Chapter-4

Learning Content Management Systems
CHAPTER-4
E-LEARNING CONTENT MANAGEMENT SYSTEMS

"Learning is what most adults will do for a living in the 21st century."

~ Perelman (1968-2012)

A Learning Content Management System is a sophisticated premeditated solution for planning, managing, and delivering all learning proceedings within an organization, including online, virtual classroom, and instructor-led courses (Greenberg, 2002). The primary key is replacing inaccessible and fragmented learning programs with a systematic means of assessing and raising skills and performance levels throughout the organization. International data corporation (IDC)'s white paper "Learning Content Management Systems: Comparative Analysis of Emerging Technologies" defines a learning content management system (LCMS) as a “system that is used to create, store, assemble, and deliver personalized e-learning content in the form of learning objects, also known as knowledge objects” (Brennan, Funke & Anderson, 2001a).

According to various authors, any Learning Content Management System encapsulates four components in its learning objects:

1. Learning objectives: general and specific learning goals for a lesson plan, scenario or course module.
2. Pre-assessment element: the learner is tested prior to teaching and a learner’s personalized learning plan is generated as a result of the pre-test.
3. Learning content: the subject matter to be taught, in various formats like text, audio, graphics, videos and animation.
4. Post-assessment: following instruction, the learner is tested to assess its mastery of the content as delineated by the objectives.

But, there is one more component which is metadata or a label providing information on the content of the learning objects in an LCMS in order to catalogue, access and utilizes it. Metadata usually supplies details about duration of instruction, the target audience, or any prerequisite knowledge.
In essence, a learning object is the smallest entity in a LCMS and can be aggregated in various ways to form simple to complex learning scenarios. According to Ellis (2001) "learning objects, which are reusable, media-independent chunks of information organized by a metadata classification system and are modular building blocks of e-learning content."

4.1 Learning Management Systems (LMSs) and Learning Content Management Systems (LCMSs)

(a) Learning Management Systems:

E-Learning systems have usually been understood as Learning Management Systems (LMS) which mainly focus on administrative aspects of learning and on content delivery and support the behaviouristic drill and practice approach. LMS have evolved from the early days of Computer Based Training CD-ROMs (CBT), which only presented the learning content but also needed some kind of course and student management to organize who should learn what and when. LMS offer at least support for planning, organizing and managing learning such as course catalogues and registration, event schedules, assessment services, keeping learner records, organizing group and individual learning paths. In addition to that they have often been extended by functions for skill and competency management for tracking and controlling the personal development of employees and by modules for resource management to also organize trainers, rooms and other types of resources for instructor-led trainings.

Systematically listed by Siemens (2004), the most important functions and parts of an LMS are:

- Personalized learner portal: This module provides the personalized entry to the whole system and views to the most important personal information.

- Course catalogues and registration: These enables learners to access catalogue offerings, register, and enroll in the offerings. It also handles billing issues (which would require integration in e-commerce systems), notifications, schedule changes, waiting lists and drop policies and defines gathered skills when mastering the courses. A curriculum
manager tool helps to define and select the courses for the course catalogue and is tightly integrated with the competency management functions. Selected courses can be assigned to trainees individually by the trainers or course managers.

- Learner-records database, with user-profile and competency management for tailoring learning experiences to competence frameworks. Core components of this module are:
  - Learner records: contain stored information about the learner, such as job title, organization, location and skills acquired. These cannot be directly edited by the user. Personal preferences, such as delivery mode and language, may be edited by the user.
  - Learner tracking: Learner tracking tracks a learner's planned learning and progress through e-learning offerings by recording the history, and current status. A learning diary can also track all articles created and documents uploaded by the trainee.
  - Skill gap analysis and personal performance reports visualize the actual skill profile of a certain user, the target skill profile to e.g. reach a certain new position and the potential gap between these two. The gap can be closed by mastering appropriate courses. Trainers can examine the progress of their students by using progress customizable grade reports.
  - Management reporting tools (requires integration with performance management systems): With these tools managers can access a learning plan/history for each direct report in their reporting chain. They can approve registration and add to their employees' future learning plans. They can also review their employees' progress for both offerings and assessments. Additional tools support team forming according to a given skill profile. That way the LMS works as a support system for the production environment and e.g. can be directly linked to a project management system to form efficient project teams.
o Needs tight integration via interfaces with course catalogues, the assessment services and the content delivery system.

- Assessment Services: Pre- and post-assessments are integrated with learning content to deliver a comprehensive curriculum that provides feedback to both learners and managers and adds value to the overall learning experience. Pre-assessments enable learners to study only the necessary material for a task at hand, saving valuable time. Post-assessments provide results that are used to track completion status and are a key element for progress reporting.

- Resource Management: Resource Management assigns classrooms and instructors for instructor-led training and virtual events, managing the schedules for equipment, facilities, rooms, and instructors and storing additional attributes (e.g. number of trainees booked for a course to define the size of the room etc.). Ideally such modules also support optimization functions.

- Administration Management: Here I summarize all other administrative tasks which an LMS can support:
  o Easy administration of users, teams, courses & classes, resources and the system itself. Import of user and group information and integration into external directory services (e.g. LDAP or Microsoft Active Directory) have to be supported.
  o Course management: creating, modifying, removing, trainee specific assigning and monitoring of courses.
  o System management: Configuration, load and failure reports, resources monitoring etc. of the system.
  o Support of numerous roles, at least distinguish between learners, trainers, authors and administrators.

- Integration with learning-content management systems.

(b) Learning Content Management Systems:
Within the last two years a new term describing a different kind of e-Learning systems has been introduced: Learning Content Management Systems (LCMS).
An LCMS contains similar features as an (Web-) Content Management System but adapted to the needs for e-Learning (Marjanovic, 1999). Its main task is the storing and structuring of content files in a database, managing revisions and modifications, and ensuring that content is tagged for easy retrieval and reuse. Some of its key features are the availability of:

- A Learning Object Repository which supports different granularities of objects, such as:
  - Content Assets, which are the most granular type of objects. Content Assets are raw media such as photographs, illustrations, diagrams, animations, audio and video files, applets or simple text documents etc.
  - Reusable Information Objects (RIOs) are classified as a concept, fact, principle or procedure and are usually described by metadata which give some hints about the re-use of the object. To support reuse, RIOs already contains metadata to describe them.
  - Reusable Learning Objects (RLOs) are data formed by assembling a collection of (ideally 7±2) relevant reusable information objects to teach a common job task on a single learning objective and are self contained, like e.g. course chapters. RLOs are the first level of granularity where it makes sense to automatically assign its objects to learners based on their skill gap analysis. However this will only happen in systems with very advanced competency management functions, usually only courses, which are the next level of granularity, are assigned to users.
  - Learning Components are a result of bundling and sequencing several learning objects together, such as courses or lessons. Sometimes (i.e. Autodesk Content Strategy Molecular Model View (Hodgins, 2000) lessons and courses are handled at different levels because a course can consist of multiple lessons.
  - A Learning Environment is the combination of several learning components (i.e. a personal curriculum) together with learning support services, such as communication and collaboration tools.
The repository also provides sophisticated reusing and structuring tools to build up objects of a higher granularity, e.g. learning objects made of multiple information objects, or courses made of multiple learning objects (Downes, 2004).

- Meta-tagging for search capabilities according to approved standards such as LOM. Meta tagging supports the creation of metadata by tagging wizards and tools which can provide automatic extraction or conversion of metadata. The Meta tagging is tightly integrated into the repository. It is important to note that there exist two different kinds of metadata:
  o Metadata which is steadily bound to the data object, e.g. creation date, size, type etc.
  o Metadata which provides information about the use of the object, because data can be used in various ways and in different contexts. That one should not be stored together with the data, but separately in e.g. multiple areas of the repository for each incarnation. Into the same category falls meta-metadata, which is metadata about the metadata, e.g. the author(s) of the metadata.

- Workflow services
  o The Workflow services offer generic learning content development, review and release workflows, with the flexibility for each workgroup to select variables to customize to their requirements.
  o A mandatory component of all workflows is registering content and baseline metadata into the repository before releasing the content.

- Collaborative authoring and editing is tightly integrated with the Workflow services and the Learning Object Repository and
  o Provides all of the traditional content management functions for learning and content objects, including
    - creation/upload, modification, copying, moving, linking and removing,
    - version control,
• notifications, history and reporting of changes (auditing).
• fine grained access control with users, groups and role handling down to the level of single documents to provide personalized training content and even
• full text searching in addition to metadata and keyword searching mentioned above
• advanced features like multiple language support and link management
  ○ Offers import/export and conversion of various content types and complete packages from and to 3rd party vendor systems.

• Authoring
  ○ Form-based authoring tool for (simple) online created content. Ideally this tool has a built-in quiz tool included, which can be used to create the following types of tests:
    ▪ single/multiple choice
    ▪ image map questions
    ▪ list matching questions
    ▪ randomized and calculated questions
    ▪ timed quizzes
    ▪ fill in-the-blank tests
    ▪ short answer tests
  ○ Tight integration of external authoring tools enables content creators to write more complex learning objects such as text, graphics, and assessment questions that can be seamlessly linked to any level of the learning hierarchy.

• Personalized and adaptive content delivery according to existing standards such as AICC, SCORM and IMS. The content delivery needs to be tightly integrated with an LMS to pass on all relevant activity and progress data (i.e. assessment results) to the according skill and record management modules of the LMS.
It also makes sense to offer the already built-in collaborative and knowledge construction features for students for their personal workspace. That way the system could support the cognitivistc and constructivistc learning paradigm. The growth of e-learning in organizations and institutions has strongly influenced the evolution of computer-based training architectures such as learning management systems and learning content management systems, in response to demands for better administration of training with personalized developmental paths, up to date records on training activities.

4.2 Characteristics and Generic Components of LCMS

Brennan, Funke and Anderson (2001b) identify four main components of an LCMS:

1. A learning object repository: learning objects are stored in a data repository, where they can be accessed and used either as a single entity or as sets of aggregated entities towards the design of learning modules or complete courses. Being media-independent, the end product may be deployed in a variety of formats, on the web, CD-ROM or through print materials, without content distortion. The integrity of content together with the media versatility of learning objects is made possible by the programming language XML, which separates content from the programming code.

2. An automated authoring application: instructional design templates with lists of choices for learning objectives, type of media preferred, characteristics of the target audience and existing learning objects related to the subject matter, allow authors whether instructional designers or subject matter experts (SMEs) to rapidly assemble courses or even convert an organization's content into reusable learning objects. The application also enables online collaborative authoring among geographically dispersed authors.

3. A dynamic delivery interface: based on the pre-test results or simple search queries, the tool delivers the content captured in learning objects via a user friendly interface which can be customized to reflect an organization's logo and theme colours. The application may include additional capabilities such as user tracking, information links tracing and assessment with feedback.
4. An administration application: the tool can manage learner profiles, course
catalogues, track and report learner’s progress or send the information to
another system with more powerful administrative capability like a learning
management system (LMS). Although the acronyms are often used
interchangeably, an LMS and an LCMS have slightly different features and
strengths, the latter which are documented and explained below.

4.2.1 Specific features of LCMS
An LCMS power lies in its efficient, training administration capabilities.
LCMS, also known as training management systems, training administration
systems, integrated learning systems, can register students for online or offline
courses, launch online courses and assign the appropriate learning resources
(e.g., providing access to lab equipment for e-learning experiments), track
student’s progress and modify report test scores and overall manage the
communities of users. With the help of integrated collaboration tools including
email, discussion forums and chat rooms, an LCMS can allow users to engage
in joint work and learning. Some LCMS have a special functionality for
competency mapping and skills assessment to establish a competency profile, a
(curriculum) training plan to bridge the competency gap with the corresponding
training resources, and an evaluation of the impact on performance.

An LCMS’s strength resides in its content management, delivery and storage
abilities. Sometimes described as providers of adaptive learning, LCMS can
assist learners in selecting adequate combination of learning resources,
generate personalized instruction plans by assembling different “chunks” of
content, closely track the user interaction with the learning material to adjust
the delivery instruction (update the content of the learning path) accordingly
and can provide comprehensive reports on tests results. An LCMS allows an
organization to do more extensive tracking of learner’s interaction with its
content than the top-level tracking allowed by an LMS, where tracking is
generally restricted to course completion and rudimentary test results (Brennan,
Funke & Anderson, 2001c).

The distinctive features of LCMS are seen as being complementary in the
literature on the topic. Tight integration between an LCMS and an LMS can
greatly enhance their mutual performance. For instance, user data such as information on usage of programs, learner's progress, and test scores monitored by the LCMS can be fed into the LMS for reporting purposes or the LMS can point multiple users to appropriate learning resources and enable them to launch the required learning objects stored and manipulated by the LCMS.

4.2.2 Issues about integration of LCMS in an organization

Several key variables have been identified by researchers studying the conditions necessary to leverage the full benefits of LCMS within organizations. These include:

4.2.2.1 Interoperability

This term refers to seamless integration of the LCMS with other third party content, management and authoring tools, databases such as ERP systems and off-the-shelf training products. In implementing an LCMS, an organization needs to ensure that it can utilize the functionalities of the LCMS platform with other software and courseware it already owns. A word of caution is essential to know that many LCMS only offers tracking with their specific, often limited authoring tools. These LCMS fail to integrate with widely used authoring applications, be it Macromedia Autorware, Dreamweaver with course builder or Flash, and do not accommodate either custom courseware or off-the-shelf, and low cost courseware from some commercial organizations. In this case, an organization's potential to leverage online learning deployment is severely restricted.

4.2.2.2 Standards

The current absence of a single standard for content interoperability as well as for metadata tagging, and data tracking leads to informal coalitions of vendors that pledge product compatibility among themselves (Connolly, 2001). To offset the uncertainty surrounding standards, four recognized regulating bodies are currently developing industry-wide standards. A first project on standards for web-based course management is run by the Aviation Industry CBT Committee (CBT-AICC) which has certified a number of products for the past decade. The second LCMS standard called SCORM (Sharable Content Object Reference Model) piloted by the U.S. Department of Defense's ADL
(Advanced Distributed Learning), draws together the efforts of the AICC, Institute of Electronic & Electrical Engineering (IEEE), and the Instructional Management Systems Global Learning Consortium (LMS). It is, however, observed that the difference between claiming AICC compliance, which is tested by the vendor, and AICC certification, which is tested by a third party for AICC is currently a source of confusion for potential LCMS buyers. Until all LCMS support both standards, organizations should thoroughly examine the degree of compliance of the relevant LCMS with the current industry draft standards and specifications.

4.2.2.3 System Longevity

A major challenge for organizations is selecting an LCMS which will afford it a reasonable length of usage. In claims similar to those made by Draft (2000) with his model of ecological change, Barron (2000) notes that in the upcoming two years, a market consolidation of LCMS vendors is likely to reduce their approximate current number of 100, to a small portion of that figure. This trend, in part due to the rapid technological advances typical of the emerging LCMS sector in which yesterday’s innovation becomes obsolete the next day, leads to dominant vendors establishing alliances to output best-of-breed products where the LCMS is the integration pivot for the other “turnkey systems”. From the vendors’ standpoint, these fully integrated learning systems serve as best guarantee against future innovations in the current absence of strong interoperable standards. In response to this issue of system longevity, a new model has emerged where vendors jostle to offer “turnkey hosted services” to organizations. In the ASP model, an organization can rent an LCMS rather than buy it and thus continually update its information technology (IT) architecture.

4.2.2.4 Scalability

The ability to deploy enterprise-wide learning solutions and to accommodate various sizes of learner population is critical, especially for global, very large or fast growing organizations. Since e-learning, including multimedia and online learning, is costly to develop, economies of scale become crucial for the LCMS to be a profitable strategy. In their study of e-learning, Hambrecht
(2000) comments that organizations will target high return on investment through the deployment of course delivery platforms capable of supporting millions of users and utilizing multiple and effective distribution channels. Organizations seeking an LCMS able to address immediate issues of large volume transactions while allowing for future growth must look for systems with an enterprise wide perspective.

4.3 E-Learning Content Management Softwares

E-learning softwares are the starting points of any online delivering system. They are the building blocks which form the critical component of any online learning program. E-learning softwares are more specialized, well crafted educational tools that incorporate a variety of organizational, administrative, instructional and technological components (Moore and Kearsley, 2005), a framework to help instructors administer the classroom more efficiently. They are widely adopted by academic institutions and instructional designers in order to fulfill specific needs and requirements in a field of ever increasing demands for effective, fast and pedagogically appropriate education and training. These softwares are called as learning management systems and learning content management systems in online terminology. Various commercial and open source softwares as listed in Wikipedia are as under:

Open source Learning Content Management Systems

(i) aTutor
(ii) Canvas by Instructure
(iii) Chamilo
(iv) Claroline
(v) Dokeos
(vi) eFront
(vii) Fedena
(viii) ILIAS
(ix) Moodle
(x) OLAT
(xi) Sakai
(xii) Totara LMS
(xiii) WeBWorK
(xiv) Joomla

Proprietary Learning Content Management Systems

(i) Blackboard Learning System
(ii) CERTPOINT Systems Inc
(iii) Desire2Learn
(iv) DoceboLMS
(v) eCollege
(vi) Edmodo
(vii) GlobalScholar
(viii) Glow (Scottish School National Intranet)
(ix) HotChalk (x) Informetica
(xi) ITWorx CLG (Connected Learning Gateway)
(xii) Latitude Learning LLC (xiii) Meridian Knowledge Solutions
(xiv) My Big Campus (xv) Ning
(xvi) QuestionMark (xvii) Saba Software
(xviii) SAP (xix) Scilipo
(xx) Schoology (xxi) SharePointLMS
(xxii) SSLearn (xxiii) Spongeland
(xxiv) SuccessFactors (xxv) Taleo
(xxvi) TeamWox (xxviii) Vitalec
(xxix) WebStudy Learning LMS

4.3.1 Advantages of Open Source Software

Most debated advantages and disadvantages of open source software are; total cost, other financial and forensic subjects (Okmen, 2008). Advantages of using open source software can be summarized as follows:

Architecture:

There is no single feature on which the future of the software depends: Open source architecture enables the user to take away the software company dependency risk that originated the code chosen to stop development and increase maintenance and development fees.

Confidence:

Popular open source software is examined by many developers and software experts so; it is filtered and cleaned of errors. In this way, with the increase in quality, the fundamental aim of software production and the process of usage, user's confidence in the software increases.

Sensitivity and flexibility for User Requirements:

Open source software is often updated more frequently than proprietary software. Most of the time, these changes reflect the needs of the user and the developer community.
The Support of Innovation:
The Production process of open source software is improved by a broader range of diverse and creative ideas. In this way, each developer has equal rights to reflect his own innovative thoughts to the product.

Security:
Open source software provides security according to the level of user requirements but usually not at the level of commercial software. Users with commercial software do not have access to the underlying contents of the code, so they do not have a definite knowledge of their security. Total cost of ownership has been defined after the comparison between open source software and proprietary software as follows:

- Hardware costs (contains purchasing cost and maintenance)
- Direct software costs (contains purchasing cost, support and maintenance)
- Indirect software costs (especially license management)
- Personnel costs
- Supporting costs
- Breakdown period costs

4.3.2 Disadvantages of Open Source Softwares
Open source softwares gained huge popularity in the field of IT in recent years. This is mainly because open-source software is free to use and its greatest advantage is that it can be modified as per the needs and requirements of the organization because its source code is available and free to change, alter or modify. As it is developed by a non-profit community, it has some disadvantages as well. Some of the main disadvantages of open source softwares are listed as under:

- Unmotivated learners or those with poor study habits may fall behind
- Lack of familiar structure and routine may take getting used to
- Students may feel isolated or miss social interaction
- Instructor may not always be available on demand
- Slow or unreliable Internet connections can be frustrating
- Managing learning software can involve a learning curve
• Some courses such as traditional hands-on courses can be difficult to simulate.

Knowing e-learning advantages and disadvantages helps in learning software selection as well as online distance learning programs structure and selection. It is important to know the merits and demerits of e-learning to make a decision.

4.4 Major Open Source E-Learning Content Management Systems

In an e-learning process, open source softwares can be used in many different phases such as application software that performs learning content preparation and in LCMS, which provides learning content presentation in a web based environment and as web server software (e.g., APACHE). Due to the advantages of e-learning, schools and higher institutions are adopting these new learning technologies and increasing their investments in it. However, along with the advantages, installation and support costs appear to be big disadvantages compared to a traditional learning environment. These disadvantages can be reduced to a great extent by the use of open source software which provides further gains. Statistical studies show that open source web server software is again found mostly preferred and widely used in learning content presentation in a web based environment such as (Netcraft Survey, 2008). The investigator used Joomla content management system for the design and development of an e-learning portal for library and information science because of the various factors and advantages described intricately in chapter-6.

4.4.1 Dokeos

The system Dokeos support online and collaborative authoring. Delivered services are blogs, wikis and discussion forums. Also there exist possibilities to enlarge the services with different modules such as PowerPoint to online course, contouring, videoconferencing. There is a multi-criteria search engine, build our own templates and MS-Office compliance to increase the productivity. It has a property of data encryption for security to avoid leaks and can articulate online activities and classroom exams. Figure-4 shows the services, activities and learning unit-course in Dokeos.
4.4.2 LAMS
Learning Activity Management System, or LAMS, is an e-learning application based at the Macquarie E-learning Centre of Excellence (MELC0E) at Macquarie University, Australia.
LAMS claims to provide teachers with a "highly intuitive, visual authoring environment" for creating sequences of learning activities. Activities can include a range of individual tasks, small group work and whole class activities based on both content and collaboration.
LAMS is also developed in Java and use the JBoss application server. Versions that integrate with other e-learning systems like Moodle, Blackboard, and Sakai are also available (http://www.lamsinternational.com/).

4.4.3 Claroline
Released under Open Source license, the Claroline platform allows hundreds of organizations from 93 countries to create and administer courses and
collaboration spaces online (http://www.claroline.net/?lang=en). Each course space provides a list of tools enabling the teacher to:

- Write a course description
- Publish documents in any format (text, PDF, HTML, video...)
- Administer public and private forums
- Develop learning paths
- Create groups of students
- Prepare online exercises
- Manage an agenda with tasks and deadlines
- Publish announcements (also by e-mail)
- Propose assignments to be handed in online
- See the statistics of the users activity
- Use the wiki to write collaborative documents

Adjustable to various training contexts, Claroline is not only used by schools and universities, but also by training centres, associations and companies. The platform is customizable and offers a flexible and custom-made working environment. The Claroline platform is organized around the concept of spaces related to a course or a pedagogical activity. Each space provides a list of tools that enable to create learning contents, manage training activities and interact with the students. Claroline has been developed following teachers' pedagogical experience and needs. It offers intuitive and clear spaces administration interface. The daily platform management doesn't require any specific technical skill. The platform is quickly installed and the use of any web browser allows managing the various course sections and enrolled users fluently.

4.4.4 ILIAS

ILIAS (www.ilias.de/) began at the faculty of business administration, economics and social sciences at the University of Cologne in Germany. ILIAS is a powerful Open Source Learning Management System for developing and realizing web-based e-learning. The software was developed to reduce the costs of using new media in education and further training and to ensure the maximum level of customer influence in the implementation of the software.
ILIAS is published under the General Public License and free of charge. In addition to e-learning features course, group and content management, ILIAS has support for Web 2.0 functions like RSS, podcasting, and Google Maps. For Web services a SOAP interface was developed. ILIAS allows efficient creation of courses and course materials. It offers standardized tools and templates for the learning and working process including integrated navigation and administration.

ILIAS offers an integrated environment for the creation and enforcement of tests & assessments. This can be used for the monitoring of learning progress by the users as well as the tutors and examiners. ILIAS Test & Assessment supports multiple choice, single choice, allocation questions, cloze questions (free text, select box), ordering, matching, hot spot and more question types. ILIAS accomplishes the e-learning-standard SCORM 1.2 and first of all open-source-LMS; it achieves the maximum conformance level LMS-RTE3. It also supports LOM metadata standard, AICC and IMS-QTI. ILIAS supports standard ways of communication as chats, forums and mails. The personal desktop includes an awareness function that shows users that are currently online. ILIAS also sends information via RSS to the user and displays external RSS feeds in the system.

4.4.5 Sakai

Like OLAT, Sakai is a Java-based e-learning system developed by an international alliance of universities, colleges and commercial affiliates. Sakai's core tools like forums, chat rooms, and message centre can be augmented with tools designed for a particular application like assignments, syllabus, and WebDAV. Sakai claims to be in production at over 150 institutions and being piloted by over 100 more.

The latest Sakai 2.5 series has changes at both the tool layer and framework level. One new provisional tool has been added, while two existing provisional tools have been promoted to the enterprise bundle. Sakai provides users with a suite of capabilities that best meet the needs of today's teachers and learners. The functionality can be assembled to create spaces for a variety of purposes. The list of Sakai current core tools is provided below. In addition, there are a
large number of add-on tools (called "contrib") available that are in use by many Sakai institutions.

The Sakai CLE is a flexible, enterprise application that supports teaching, learning and scholarly collaboration in either fully or partially online environments. Sakai also has a robust and full-featured online portfolio system built-in. The Sakai CLE is distributed as free, open-source software, which offers the ultimate in flexibility and avoids the risks of vendor lock-in and escalating license costs.

Instructors teach in a variety of different styles using a wide array of methods. Sakai meets the needs of the institution, the individual instructor and students through its highly customizable nature. Sakai’s architecture is modular and individual instructors can select the tools they want available for their class. Or you can configure sites that are specifically designed for research collaboration or administrative work groups (www.sakaiproject.org).

4.4.6 OLAT
Unlike most of the e-learning applications, OLAT (Online Learning And Training) is based on Java and is Apache Licensed web application or so called Learning Management System that supports any kind of online learning, teaching, and tutoring with few instructive restrictions. OLAT is free open source software and has been developed in 1999 at the University of Zürich. OLAT supports various E-learning standards such as IMS and SCORM. Many extension points have been added to the system in version 4.0, which makes it very easy to extend the LMS functionality. In version 5, new functions like Wiki, Calendar, AJAX Beta Mode, and Full text Search have been implemented. Version 6.0 comprises a new and improved layout based on a usability evaluation. The most recent Version 6.1 provides full scalability, meaning OLAT can be run on a cluster of servers. This is crucial to maintain full speed when large numbers of users are accessing simultaneously.

OLAT has many features which are typical for e-learning platforms like content managing, forums, file discussions, quizzes with different kinds of questions, wikis, surveys, chat, submission module (for exercises), grading
module, time marker for video data, scalability and can be run as a cluster with Multi-language support (www.olat.org/).

4.4.7 Fle3

Fle3 (http://fle3.uiah.fi/), a web-based learning environment is server software for computer supported collaborative learning (CSCL). Fle3 is an open source and free software released under the GNU General Public License (GPL). The license is protecting our freedom to use, modify and distribute Fle3. It is designed to support learner and group centered work that concentrates on creating and developing expressions of knowledge (i.e. knowledge artifacts) and design. Fle3 contains three learning tools and several administration tools with support to 16 different languages. Various Fle3 tools like web tops, knowledge building and jamming tools are used to store different items, carry out knowledge building dialogues and shared space for collaborative construction of digital artifacts.

4.4.8 MOODLE

MOODLE is Web-based e-learning open source software which is described most preferably as a course management system to help educators create "effective online learning communities.” Open source softwares are rapidly developing, and new alternatives for non-profits organizations are mushrooming and maturing. An open source learning environment, MOODLE is becoming widely adopted by universities and other educational institutions. Managing an LMS is a complex chore. MOODLE does not hide this complexity and its detailed on-line help, examples and sensible defaults assist users in installing, administering and using the LMS (Ambrosi, Bianchi et al., 2006).
Figure-8: Sample perceptive interface of Moodle

Moodle allows integration of a wide range of resources which include any kind of html-based or text-based documents, multimedia resources (audio/video & graphics), power-point presentations and flash-based applications. Lessons and tasks within Moodle can also be linked to any of the resource that is uploaded in a server or that is available on the Internet. Moodle has a built-in html editor and glossary module which allows more sophisticated presentations along with animations and to create own text, course or site dictionaries.

4.4.9 Joomla

Joomla is a free, open source content management system which offers an easy and dynamic website, portal and powerful online application building. It allows us to easily create and manage a dynamic website and is written in PHP, uses object-oriented programming (OOP) techniques. Since the release of first version of Joomla 1.0 in September 2005, it has released and upgraded many versions since then and the latest full version available is 3.0 Alpha-1 and recently released 2.5 in the month of February of 2012 with more additional features.
Until now, Joomla was only compatible natively with MySQL databases but its latest release comes with multi-database support, including Microsoft SQL server. It also brings improved search, automated script updates and autocomplete functionality within the article editor, among others. The security factor has also been modified with as many as 240 major vulnerabilities fixed and a lot many miscellaneous elements, such as banners, news feed, links, etc., are dumped under its Components section (http://www.joomla.in/).

Development
On August 17, 2005, Joomla was developed by the fork of Mambo, the name which was trademarked by Micro International Pvt. Ltd. who formed a non-profit foundation with the stated purpose to fund the project and protect it from lawsuits. A website called OpenSourceMatters.org was created for the distribution of information to users, developers and web designers. On September 1, 2005, the new name ‘Joomla’ was announced derived from the spelling of Swahili word ‘Jumla’, which means “all together” or “as a whole”. Since then, Joomla and its developers have won many awards of excellence for the development of the world’s most popular open source CMS.

Summary features
Joomla is a completely database driven site engine, whereby news, products or services sections are fully editable and manageable. It has easy to use graphical administrative interface with powerful WYSIWYG editor for creation and editing of pages. It supports creation of nested or flat content hierarchies. It runs on Linux, FreeBSD, Mac OSX server, Solaris, Windows NT/2000 via the (Microsoft Web Platform Installer) and AIX.

(a) Easy Installation
There are two main ways of installing Joomla, the browser installation and the manual installation, but for both of the methods, we must have a working Apache web server with PHP and MySQL database. Browser installation is a four step process with pre-installation check and GNU/GPL (General Public license). For manual installation, we must ensure that PHP has been compiled with support for MySQL, zlib and XML in order to successfully run Joomla. We need to download a complete package of Joomla from its main site which
is mainly in gzip or tar format. After unzipping the package, we can install the software by following the instructions given in the main installation documentation support of the Joomla website.

(b) Fantastic Design

Joomla allows uploading and switching site templates right from our administration panel and we can choose hundreds of free Joomla templates provided by their site ground.

(c) Intuitive Administration

Joomla CMS is a multi-functional open source application for creating websites and web portals. With a regular, functional CMS, it is hard to keep track of all pages, menus, users etc. But with Joomla’s easy to use interface, everything is in its right place and easily accessible. With its multiuser and multilevel environment, many users can interact and contribute to the development of a Joomla-based site. Users can be assigned to different groups with different privileges.

(d) Extendable

Joomla is having one of the biggest communities of developers that distribute its free application extensions daily. There are thousands of components, modules and plugins that allow us to develop a site without being a developer.

(e) Flexible

We can build all kinds of websites with Joomla, not just a forum, blog, e-commerce website or news portal. All these sites can be made in a single application and are managed from a single administrative area. This provides unparalleled flexibility for the site owner. News, products, or services sections are fully editable and manageable and fully customizable layouts including left, center, and right Menu boxes.

(f) Secure

Being an open source application, it is daily tested by hundreds of users. It needs to be properly configured and hosted on a quality server. Joomla is reliable and secure solution even for big corporate website working with sagacious information.
Joomla Core Features

There are four main core features of Joomla CMS which makes it smarter than other open source e-learning software in the same class. They are:

(a) Components
(b) Modules
(c) Plugins
(d) Templates

Components

A component is more or less a kind of extension in Joomla. Components are like mini applications which serve as main functional units. They are usually displayed in the main content area of a template or in the center depending on the template. Under the components section, we have six main sub-components:

- Banner
- Contacts
- Newsfeeds
- Polls
- Search
- Weblinks

Modules

Modules are informal, flexible and lightweight extensions used for page rendering. They are often like boxes set around a component on a distinctive page. Some modules can be linked to components; however, they do not need to be linked to anything and can just be static html or text. The main elements in modules component are:

- Archived Content
- Custom HTML
- Footer
- Menu
- News Flash
- Random Image

- Banners & Feed
- Breadcrumbs
- Login
- Most Read & Latest News
- Polls
- Related Items
Chapter 4

Plugins

A plugin extension in Joomla provides functions which are allied with trigger events. A whole set of core plugin events in Joomla can custom events and when a particular event occurs, all plugins get activated and then executed in sequence. This extends the functionality of Joomla in a powerful way. It also offers extension developers an approach to allow other extensions to respond to their actions, making them extensible.

The main components in plugins are:

- Authentication (Joomla!, LDAP, OpenID, GMail)
- Cache
- Code Highlighter (GeSHi)
- Email Cloaking
- Editors (TinyMCE 2.1 & Xstandard Lite for Joomla)
- Editors-XTD (Image, Page Break, Read more)
- Legacy
- Rating
- Search (Categories, Newsfeeds, Sections, Contacts, Content, Weblinks)
- SEF (Search Engine Friendly URLs)
- XML-RPC (Blogger API, Joomla API)

Templates

Templates are the kind of extensions in Joomla, which allows us to change the looks of our site. We can use them to make our site as we want to design. There are 3100 free and 150 professional high quality Joomla paid templates to choose from. Out of them, four templates are pre-installed with Joomla. No specialized programming language is required to customize or build these templates.
4.5 Discussion

Software plays an important role in structuring and scheming of an e-learning system. The whole infrastructure is dependent on the type of softwares handling the system. Various softwares are available in the e-learning market and many new open source softwares are coming up due to the rising global software demand and competition. We are witnessing radical changes in the ways of delivering knowledge by institutions and organisations throughout the country. The use of learning management systems and content management systems have proliferated within few years but one still need to understand how it works before we can drive it. The latest generation of CMSs from the major vendors shows signs of moving ahead in this direction, but still there is much work to be done.

We lack a full-fledged E-learning system in library and information science. Here is the need to develop an e-learning system in LIS education after evaluating some of the select well known web-based learning systems, which provides free access to LIS professionals, teachers and students. These learning and content management systems require for more expertise, skill, patience and dedication than is desirable. The technology is getting more sophisticated and flexible in order to satisfy users with regard to content management and groupware functions. Since, Joomla is a kind of software which is easy-to-learn and handle. There is no need to hire any IT specialist and there have been many discussions and complaints about the Moodle interface. For any problems with Moodle, there isn’t any helpdesk and one has to look for solutions on forums which are the only support option while as Joomla has a guaranteed helpdesk to support which is already included in the license price which makes Joomla the preferred one over other authoring tools. After analyzing the attributes like accessibility, compatibility, maintainability and usability of various softwares, the investigator chooses Joomla for the design and development of an e-learning prototype namely 'LISLearn.'
Chapter 4

LMS & LCMS

References


