview of distance learning and e-learning, and describes a Managed Virtual Learning environment prototype system called “ProFlexLearn,” which was developed to support flexible e-learning. Further developments on this system; to add intuitive features were carried out; these are described and assessed in the chapter.

Chapter V, *An Expert-Based Evaluation Concerning Human Factors in ODL Programs: A Preliminary Investigation*, by Athanasis Karoulis, Ioannis Tarnanas and Andreas Pombortsis, presents a holistic evaluation approach to ODL, taking into account HCI and human factors, especially principles on collaboration and distributed cognition. The authors discuss lessons learned, with useful insights and suggestions.

Chapter VI, *Integrated E-Learning System and Its Practice*, by Toshio Ōkamoto and Mizue Kayama, describes an intelligent media oriented e-learning system. This system includes collaborative tools, as part of a learning management system, to facili-
tate interaction. Also, it offers an innovative educational method to link industry and university. This work has been tested, and analysis of the results are presented and used to inform further improvements.

Chapter VII, SEGODON: Learning Support System that can be Applied to Various Forms, Takashi Yoshino and Jun Munemori, describes learning support systems, which the authors developed, called SEGODON and SEGODON-PDA. The first consists of personal computers and local area network (LAN), and the second consists of Personal Digital Assistants (PDAs) and wireless LAN. An evaluation study is discussed to assess if this new system may have had an impact on improving students’ results.

Chapter VIII, Creative E-Transitions, by Lynne Hunt, describes a pilot, online transition to a university project titled “Click Around Edith Cowan University,” and an online, generic skills and career planning project called “Careering Ahead in Health Promotion”. The author explains that both projects are informed by authentic learning pedagogy, which proved to be effective for e-learning.

Chapter IX, Distributed Constructionism through Participatory Design, is by Panayiotis Zaphiris, Giorgos Zacharia and Meenakshi Sundaram Rajasekaran. This chapter presents the implementation of Distributed Constructionism through a participatory design methodology for an online learning community, using a Modern Greek language course. Different aspects of participatory design were explored and quantitative analysis was carried out to evaluate its effectiveness in supporting users.

Chapter X, Fast Track: School Based Student Software Design, by Philip Duggan, Claude Ghaoui and Mike Simco, describes a pilot study, which explores the effectiveness of using participatory design in the learning of students. Students were involved in the design and development process of a software in a school environment. Preliminary results are encouraging and further usability evaluations on a larger scale are planned.

Chapter XI, E-Learning as a Catalyst for Educational Innovation, by Petek Askar and Ugur Halici, describes initiatives regarding e-learning and its impact on instructional design, management and the wider community. Experiences from Turkey were discussed by the authors.

Section II: More on Intuitive, Social and International Issues

Chapter XII, Employing Intelligent and Adaptive Methods for Online Learning, by Bernard Mark Garrett and George Roberts, discusses strategies for using intelligent and adaptive methods for online learning. It also gives an overview of representation of knowledge and intelligent agents, using a simulation application as an example. Future directions on the use of this technology in online learning are discussed.

Chapter XIII, Toward Predictive Models for E-Learning: What Have We Learned So Far?, is written by Maria Alexandra Rentroia-Bonito and Joaquim Armando Pires Jorge. This chapter raises an important concern of working and developing e-learning without taking a multidisciplinary and interdisciplinary approaches to the problem. In an effort to address this issue, the authors propose a holistic framework to e-learning.

Chapter XIV, Supporting Informal Interaction in Online Courses, by Juan Contreras-Castillo, Jesús Favela and Carmen Pérez-Fragoso, describes a system called CENTRES, which the authors developed to provide informal communications through
instant messaging and presence awareness. A socio-academic based evaluation study was carried out to assess the usability of this system in an online learning environment.

Chapter XV, *The Orientation and Disorientation of E-Learners*, by Bernard Mark Garrett and Richard Francis, explores how students may be orientated and disorientated to online learning, examining some of the methods that can be employed to reduce some of the pitfalls, which come with this mode. The authors argue that disorientation experienced by students in this mode is part of the learning process to become better independent learners.

Chapter XVI, *Ensuring Usability in International Web-Based E-Learning Systems*, is written by Andy Smith. This chapter provides a summary of the main issues within cross-cultural usability with an emphasis on web-based systems. It discusses the application of generic models and theories to the field of e-learning systems and provides some future directions to ensure usability in the international context of e-learning.

Chapter XVII, *Knowledge Spaces: Cultural Education in the Media Age*, by Wolfgang Strauss, Monika Fleischmann, Jochen Denzinger, Michael Wolf and Yinlin Li, describes the work on e-learning carried out in the field of art and culture by the MARS research group. New forms of knowledge retrieval were investigated and discussed.

Chapter XVIII, *Development and Evaluation of a New HTML Browser Method of Presenting Reading Material for Students with Low Vision*, is by Kazuhito Ujima and Koichi Oda. This chapter describes a novel method, using both web technology and vision science, to predict the vision needs of individual students, and produce the appropriate reading material. Evaluation with students showed very encouraging results, which are presented.

Chapter XIX, *A Sign Language Teaching System Using Sign Language Recognition and Generation Methods*, by Hirohiko Sagawa and Masaru Takeuchi, describes a sign language teaching system that was developed, using sign language recognition and generation methods, to overcome three problems: lack of information about non-manual gestures, display of gestures and feedback given to learners on the correctness of their learned gestures. Evaluation showed positive results, which are discussed.

Chapter XX, *Precursors to Web-Based Methodologies: Lessons We Can Learn from Teaching Machines, Automatic Tutoring Devices and Learning Hierarchies*, is written by Robert S. Owen and Bosede Aworuwa. This chapter reviews the original methods on automatic teaching and tutoring machines, and compares these to hypermedia methods that are now enabled via the Web. Usability issues are explored in both contexts, with a greater emphasis on the educational aspects in an online learning mode.

**CONCLUSION**

The 20 chapters included in this book cover a wide range of important issues on the subject of “E-Education Applications: Human Factors and Innovative Approaches,” representing experiences from 12 countries. It was really pleasing to have representations from the following 12 countries: UK, Greece, France, Germany, Portugal, Turkey, Poland, USA, Canada, Australia, Japan and Mexico. The chapters report on research, development and real experiences, including theory, practice, techniques, analysis, design and work in progress. Authors present new insights and views, by reflecting on
the inter- and multi-disciplinary nature of this topic, addressing it from different perspectives, e.g., Computer Science/IT, Engineering, Psychology, Sociology, Cognitive Science, Art, and Design. The main contribution of this book is in its focus on “innovation and HCI-based” solutions for the benefit of e-education. This theme fills in a gap in literature, and particularly benefits practitioners who are working in different capacities in IT and the education sector.