Preface

ONLINE LEARNING: THE BACKGROUND

Over the last two decades, the landscape of higher education has changed considerably, with more and more resources spent on instructional technology supporting *face-to-face, hybrid, and online modes of content delivery*. The truly revolutionary changes in instructional technology contributed to the tremendous growth of online learning and training in both, the academia and corporate environments.

Nowadays, *online courses* are offered not only by 'pure' online educational institutions but also by traditional schools. According to the research by Allen and Seaman (2008) prepared for the recent Sloan Report, in the United States more than "twenty percent of all U.S. higher education students … [or] over 3.9 million students were taking at least one online course during the fall 2007 term; a 12-percent increase over the number reported the previous year." (p. 1). By 2010 this number increased dramatically, with "over 6.1 million students were taking at least one online course in fall 2010; an increase of 560,00 students over the number reported the previous year; thirty-one percent of all higher education students now take at least one course online" (Allen & Seaman 2011, p. 4). Moreover, distance-learning courses are currently being offered not only to incoming college students and adult learners but also to K-12 students, increasingly covering practically all population groups from children to mature adults. We can expect that the continuing economic downturn in the United States and across the globe will make a further positive impact on online enrollment due to rising fuel costs and rapid occupational shifts in the job markets. For example, while the overall enrollment into for-profit colleges has been declining due to ongoing recession and new federal regulations, enrollment into online programs has been steadily growing. Most recently, one of the leading for-profit educational providers, Corinthian Colleges, reported virtually flat growth for their physical campuses for the forth 2012 quarter, with a spectacular 19% enrollment growth in their online programs (Corinthian Colleges Press Release).

It is important to emphasize that there is no universal consensus on the use of terminology related to online forms of course delivery. The term *distance learning* can be applied either to pure online course offerings, where 100 percent of course content is delivered online, or to courses with only some of the content delivered online. The latter include *blended or hybrid courses* as well as traditional courses supported by Web-based content. The Sloan Report quoted above considers online courses as "those in which at least 80 percent of the course content is delivered online." (p. 4).

While courses supported by online content can rely on commonly used multiple *Web-enabled technologies*, such as e-mail and instant messaging for communication between instructors and students or static Web content for displaying syllabi and course announcements, all Web-based and Web-supported forms of course delivery increasingly use specialized educational technologies called *learning manage-*

ment systems (LMS) or *course management systems (CMS).* These technologies are widely used not only for online course delivery but also for computerized support of traditional courses, as more and more students expect at least some access to all their classes through the World Wide Web.

LEARNING MANAGEMENT SYSTEMS AND INSTRUCTIONAL DESIGN

The use of computer technologies in educational practice goes back a few decades to the dawn of the 'information revolution.' While in the 1980s the importance of computers for education was still a matter of debate (Cuban, 1986), in the 1990s the explosive proliferation of personal computers, educational software, and the World Wide Web placed *computer-assisted pedagogy* at the center of the educational process.

This trend gave rise to rapid development of learning management systems – full-scale learning platforms supporting multiple facets of an educational process, from administrative functions to course delivery and assessment. Some researchers (Mallon et al., 2009) trace the emergence of LMSs to rudimentary "training management systems," which later evolved into the full-scaled "e-learning platforms;" others (Bailey, 1993) emphasize the importance of integrated learning systems as precursors of contemporary learning management systems.

However, as with the term online course, there is no universal consensus on the semantic scope of the term learning management system, often used interchangeably with the term course management system. In the context of this publication, we do not find it productive to try to find one all embracing 'essential definition' of what a LMS is or to differentiate between a LMS and a CMS. Consequently, the two terms are often used interchangeably. In fact, the book can be considered as an attempt to contribute to the 'ostensive' definition of a LMS, covering a wide range of commercial and open-source LMSs and related technologies used in the institutions of higher education. At the same time, it is not our primary objective to cover in this publication LMSs used in the business world for corporate training and related purposes.

Currently, multiple LMS solutions for higher education can be purchased from the commercial providers such as the Blackboard Corporation, the dominant player in the United States with more than 50 percent of the educational market, or obtained from the open-source community without any licensing cost. At the same time, European countries increasingly rely on *free open-source learning management systems*; the important component of this trend is their proclaimed commitment to knowledge as a community asset to be available to all independent of their economic status.

This book addresses from multiple perspectives some of the most popular software products. In particular, an important recent development in online education is proliferation of *cloud-based LMS solutions*, providing eLearning services in a distributed computing environment on the Web. Among the notable players in this field are Haiku and OpenClass introduced by Pearson with an apparent intention to create a new educational and business model by integrating instructional content with *cloud-based learning environment*. Another popular cloud-based trend in eLearning is practice of *massive open online course (MOOC)* offerings by either individual higher education institutions or a 'consortium' platforms like *Coursera* (Hill, 2012).The MOOC phenomenon could be placed within the framework of *open educational resources* movement focused on creation and distribution of free and open-source educational materials and supporting software (Geser, 2007). At the same time, a number of institutions, especially 'for profit' schools, develop their own in-house proprietary e-Learning platforms not covered in this book.

With a relative maturity of the LMS market, some participants are looking to move from their previously acquired LMS to a new product. The switch to a new product is usually motivated either by an attempt to reduce the cost of licensing and maintaining an expensive technology or by dissatisfaction with the existing LMS. The book should help both the novice in the area of educational software and the seasoned user to either choose their first or to switch to a new, more suitable, LMS.

All LMS products, commercial and open-source, share virtually the same capabilities, providing administrative functions such as student registration and assessment as well as different forms of content management. Typically LMSs utilize advanced relational database software such as Oracle, Microsoft SQL Server, or (especially for open-source systems) MySQL and PostgreSQL. The use of relational databases with their emphasis on data independence greatly enhances security of LMSs, incorporating a variety of login 'roles' such as an instructor, a student, or a guest among others. An instructor can either privately interact with each course participant or create discussion groups and teams with different profiles.

With the advance of the so-called Web 2.0, modern LMSs decisively moved towards allowing integration with multiple Web 2.0 enhanced technologies such as Facebook, Twitter, visual and audio tools, and ePortfolio supporting software. Learning management systems also increasingly support mobile devices such as smartphones and iPad-like tablet devices. The Web 2.0 technologies and mobile devices made their way not only into academia but also into the corporate world and even medical education. Another important trend is using *synchronous mode of content delivery* for online courses and corporate training, making extensive use of conferencing software such as commercial Adobe Connect and Elluminate or open-source Bigbluebutton and Skype.

As a related development, the proliferation of LMSs and supporting technologies made a definite impact on instructional design and teaching methodologies. As students increasingly take courses in either online or hybrid format, they typically expect to have access to at least some course material online in all their classes. Consequently, even an instructor of a traditional face-to-face class must be able to use a LMS. At the same time, while faculty need to master new computerized technologies, software developers also should be able to accommodate best teaching practices and course design methodologies.

In this respect, among the important challenges to LMSs mentioned by researchers is a necessity to incorporate *constructivist instructional design* methods and pedagogy, in particular emphasizing *active and collaborative learning* and personalized attention to all course participants. The ability of modern LMSs to integrate multimedia and Web 2.0 tools made a significant impact on instructional design and teaching practice. In particular, Web 2.0 applications may be used to enhance student interaction and collaboration (Beldarrain, 2006); simulations and serious games are also finding their way into eLearning environment (Horton, 2012; Clark & Mayer, 2011).

A close relationship between learning environments and instructional design decisions is especially apparent in the concept of *learning object* (Koohang, 2006). This concept is a product of the *modular approach to instructional design* and content delivery, with a dual focus on *semantic portability of learning units* across multiple courses and *software portability across multiple LMS platforms*. As a result, learning content could be reused and shared between courses or training modules as well as imported from and exported to a variety of learning management systems that implement *Sharable Content Object Reference Model (SCORM)* and related standards. In this context, design and distribution of learning objects could support the open educational resources initiative mentioned above. In turn, educational technology and instructional design methodologies are closely related to evolving practices in online and hybrid course delivery. That is why this book, along with the coverage of LMSs and related technologies, also includes a thorough discussion of the interaction between technology, instructional design and teaching practice.

In the next section, we provide a detailed guide to the book's content.

BOOK CHAPTERS OVERVIEW

The book, "Learning Management Systems and Instructional Design: Best Practices in Online Education," is organized into four sections, beginning with adoption and implementation of LMSs and, then, consistently moving to the comparative analysis of technologies supporting synchronous and asynchronous eLearning environments, instructional design and eLearning methodologies, and, finally, to special topics in virtual learning environments.

Section One, "Learning Management Systems: Choice, Implementation, Transition," begins with a broadly based overview by Anthony Pina focused on the LMSs typically used in academia, with a special emphasis on the commercial products. Among the LMSs reviewed are Blackboard, Desire2Learn, Angel, eCollege, Sakai, Moodle, and recently released cloud-based systems. Dr. Pina introduces the reader to a variety of learning management platforms and key features found in most LMSs, and presents a comparative analysis of the most commonly used products. The chapter also serves as a general introduction to other sections of the book.

In the second chapter, "Learning Management System Evaluation and Selection: A Case Study of the University of Massachusetts System Methodology for the Learning Platform Review," Apostolos Koutropoulos analyzes the process of learning management system evaluation and selection. He presents a case study of the University of Massachusetts methodology for the learning platform selection. The author begins with the brief review of the LMS platforms traditionally used across the University of Massachusetts campuses and proceeds to the discussion of logic behind evaluation and selection of Blackboard Vista as a new unified LMS. He considers the evaluation and selection process in the context of *Agile Project Management* methodology. The chapter is an interesting attempt aimed at overcoming the current disparity in evaluation and selection criteria for e-Learning platforms.

The next chapter by Sergey Butakov, Oleg Solodky, and Bobby Swar, "LMS Implementation in Startup Institutions: A Case Study of Three Projects," is focused on a variety of issues related to the process of selecting a LMS platform at startup institutions without any prior experience with learning management systems. The authors, capitalizing on their international experience, consider and compare LMS implementation process in Nigeria, Russia, and Korea. They examine LMS selection criteria such as student and faculty profiles, affordability, and robustness, among others.

In the fourth chapter, Tawnya Means and her coauthors analyze the adoption of a popular open source LMS Sakai at the University of Florida. The authors discuss in detail the motivation behind adopting a particular version of Sakai e-Learning platform at their home institution. The chapter includes a thorough examination of the procedure developed for the evaluation and testing of LMS candidates, including data collection process as well as roles of key stakeholders.

In the next chapter, "Challenges of LMS Implementation in a Multi-Cultural Context," Ross Ian Vance and Beth Crawford examine how LMS capabilities may be used to overcome cultural diversity and enhance cross-cultural interactions. In this context, the authors consider political, pedagogical, and technical aspects of eLearning, and give recommendations for cross-cultural LMS implementation strategies aimed at creating a truly global learning environment.

The first section of the book concludes with the chapter by Younis Alsabawy, Aileen Cater-Steel, and Jeffrey Soar "E-Learning Service Delivery Quality: A Determinant of User Satisfaction," where they present results of the comprehensive investigation focused on the connection between eLearning *service delivery quality* and user satisfaction. This highly structured research project utilized mixed

(quantitative and qualitative) case study methodology and was conducted at the University of Southern Queensland, Australia.

Section Two of the book, "Tools and Technologies for Asynchronous and Synchronous Content Delivery," offers a detailed discussion of software tools supporting a wide variety of LMS functionalities. In the first chapter, Sergey Butakov, Vladislav Scherbinin, Vadim Diagelev, and Alexander Tskhay review plagiarism detection tools and methodologies, including cross-language plagiarism detection. The authors' research covers popular software solutions, including Turnitin and SafeAssign, which are often integrated into commercial and open-source LMSs. Furthermore, the chapter describes a new architecture for *plagiarism detection infrastructure* and its implementation as a plug-in tool for the LMS Moodle. This comprehensive analysis of plagiarism detection is an excellent source of information for faculty and college administrators alike.

The second chapter by Vladimir Riabov, "Learning Management Systems Evaluation and Selection: A Case Study of the University of Massachusetts System Methodology for the Learning Platform Review," examines a variety of open-source free software tools used by the author for online and hybrid course delivery in computer science. The special emphasis is placed on using the tools for virtual labs and student course projects. In particular, the author reviews tools for the implementation of Unified Modeling Language diagrams and computer programs written in C/C++/JAVA programming languages; he also considers popular free tools for classes in data communication, database systems, networking, and Web development.

Clark Shah-Nelson in his chapter "LMS Implementation in Startup Institutions: Case Study of Three Projects," offers a discussion and analysis of tools used for synchronous course delivery and support. The popularity of such tools has been growing with the increasing availability and decreasing cost of broadband Internet access. The chapter covers software solutions supporting instant messaging, Internet chat, conferencing, and collaboration. The use of synchronous communication software is examined from the perspectives of instructors, students, and technical support staff.

The next chapter, "Lessons Learned from a Course Management System Review at the University of Florida," by Rebecca Curtin and Michael Tarnow presents a case study of the iPad pilot implementation project for Shanghai middle school students. The authors discuss the motivation behind the project and analyze the results from the perspective of potential benefits vs. challenges to the traditional learning pedagogical paradigm. In this context, they address a variety of learning activities and pay special attention to integrating iPad applications and features into *constructivist learning environment* with a special focus on enhanced student participation and collaboration.

Section Two concludes with the chapter by Angelo Jesus and Maria Joao Gomes, "Web 2.0 Tools in Biomedical Education: Limitations and Possibilities," where they address the growing use of Web 2.0 tools in biomedical education. The authors link the increasing popularity of Web 2.0 tools to their ability to enhance constructivist learning environment by allowing effective collaboration, including speedy exchange of text, audio, and video files between faculty and students. A special emphasis is placed on the use of podcasts, vodcasts, blogs, wikis and virtual worlds.

Section Three of the book, "Instructional Design and Best Practices in Online Teaching and Learning," begins with the chapter by Michael Beaudoin where he examines the role of the instructor in a rapidly changing eLearning environment. The author discusses the complex relationship between technologies used in online education and successful pedagogical methodologies, and, in this context, considers the increasingly 'invisible' role of faculty in online instructional setting.

In the second chapter, "Leveraging Learning Theory and Learning Management Systems in Higher Education: The Critical Role of Instructor Facilitation," Coleen Harris and David Rausch explore the connection between constructivist and social-cognitivist learning theories, principles of instructional design, and learning management environments such as Blackboard and Moodle. The chapter concludes with the case study of the hybrid doctoral program implemented at the University of Tennessee at Chattanooga. The authors emphasize 'organic' structure of modern learning environments, with complex interactions between technology, course design paradigms, and facilitation techniques.

In the next chapter, "Challenges Encountered in Creating Personalized Learning Activities to Suit Students Learning Preferences," Eileen O'Donnel, Mary Sharp, Vincent Wade, and Liam O'Donnel consider the role of technology enhanced learning in providing personalized learning experience to accommodate unique learner profiles. This issue is explored in the context of *adaptive educational hypermedia systems* allowing to enrich course design with personalized learning activities that best match each student's learning style. The authors make an interesting case, linking 'net-generation' students, routinely engaged in online gaming environment, to their learning preferences and expectations.

In their broadly based study, "Practices and Tools in Online Course Delivery," Nory Jones and Christian Graham discuss improving hybrid and online course delivery with emerging technologies. The chapter examines how online pedagogy could be enhanced by a variety of technologies, in particular Web 2.0 tools. Among the technologies and applications reviewed are weblogs, a variety of social networking tools, Second Life, videoconferencing, and wireless technologies. The use of new educational technologies is linked to the active learning paradigm.

Finally, the chapter by Melanie Shaw, Kelley Walters, and David Long, "Online Course Activities: A Case Study of Assignments and Assignment Types," investigates activities and assessment techniques typical for online and hybrid modes of course delivery. The study is not only based on cutting edge theoretical research but also utilizes results of the survey conducted by the authors. Among the survey parameters are LMS usage, course length, programs of study, and user preferences. The LMSs used by the survey participants include Blackboard, WebCT, Angel, Moodle, and eCollege among others.

The last section of the book, "Virtual Learning Environments: Frontiers and Applications," begins with the chapter by Torsten Reiners and Lincoln Wood "Immersive Virtual Environments to Facilitate Authentic Education in Logistics and Supply Chain Management." The authors explore a variety of educational techniques in logistics and supply chain management courses, with an objective to define an authentic educational framework with students fully immersed in their learning environment. In particular, they note effectiveness of serious games, simulations, and virtual worlds (such as Bear Game, Fresh Connection, and Second Life among others) as educational tools preparing students to real world experience and, in this context, introduce and discuss in detail a concept of *n-dimensional immersive virtual environment.*

In the next chapter, "The Role of Learning Management Systems in Early Childhood Education," Jim Prentzas and Theodosius Theodosiou discuss the increasing role of learning management systems in *early childhood education*. They carefully consider the connection between the roles of stakeholders involved in early childhood education and the functionalities and services provided by existing learning management systems. The chapter presents relevant case studies and provides practical recommendations for the use of leaning management platforms in childhood education, with a particular emphasis on the open-source Moodle platform.

In the last chapter of the book, "Virtual Tools in Medical Education," Jason H. Epstein, Andrew Goldberg, Marina Krol, and Adam Levine from the Mount Sinai School of Medicine (New York) explore

increasingly growing use of virtual tools in medical education with a special emphasis on simulators. They consider a wide range of technologies, from mannequin-based simulators to virtual reality environments. This chapter is a valuable resource for medical education practitioners looking to enrich their curricular with new cutting-edge technologies.

CONCLUSION

With the rapid proliferation of distance learning, academic and corporate stakeholders confront the difficult problem of choosing and managing an appropriate technological environment that fits their budget, technical resources, curriculum, pedagogy, and profile of learners. In this context, the book is intended to fill the gap in the current literature on the interaction between LMSs, supporting technologies, instructional design principles, and best teaching methodologies. This book is intended for administrators, faculty, subject matter specialists, and all those looking to launch a new or to expand an existing distance learning program. In particular, it covers commercial and open-source LMSs as well as technologies used for synchronous and asynchronous course delivery; and it offers a comprehensive discussion of factors influencing the transition from one LMS to another. The reader will also find coverage of learning theories, instructional design paradigms, and technological solutions related to a variety of issues such as plagiarism, student tracking, assessment, and using simulations in learning environment. The thorough scholarly research is complemented by interesting case studies. We hope that this book will prove to be a comprehensive guide on the available technological solutions, instructional design and pedagogy in the area of online education.

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