Núria Ferran Ferrer
Julià Minguillón Alfonso
Editors

Content Management for E-Learning

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Editors
Núria Ferran Ferrer
Universitat Oberta de Catalunya
Barcelona, Spain
nferranf@uoc.edu

Julià Minguillón Alfonso
Universitat Oberta de Catalunya
Barcelona, Spain
jminguillona@uoc.edu

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Foreword

This is a book about content management for technology-enhanced learning (TEL). Of course, learning is not *only* about content. If it was, as many have argued before, then we could have just sent students to the library in the predigital era and we could have asked them to come back for exams after 5 years or so.

However, content (or maybe the more general notion of resources) certainly is important in learning: learners manipulate content to figure things out, teachers (in more or less formal settings) use content to demonstrate or illustrate or provide background or detail, etc.

After the initial hype around "learning objects," learning content suffered from a "bad reputation" in TEL research circles. This may be the natural backlash of disappointment after initial expectations that were too high or that did not factor in the time it would take to reach some of the goals. Maybe the renewed interest in Open Educational Resources will make research on learning content more respectable and popular again. But then again, it will only be a matter of time before the hype cycle will take its downward dive again. Still, then the Next Big Thing will come along and content will be "hot" again...

Beyond the changing appreciation of the value of content for learning, on a more fundamental level, I am convinced that research on content management is a core topic for the TEL community and I am delighted to see how many of the more prominent researchers in our domain continue to focus on this topic, exploring issues ranging from theoretical perspectives, over pedagogical design and copyright to more technical aspects like interoperability and repositories. Even strategic management issues are explored in the concluding chapter of this book.

I also note with particular pleasure that the second part of this book focuses on case studies and practical issues – all the more relevant in a field like ours where too many people have too many opinions (not necessarily hindered by any knowledge of the domain or practical experience with trying things out in practice) and few dare to actually build prototypes or even production level systems, in order to observe what happens when these get deployed and learn from the experience in a more scientific way.

In short, this book addresses an important and enduring topic for TEL research: as such, it will be a valuable resource for many current and future researchers. But first and foremost, I do hope that this book will be of value to you, dear reader... Enjoy!

Leuven, Belgium — Erik Duval

Preface

The increasing growth in the use of e-learning environments, in which education is delivered and supported through information and communication technologies, has brought new challenges to academic institutions. E-learning through virtual environments could be defined as the use of the Internet to access learning resources, interacting with contents, instructors, and other learners, in order to obtain support during the learning process, with the aim of acquiring knowledge, constructing personal meaning, and growing from the learning experience. From all the current definitions of e-learning, it can be seen that learning contents are one of the key issues for a successful e-learning experience. This is the reason why there is a real need for academic staff, managers, and librarians to rethink the whole process of delivering courses, information resources, and information services.

E-learning systems involve, therefore, users, services, and contents. All these elements cannot be independently managed, as the learning process is a complex combination of all of them. With respect to contents, some authors point out that traditional content management systems applied to learning resources try to reproduce the traditional learning process where contents are transmitted (or, in this case, delivered) from teachers to learners, following a producer–consumer model (one-to-many). But the concept of learning itself has changed, shifting from a content-centered paradigm to a learner-centered one, where contents are no longer the most important element in the learning process. On the contrary, it is much more important to focus on the interaction between the learner and the contents (wherever and whatever they are). We live in an age of content abundance, so the problem now is not finding contents, but organizing them and selecting the most appropriate ones for a given learning objective. Recent initiatives such as Open Education Resources or OpenCourseWare are making quality contents publicly available, so contents are no longer confined to a single educational institution. In this sense, learning object repositories (as a specialization of digital libraries) are becoming a common element of educational institutions, allowing both teachers and learners to build true learning communities around a common subject or field of interest. Furthermore, the apparition of the web 2.0 has promoted a new create-remix-share model (many-to-many) where all users (experts and teachers but also learners) are potential authors of new kinds of contents. Therefore, the concept of content management applied to e-learning needs to be rethought.

Nowadays, the term content management has been widely accepted and commonly used, and there are hundreds of products that offer solutions for several areas of application, including education. For this reason, this book tries not to focus on specific product solutions but rather offering on the one hand, a conceptual framework that comprises what is content management and the relationship with knowledge management together with providing perspectives on how the semantic web could complement content management and also how to deal with copyright restrictions, and how to describe information competences and skills required and acquired by teachers and students in virtual environments. On the other hand, the book also provides case studies and practical solutions for designing a project for managing content, standards for content e-learning management, a review of existing experiences of learning repositories, and a survey of available platforms for delivering courses and providing access to information resources.

This book attempts to address content management in the elearning sector from mainly two approaches; one theoretical and the other, a more pragmatic one.

The 11 chapters explore the areas and issues that are highly important in relation with content management for e-learning. The chapters are organized in three parts. The first one includes the conceptual framework, the second outlines the case studies and pragmatic issues and the last one is a chapter with the perspectives and the conclusions.

The conceptual part of the book starts with a background on content management and the role of the content management systems and the social software, beyond the technological solutions, in the disciplines of knowledge management and e-learning. This chapter revises the idea of implementation of content management systems in relation with the context of e-learning and the different types of knowledge involved.

Chapter 2 sets out how the methodological changes imposed by the European Higher Education Area and the technological changes derived from Web 2.0 have modified the requirements of content management systems in educational institutions. This chapter also describes the learning process in virtual learning environments as something that is much more than just providing learners with digitized content. The chapter also explores the relationships of traditional content management systems and the broader scope of virtual learning environments, including aspects of metadata standards, content personalization, the use of semantic web techniques and ontologies, the use and annotation of learning resources and the possibilities offered by the use of web 2.0 technologies.

The concept of the learning object is deeply studied in Chap. 3. This chapter tries to establish basic definitions around the learning object with the aim of promoting findability and retrieval which are two basic requirements of any educational scenario dealing with learning objects. In order to do so, a list of assertions and implications related to learning objects are discussed, raising several important issues with respect to context of use, metadata, instructional design and automation. These assertions establish a minimum set of requirements that should be taken into account when designing any educational experience based on the use of learning objects.

The following chapter explores the relationship between pedagogical design and content management in the creation and use of online learning resources. A strong relationship between the two concepts is presented and in particular that the strategies and considerations around content management in e-Learning systems impose a number of constraints on the variety of pedagogical designs and methods that are available to teachers using these technologies. For instance, it exposes the problems that arose when changing from one Virtual Learning Environment (or Learning Management System) to another one. It also outlines the issue of reusability which is a crucial factor of many aspects of e-learning content management and pedagogy.

The aspect of the competences required for searching and using information for learning is addressed in Chap. 5. First of all, the chapter explains the concept of "information competence" and how important it is to develop such competence in the context of workplace skills required in a knowledge society, and specially, in an e-learning environment. Being competent in the use of information is a requirement for life-long learning. In that sense, the information competence development has been a controversial aspect since their implications on the learning and teaching process makes it difficult to see it as an isolated concept. The components of these competencies are explained, such as skills, attitudes, and all other aspects linked to information seeking and use process. Finally, some recommendations of the aspects of information competence are laid out and which must be taken in to account in order to design systems that help teachers and students to be more competent in their use.

The last chapter of the theoretical part of the book is about copyright as for a successful and peaceful production and exploitation of e-content, one needs to take into account any possible pitfalls that may exist under the legal systems and adopt the best contractual practices to avoid them. This chapter outlines the several legal issues involved in the production and exploitation of e-learning contents, copyright, and intellectual property, which deserve special attention not only because of their strategic and economic importance in any e-learning project, but mainly because of the intricacies that may result from the different national laws that may be affected as a result from the ubiquitous nature of the Internet. This chapter will identify these issues and examine the existing legal framework from an international perspective.

The second part of the book presents a more practical perspective and provides case studies to illustrate the issues presented.

The first chapter of this second part provides a more technical view provided through a review of the LCMS (Learning Content Management System) with regard to its functionality for content management, which is classified in four categories: creation, management, publication, and presentation. Content creation provides creators that do not have technical knowledge in building web pages with the necessary tools to focus on the contents. Content management puts at one's disposal the mechanisms to store all documents in a central database where the rest of the web page data, users, preferences, and structure are also stored, in order to facilitate the work flow and the communication among all the participants. Content publication provides the automated mechanisms so that an approved page can be presented, applying the established patterns, which once expired, can be filed for

future reference. Finally, content presentation in a LCMS can manage automatically the accessibility of the web site, with the support of international rules like WAI, and adapt itself to the preferences or needs of each user.

In Chap. 8, an introduction to e-learning technical standards, where the principal actors in e-learning standardization efforts are presented, together with the main areas of standardization and the most important initiatives in progress is offered. This chapter describes the most relevant standards for content management within the e-learning context. The first part of this chapter is devoted to the concept of the Learning Object, which is presented and studied as a way of management learning content within e-learning environments. The final part describes the most popular content management standards and specifications, such as IEEE LOM (Learning Object Metadata), SCORM (Sharable Content Object Reference Model), and IMS Content specifications (IMS Content Packaging, IMS Question & Test Interoperability Specification and IMS Digital Repositories Specification).

Apart from the interoperability and reusability of the learning objects, one of the key issues in learning repository design is the quality of the content. Chapter 9 presents a peer evaluation process that was developed for and trialed on learning objects and funded by the LEARNet project in Hong Kong. The chapter begins with a discussion of learning objects and why there is a critical need for evaluation of them. It then outlines methods of evaluation, the rationale for choosing peer evaluation in the Hong Kong context, how the peer reviews were conducted, the obstacles faced, and the resulting recommendations for future evaluation.

There are many critical issues around quality, access and the costs of information and knowledge over the Internet, as well as the provision of content and learning material. As it becomes clearer that the growth of the Internet offers real opportunities for improving access and transfer of knowledge and information from universities and colleges to a wide range of users, there is an urgent need to clarify these issues with a special focus on Open Educational Resources initiatives. This is the aim of the last chapter of the section. This work addresses the need to define the technical and legal frameworks, as well as the business models, to sustain these initiatives. That is the background to the study which has aimed to map the scale and scope of OER initiatives in terms of their purpose, content, and funding.

Finally, the last part of the book, offers an e-learning management strategic perspective as a conclusion. Content management is not an issue most senior administrators in educational institutions will be familiar with. In this chapter, a strategic view of content management, especially for those institutions that have or are about to make a major commitment to the development and delivery of online teaching and learning materials.

Although content management is probably most likely to be implemented from the bottom up, through small projects initiated at a departmental or divisional basis, there will come a point at which the institution needs to look at content management as a whole. This chapter will not provide definitive answers to these questions since these answers will vary from institution to institution. However, the chapter will discuss some of these questions and suggest a process for dealing with the management of content.

Contributors

A.W. (Tony) Bates
President and CEO of Tony Bates Associates Ltd, a consultancy company specialising in planning and managing e-learning and distance education, Vancouver, BC, Canada
tony.bates@ubc.ca

Josep Maria Boneu
Professor of Computer Science at the Centre d'Estudis Politècnics. Barcelona, Catalonia, Spain
jboneu@uoc.edu

Sandy Britain
Research consultant for the Ministry of Education in New Zealand, New Zealand
sandybritain@gmail.com

Núria Ferran
Professor at the Department of Information and Communication Sciences, Universitat Oberta de Catalunya, Barcelona, Catalonia, Spain
nferranf@uoc.edu

Dirk Frosch-Wilke
Professor at the Faculty of Business Information Systems, University of Applied Sciences Kiel, Germany

Jennifer Jones
Faculty of Education, The University of Wollongong, Wollongong, NSW, Australia
jlj366@uow.edu.au

Brian Lamb
Manager of Emerging Technologies and Digital Content with the Office of Learning Technology at The University of British Columbia, Vancouver, BC, Canada

María Gertrudis López
Professor at the Central University of Venezuela, Caracas, Venezuela

Carmel McNaught
Centre for Learning Enhancement and Research (CLEAR),
The Chinese University of Hong Kong, Shatin, N.T, Hong Kong, China
carmel.mcnaught@cuhk.edu.hk

Julià Minguillón
Professor at the Computer Science, Multimedia and Telecommunication Department, Universitat Oberta de Catalunya, Barcelona, Spain
jminguillona@uoc.edu

Mario Pérez-Montoro
Professor at the Department of Information Science, Universitat de Barcelona, Barcelona, Catalonia, Spain
perez-montoro@ub.edu

Salvador Sánchez-Alonso
Lecturer at the Computer Science Department, University of Alcalá, Alcalá de Henares, Spain
salvador.sanchez@uah.es

Niall Sclater
Director of Learning Innovation, Open University, Milton Keynes, UK
N.L.Sclater@open.ac.uk

Miguel-Angel Sicilia
Head of Information Engineering Unit at the Computer Science Department, University of Alcalá, Alcalá de Henares, Spain

Sirje Virkus
Tallinn University, Institute of Information Studies, Lecturer and Erasmus Mundus Digital Library Learning (DILL) Master Programme Coordinator

David Wiley
Instructional Psychology and Technology, Brigham Young University, Provo 84602, UT, USA
david.wiley@gmail.com

Raquel Xalabarder
Professor of Intellectual Property Law, Universitat Oberta de Catalunga, Barcelona, Catalonia, Spain
rxalabarder@uoc.edu

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Part I
Conceptual Framework

Chapter 1
Theoretical Perspectives on Content Management

Mario Pérez-Montoro

Abstract In the last decade different software solutions have appeared in order to facilitate content management. These solutions make the life cycle of digital contents more comfortable and flexible so that it is possible to improve and to automate processes and make both more effective and efficient the communication via Internet. Nevertheless, there is a lack of a single standard that integrates all these products and applications. In this chapter we present a state-of-art of the different types of existing products, including Content management (CM), Web content management (WCM), Record management (RM), Document management (DM), Digital asset management (DAM), Enterprise content management (ECM) and Learning content management (LCM), and their characteristics are defined. We will also approach the different research lines associated with these solutions, showing a special attention to the application of these solutions in the knowledge management and e-leaning fields.

1.1 Introduction

In the last decade, different software solutions have appeared in order to facilitate content management. These solutions, Content Management Systems (CMS), make the life cycle of digital contents more convenient and flexible so that it is possible to improve and automate processes and make communication via the Internet both more effective and efficient. Nevertheless, there is a lack of a single standard that integrates all these products and applications.

This chapter has a dual purpose: on the one hand, to look at content management in a wide sense, and, on the other hand, to demonstrate the role played by the new CMS, beyond the technological component, in the disciplines of knowledge management and e-learning.

M. Pérez-Montoro (✉)
Department of Information Science, Universitat de Barcelona, Barcelona, Catalonia, Spain
e-mail: perez-montoro@ub.edu

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To achieve this aim, the following points will be developed. First, in Sect. 1.2, providing a description of the context in which they originate, with special emphasis on the needs that lead to their development will be discussed. Second, a characterisation and defining a special type of CMS will be made, i.e., social software. Following on from this, in Sect. 1.3, an examination of the different types of knowledge that might be found in a teaching–learning environment and within the context of an organisation will be made. Once this examination has been fully completed, we will then identify and analyse the critical operations that define both the disciplines of knowledge management and that of e-learning with regard to this cognitive typology. Thus, we will analyse the critical operations that would have to be implemented for the knowledge to fully achieve a central role within the organisational environment and to ensure that it is transferred correctly within an e-learning context. Finally, in Sect. 1.4, we will assess to what extent the technological solutions offered by CMS can help in the appropriate implementation of critical operations in these two different contexts.

1.2 Content Management

In recent years, there has been a proliferation in the number of different technological solutions geared towards facilitating and making the creation, management and use of web page content easier. All these solutions, with their individual peculiarities, offer a series of common features and properties that enable them to be identified as CMS.

The expression CMS has become a macro-label used to classify a broad and extensive set of existing technological products on the market, ranging from document management systems in the traditional sense to new solutions for the creation and diffusion of knowledge.

In financial terms, as quoted by certain sources (Shegda et al. 2006), these types of solutions[1] are widely established, generating a $2.3 billion software market in 2005, with an annual forecast growth of 12.8% up to the year 2010.

Yet it is not only in terms of the financial aspect that these types of solutions are beginning to become established. The theory, for example, has also inspired a significant amount of specialist literature. The important role that these types of tools may play has been studied with regard to different fields, from economics to education, but it must be stressed that in this particular case, practical development clearly preceded subsequent theorisation.

However, although rivers of ink have been written on the subject of CMS, characterising these types of solutions is no easy task. The problem does not lie in the complexity of the object analysed, but rather in the nature of it. Indeed, as some authors have said (Browning and Lowndes 2001, for example), CMS is more a new concept than a new technology.

[1] In the version known as Enterprise Content Management (ECM).

1.2.1 The Origin of Content Management Systems

In general terms, it can be said that CMS appear to meet the needs that result from a technological evolution and the use made of it.

If an approximate date has to be proposed, as some authors agree (Tramullas 2005; Wilkoff et al. 2001; Cuerda and Minguillón 2005), although fully functional developments already existed in the second half of the 1990s, it is, primarily, after 2002[2] when CMS begin to become established within the technological panorama.

It was precisely at that time that an important change in the use of the Internet environment by its users, and especially companies, took place. Throughout the 1990s, corporations had identified the possibility of using the Internet phenomenon for their own benefit.

In this sense, on the one hand, the Net was beginning to be seen as a source of business identifying new marketing channels and giving rise to what we now call e-commerce and to everything linked to this business strategy. On the other hand, the Net was identified as the perfect technological resource for improving and making the internal operation of organisational structures and processes involved in these types of organisations more efficient. Finally, the Net was ultimately identified as a unique opportunity that until that time had not been considered for reinventing and channelling teaching–learning processes, with e-learning strategies and all their subsequent development being established this way.

In this new context, in order to tackle these new challenges successfully, static and unarticulated web pages soon became insufficient, and the use of other types of more dynamic web pages capable of allowing continuous changes – more scalable web pages, in a manner of speaking – would increasingly be required to meet the needs of the environment.

However, the challenge was not only a technological one, but it also had to respond to economic restrictions. It was necessary to find a tool that would enable all this to be done, but which would also enable it to be done cheaply; in other words, that would allow someone with minimal IT knowledge to be able to use it and develop the required solutions quickly and in a straightforward way. CMS, by taking advantage of the advances developed in the field of information and documentation management, came about in response to this dual technological and economic need.[3]

But how do these systems help achieve these aims? In the context of an organisation, we usually find an infinite number of documents (or digital resources) that contain different types of data. So, for example, we can identify documents with textual data, numerical data, images and/or sounds or even documents that simultaneously

[2] Although, strictly speaking, by 1995 some companies, such as Vignette, had already launched this type of product on the market.

[3] These origins are so closely connected to the web, as we shall see, that some authors (including Wilkoff et al. 2001) refer to these types of systems as Web Management Systems rather than Content Management Systems.