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Chapter 1

A Review of Distance Learning and Learning Management Systems

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Additional information is available at the end of the chapter

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Abstract

In recent years, rapid developments in technology and the web have led to many changes in education. One of the most important changes in education is in the form of distance learning. Distance learning, which is used to define education where educators and learners are physically separated, is not a new concept; however, emerging technologies and the web allow web-based distance learning and therefore increase its popularity. As a result of these developments, many universities have started to use web-based distance learning systems to provide flexible education that is independent of time and place. In this chapter, we review all popular, widely used, and well-known learning management systems and include detailed comparison of some of these systems to allow institutions to choose the right system for their distance education activities.

Keywords: distance learning, literature review, educational research, learning management systems, Moodle

1. Introduction

Distance education, which is now also referred to as distance learning or e-learning, has existed for centuries. Although as Keegan says "the ideas surrounding the educational endeavor are somewhat similar" [1], it is not easy to find a single definition of distance education. While according to North [2], a few definitions even look to define it in terms of a single technology, according to long-distance teaching [3], others display distance education simply as a recent development of the class into a remote location [4]. However, such definitions are restrictive and fail to recognize the actual needs of distance education users. Mugridge [5] provides a better definition, describing distance education as "a form of education in which there is normally a separation between teacher and learner and thus one in which other means—the printed and written word, the telephone, computer conferencing or teleconferencing, for example—are used to bridge the physical gap".

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Many educational institutions have created solutions to their increasing educational needs through the development of distance education programs. Distance education allows educational paths to be determined by educators and students, who are separated with physical distance, using technology (e.g., audio, video, data, and written text). It is a form of education in which students, teachers, and teaching materials in different geographies are brought together through communication technology [6]. Using video, audio, active learning, simulations, and electronic advances appeals to a variety of students with multiple learning styles.

This chapter presents a review of distance learning literature; the purposes, advantages, disadvantages, and types of distance learning; and a detailed comparison of web-based distance learning tools in education.

2. A review of distance learning

Research on distance education has been subject to long and numerous debates [7–10]. Distance education needs a reliable means of communication between students and lecturers. Therefore, the history of distance education begins at the point where a reliable communication method is established. Most historians date distance education to the eighteenth century, when a few lecturers began to offer what were called correspondence courses. One of the first examples of distance education was observed in 1728, when "an advertisement in the Boston Gazette named 'Caleb Phillips', teacher of the new method of Short Hand" was searching students for lessons to be sent weekly [11]. But technology-based distance education started after the introduction of some devices, which are using both sight and sound, into the schools in the early 1900s.

In the late 1960s and early 1970s, microwave technology was developed. So networking technology costs were reduced, and universities began to use microwave networks to take advantage of the Instructional Television Fixed Service (ITFS) authorized by the Federal Communications Commission [12].

Today, distance education programs have a wide range of approaches [13]. For example, independent study courses through computer networking, computer-delivered instruction, communication between students and instructors through electronic mail, class sessions, cluster groups, undergraduate and graduate degrees through cable networks, and video courses with texts and other collateral materials are these approaches [13].

In summary, the history of distance education shows a constant state of evolution. In the historical view of distance education, a stream of new ideas and technologies has been observed. Historical development of distance education shows that nontraditional education tends to blend with traditional education while meeting the changing learning theories and developing technologies [13].

2.1. The purposes of distance learning

The main goal of distance education is to overcome barriers of place and time. Learners may live in isolated, less-populated and nonurban, rural areas and have no access to education.

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Other learners may have ready access to a private school or college but that college might not offer the course of study needed by that learner. Distance learning allows education to reach those who are not able to physically attend courses in universities [14].

One of the most important purposes of distance education is to provide an opportunity of education, often on an individual basis, to learners who are not physically present in a classroom [15]. Also, it provides equity in educational opportunities by allowing access to quality education for those who otherwise would have been denied.

2.2. The advantages and disadvantages of distance learning

The aim of distance education is to provide a strong communication between students and lecturers. That's why there are also disadvantages as well as advantages of distance education.

The main advantage of distance learning is that the students can study wherever, whenever, and whatever he/she wants. So, it can be said that flexibility is the most important advantage of distance learning. The other advantages of distance learning are as follows:

- The students have the convenience of course materials being delivered to his/her home or office.
- Students may gain useful, transferable skills, such as planning and research.
- Students can make their feedback easily.
- There is no waste of time in transport.
- Accessing students without face-to-face learning opportunities.
- Distance learning provides just-in-time learning.
- Distance learning is associated with technology more than face-to-face learning.
- Distance education can reach a wider audience.
- Distance learning can facilitate greater learner-instructor interaction.
- Distance learning can equalize access to education.
- Distance learning makes information and lecture notes open to everyone.
- Distance learning minimizes the costs of stationery.
- Distance learning increases the effectiveness of education through the use of items such as sound and image.

Although distance learning has numerous benefits, it has some disadvantages that are listed as follows:

- There is a lack of eye contact between the students and the lecturers.
- It can be occasional Internet provider downtime.
- Student must be more active in education environment.

- The cost of developing course materials is too much, and it is needed more time to prepare course materials.
- There is unconsciousness in the use of educational technology.
- Distance learning is not suitable for undisciplined learners or inflexible instructors.
- Laboratory and experimental courses cannot be given remotely.
- Students who have little technological knowledge cannot follow the courses.
- Students and instructors need to take technical training and support.
- Some of the students cannot access the necessary facilities, such as computers, Internet, etc.

2.3. Types of distance learning

In general, distance education is collected under two main headings:

i. Synchronous

ii. Asynchronous

Synchronous learning requires all students to participate the classes at the same time. The method of delivery is usually interactive and includes Internet chat sessions, teleconferences, telecourses, and web conferencing [16]. Synchronous distance education is less flexible than asynchronous distance education because synchronous distance education requires all enrolled students and the teacher to be online at a specific time. Asynchronous instructions do not require simultaneous participation of all students in the class, so it is more flexible. Asynchronous instruction gives students the freedom to interact with the material and instructor at a time that is convenient for them [16].

Internet-based distance education has become a specific focus for at least three reasons according to the Institute for Higher Education Policy (IHEP) [17]:

First, Internet is quickly becoming the predominant technology in distance education, because of its increasing telecommunications bandwidth capabilities. Second, Internet-based distance education especially asynchronous instruction mode allows the teaching and the learning processes to occur "at any time and any place." Provision of the interactive learning activities at any time and any place has become the most important characteristic of this technology. Third, Internet-based distance education is, in many ways, fundamentally different from traditional classroom-based education.

Internet-based distance education must have the following features [18]:

- The identification and management of users
- Preparation of online course contents
- Managing courses

- Monitoring and analyzing student behaviors
- Assessment of students' achievement status
- The creation and management of interactive communication media

2.4. Learning management systems

Computers and computer networks are rapidly becoming the preferred long-distance communication tool, and they are evolving as a major resource in distance education. There are many computer-based distance education tools, and the names of the major tools and their web addresses are listed in **Table 1** [19].

In this chapter, we have reviewed the most popular, widely used and well-known learning management systems (LMSs) and included detailed comparison of these systems. Therefore, we include ATutor, Blackboard, Claroline, Desire2Learn (D2L), Docebo, Dokeos, eFront, Moodle, OLAT, and Sakai systems in this chapter. Among the others, Blackboard and Moodle are the two most well-known web-based learning management systems widely used in universities and higher education [19].

2.4.1. ATutor

ATutor is a free and open-source course management system that has a simple and straightforward structure. It is a web-based learning content management system (LCMS) under the GNU General Public License (GPL). It was prepared such that it can be easily used in any type of computer system and all operating systems. ATutor has been used in many universities, institutions, research centers, and educational institutions.

ATutor was implemented in Personal Home Page (PHP: Hypertext Preprocessor), and it includes facilities for teachers and students. Students can change the learning environment based on existing templates, send messages, and collaborate on courses. On the other hand, instructors can manage the courses, store files, and create workgroups. At the same time, in ATutor, people with disabilities were considered, so ATutor was arranged to use easily.

ATutor has blog, forum, photo gallery, glossary, site map, chat, directory, tests and surveys, and MyTracker tool, which tracks users' navigational patterns. It supports Sharable Content Object Reference Model (SCORM) standards and Instructional Management Systems (IMS) packets. It is available in more than 20 languages. Some video conference softwares such as Adobe Connect, BigBlueButton, and OpenMeetings modules can be integrated in ATutor. **Figure 1** shows web page for an ATutor course.

2.4.2. Blackboard

Early in 2006, owners of Blackboard Learning System and WebCT decided to join their forces and merge two companies under the existing name of one of them—Blackboard. The new entity continues to support both systems [19]. Also, Blackboard Learning System acquired Angel Learning System in May 2009. So the Blackboard Learning System is a web-based

Tools	Web addresses
Adobe Connect	http://www.adobe.com/products/adobeconnect.html
AkademikLMS	http://www.akademiklms.org/
ANGEL	http://www.angellearning.com/community/highered.html
ATutor	http://atutor.ca/
Avilar WebMentor	http://www.avilar.com/learningmanagement/lms.html
Blackboard (WebCT)	http://www.blackboard.com/
Bodington	http://bodington.org/
Claroline	http://www.claroline.net/
CoursePark	http://www.coursepark.com/
Desire2Learn	http://www.d2l.com/
Dokeos	http://www.dokeos.com/
DotLRN	http://dotlrn.org/
Drupal	http://drupal.org/
eFront	http://www.efront.gr/
Enocta	http://www.enocta.com/enocta/web/pdefault.aspx
eStudy	http://estudy.sourceforge.net/
ETUDES	https://myetudes.org/portal
Fle3	http://fle3.uiah.fi/
ILIAS	http://www.ilias.de/
IntraLearn SME	http://www.intralearn.com/
Janison Toolbox	http://www.janison.com.au/
Moodle	http://moodle.org/
OLAT	http://www.olat.org/
Perculus	http://www.perculus.com/
RCampus	http://www.rcampus.com/
Sakai	http://www.sakaiproject.org/
SimplyDigi	http://www.simplydigi.com/products.html

Table 1. The distance learning tools and web addresses.

commercial distance education system dedicated to education containing teaching resources and straightforward user hierarchy. It allows instructors to post course information and materials as well as readings and assignments.

Thanks to the flexibility of the Blackboard Learning System, it is easy to design a course curriculum or study schedules, and the continuation of education courses go on flawlessly. Not only can the teacher shift page layouts including font types or colors but also choose texts and icon links. It also facilitates interaction between users, who can have basic discussion, and offers other collaborative tools.

The idea behind the Blackboard Learning System is to let teachers deliver course content, especially adjusted to large courses at lower levels. The role of an administrator of the system

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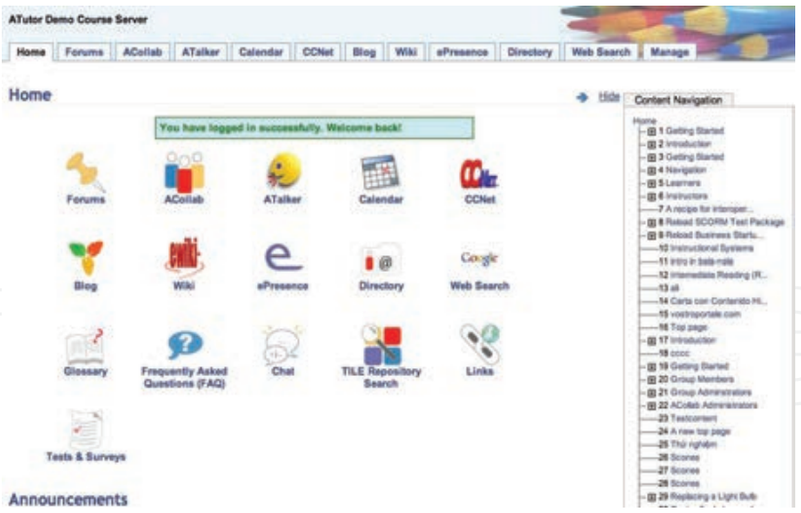


Figure 1. ATutor Course Web Page.

is limited to conducting basic operations such as initial course and teacher registration. The administrator is not overly dependent on it as many course management tasks, such as student and course content registration or tests and statistics check, can be carried out by a teacher. The system consists of many communication and discussion features enabling active participation of students [20]. The possibility of the use of multimedia, an instructional option, is willingly utilized by teachers. **Figure 2** shows the web page for a Blackboard course.

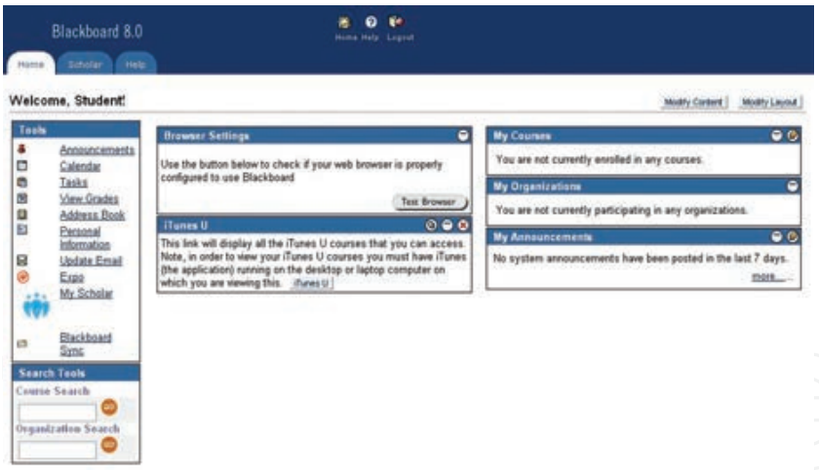


Figure 2. Blackboard Course Web Page.

2.4.3. Claroline

Claroline is an open-source e-learning and e-working platform. It can work on both Windows and Linux server systems. Claroline provides the ability to manage public education activities on the web and to create effective online courses. There is a large community of users and software developers worldwide.

In Claroline Learning Management System, a user has three roles. These roles are student, teacher, and administrator.

GNU/Linux, BSD, Unix, Windows (9x, ME, NT4, 2000, XP, Vista, and 7), or Mac OS X operating systems, Apache, IIS or Wampler web servers, PHP and MySQL database server should be installed on the web server where Claroline is installed. It is under the GPL.

Two language options, which are website language and course language, are available in Claroline. It has been used in more than 100 countries and translated into 35 languages. However, some languages such as Turkish are not supported completely and some sections are still awaiting translation.

Claroline has rich interaction tools such as chat, forum, and wiki, but there is no survey functionality and whiteboard application. It does not require any programming skills to install, manage, and use. It supports SCORM standards. Claroline allows user lists to be created and user statistics to be seen. User groups can be created in courses. **Figure 3** shows a web page from Claroline.



Figure 3. Claroline Course Web Page.

2.4.4. Desire2Learn

Desire2Learn, which is also known as Brightspace Learning Management System, is another educational learning management system. It is based on competency education and provides a cloud-based learning suite.

Desire2Learn is a commercial educational system that supports mobile learning and web conferencing. It also has some features such as exams, discussions, assignments, quizzes, grades, and portfolio-based activities. D2L supports foreign languages and mathematical notations. D2L also includes a learning repository, course creation tools, an e-portfolio module, mobile delivery, analytics, and lecture capture facilities. **Figure 4** presents web page of Desire2Learn.

2.4.5. Docebo

Docebo LMS platform is a learning management system that is based on SaaS/cloud platform. With Docebo, users can organize, track, and distribute online courses for formal learning. The instructors can create users as well as groups and create reports about them. It was offered as open source but it is not available as open source for a while. Although Docebo is offered for education, now it is primarily used in the corporate sector.

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Figure 4. Desire2Learn Course Web Page.

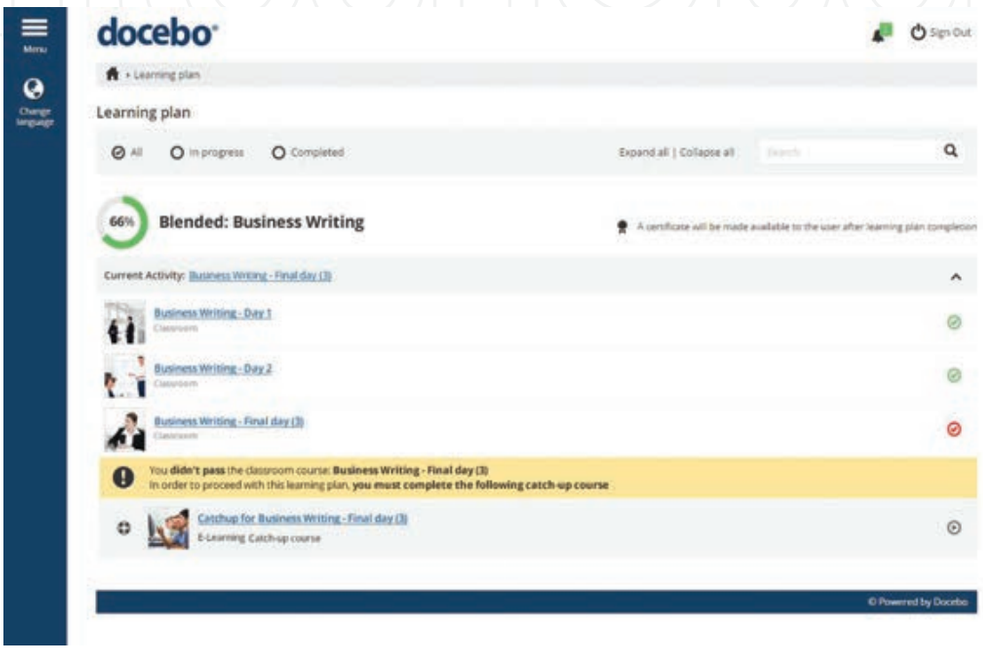


Figure 5. Docebo Course Web Page.

Docebo is under the GPL, so it has no licensing cost. It is compatible with SCORM, Aviation Industry CBT Committee (AICC), and xAPI. It has a component-based architecture and works with PHP and MySQL database.

Docebo has interfaces for video conferences. It is integrated with Adobe Connect, BigBlueButton, Cisco WebEx, Citrix GoToMeeting, OnSync by Digital Samba, and TeleSkill Live. Also, it has integrations with Google Apps, WordPress, and Vivocha.

Docebo is available in more than 30 languages and more than 10 countries. This platform is mobile-ready platform, so it includes mobile learning. The features of Docebo are blogs, course catalogs, labels, and discussions. **Figure 5** shows a course web page from Docebo.

2.4.6. Dokeos

Dokeos is an online and open-source course management system that is widely known and freely available. It is also a learning content management system based on MySQL database and written in PHP language. Dokeos is based on Drupal, which is a content management system. It is available in standard and Professional (PRO) versions.



Figure 6. Dokeos Course Web Page.

Dokeos is used in more than 60 countries, and it has been translated into 34 languages. It features a variety of e-learning templates and e-learning course authoring tools. The features of Dokeos are documents, announcements, tests, agendas, forums, links, tracking tools, and chats [21].

Dokeos supports mobile and cloud learning. Also, it supports SCORM, AICC and Tin Can API compliant. Portals and assessments can be used in Dokeos system; on the other hand, it has agenda, forums, discussion forums, chat, videoconference, open questions, and assignments. It is fully compatible across all browsers and platforms. Web page of Dokeos is presented in **Figure 6**.

2.4.7. eFront

eFront is a modern learning, which is also known as a course management system or learning management systems or virtual learning environment, and an educational platform. eFront is designed to help creating online courses. It has many features such as project management, extended statistics, files management, reports generators, assignments builders, internal messaging system, forum, calendar, chat, survey, etc. It supports SCORM standards.

eFront is a multilingual platform. It offers two types of language files: machine translated and human translated. It supports 48 languages. While 18 of these languages are machine translated, 30 languages are human translated.

This learning management system is PHP based and open source. eFront runs on GNU/Linux, Microsoft Windows, and any other operating system that supports PHP 5.1+ and MySQL 5+. It is under the Common Public Attribution License (CPAL) license. eFront supports Unicode and LDAP, and uses 3-tier architecture with low bandwidth connections.

eFront is content friendly by using presentations and videos. It has multiple types of test and questions. This course management system can collect and analyze surveys. It supports the blended learning. Some video conference software such as Adobe Connect, BigBlueButton, and OpenMeetings can be used with eFront. A sample course page is given in **Figure 7**.

2.4.8. Moodle

Moodle is an online course management system that is widely known and freely available. The word Moodle stands for "Modular Object Oriented Dynamic Learning Environment" and was

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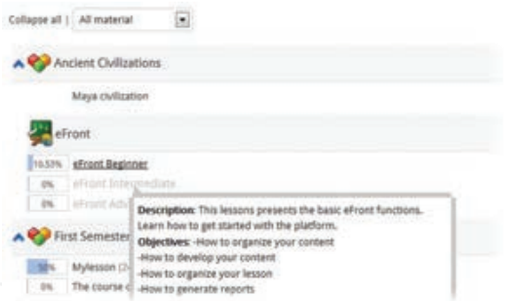


Figure 7. eFront Course Web Page.

created by Martin Dougiamas who is a computer scientist and an educator at a university in Perth, Australia [22].

Moodle is a software package that it is used to create Internet-based courses and their websites. Moodle is used in 234 countries, providing support for 139 languages, and has 88,204,960 registered users according to Moodle statistics on the Moodle website in July 2016. There are currently 10,106,758 registered courses and 70,872 active sites that have been registered from those countries.

Moodle is utilized by both institutions and individuals. The list of the former is long, including universities, high and primary schools, governmental departments, military, and healthcare organizations as well as airlines or oil companies. Homeschoolers, independent educators, and special educators are among the individual users.

Moodle, a PHP-based open-source online learning system, has been used since 2002 as a distance education tool, and has various versions supported by Windows, Linux, Unix, and Mac OS X operating systems. The latest version of Moodle is Moodle 3.1.1, released on 11 July 2016. Moodle is under the terms of the GNU General Public License (GPL). There are documents for use, training, and online help in Moodle. Moodle has 14 different activity types such as assignments, chat, choice, database, external tool, feedback, forum, glossary, lesson, quiz, SCORM, survey, Wiki, and workshop.

A number of programs, namely PHP, which is a script language embedded into html codes that work in a server-side; MySQL, which is a database management system that can run in the background and can respond to requests, such as a high-performance web server; and Apache, which is an open-source software web server that is completely free and has a high performance, are required before the Moodle program is set up.

Moodle supports mobile learning, so it has its own Moodle Mobile application. Moodle Mobile supports currently 15 languages. It has responsive design for phones and tablets. Users can download and view some course resources. A course web page from Moodle is presented in **Figure 8**.

2.4.9. OLAT

OLAT is an abbreviation of the words Online Learning and Training. OLAT is a Java-based open-source learning management system that was developed in 1999. OLAT is under the

Apache 2.0 Open Source License. OLAT has forums, chat, blogs, surveys, grading and submission modules, wikis, quizzes, and discussions. It allows monitoring the effectiveness of learners and tutors.

OLAT is multilingual and available in fifteen languages. OLAT runs on Unix, Linux, OpenBSD, FreeBSD, Windows, and Mac OS X operating systems. Java SDK, Apache as a web server, Tomcat Servlet Engine as an application server, and MySQL or PostgreSQL as database are required to install OLAT. It supports SCORM, IMS Content Packaging, and OTI standards. A main web page of OLAT is displayed in **Figure 9**.



Figure 8. Moodle Course Web Page.

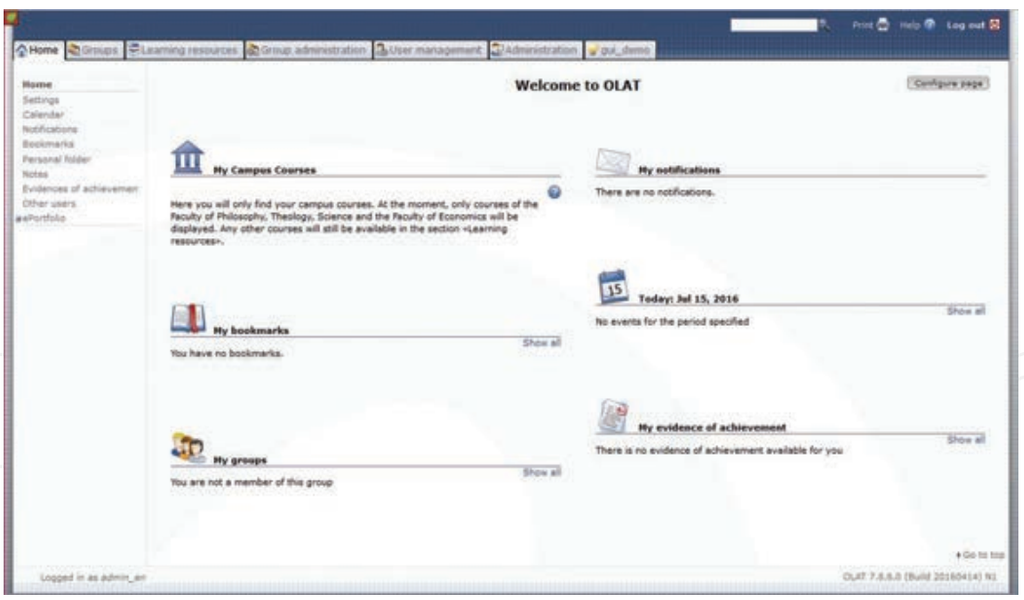


Figure 9. OLAT Course Web Page.

2.4.10. Sakai

Sakai is a free learning system that is designed for educational institutions. It is a Java-based LMS. It has been launched as a "Sakai Project" supported by the Mellon Foundation.

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Sakai is a free and open-source course design platform. It is web-based and platform-independent application with many features such as supporting training. It can run on CentOS, Debian GNU/Linux, Fedora, Gentoo Linux, Mac OS X server, Microsoft Windows, Red Hat Enterprise Linux (RHEL), Sun Solaris, SuSe Linux, and Ubuntu operating systems. It can be downloaded from the Internet for free, and it works interactively with both MySQL and Oracle database management systems.

Sakai has forums, chat rooms, message center, assignments, grade book, discussions, syllabus, wikis, and WebDAV. It is designed to present mathematical notation such that it can display LaTeX equations on most pages. Sakai is under the Educational Community License (ECL). It is available in more than 20 languages.

Some video conference software such as Adobe Connect, BigBlueButton, Kaltura, and OpenMeetings can be integrated in Sakai, and it has IMS Learning Tools Interoperability (LTI) standards. **Figure 10** shows a sample web page for a course from Sakai.

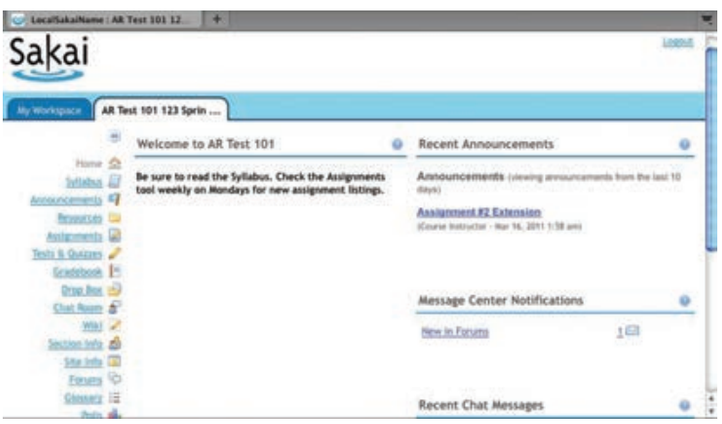


Figure 10. Sakai Course Web Page.

2.4.11. Comparison of learning management systems

In the below sections, we provide comparisons among the most similar learning management systems, and in **Table 2**, all comparisons of all learning management systems are summarized.

2.4.11.1. ATutor, eFront, and *Moodle*

ATutor is a PHP application and it has some registered installations such as Moodle.

ATutor seems like a down-sized version of Moodle with a slightly more technical look than eFront. But the development on its modules are rather limited [23].

2.4.11.2. Blackboard and Moodle

The Blackboard Learning System (i.e., WebCT) ensures variety in course content and materials. In addition, the Blackboard Learning System assists students in their offline efforts. Curriculum

	ATutor	Blackboard	Claroline	D2L	Docebo	Dokeos	eFront	Moodle	OLAT	Sakai
Price	Free	Commercial	Free	Commercial	Commercial	Free but it also has commercial version	Free	Free	Free	Free
Open source	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes
License	GPL	N/A	GPL	N/A	GPL	GPL	CPAL	GPL	Apache 2.0	ECL
Type	LCMS	LMS	LMS	LMS	LMS	LCMS	LMS	LMS	LMS	LMS
SCORM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Language	More than 20	More than 20	35	More than 10	More than 30	34	48	139	More than 15	More than 20
Countries	N/A	More than 50	100	N/A	More than 10	More than 60	More than 50	234	More than 30	20
Written in	PHP	N/A	PHP	PHP	PHP	PHP	PHP	PHP	Java	Java
Video conferences integration	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Operating system	Windows, Unix	Microsoft NT								
Servers, Windows, Mac OS X	Windows, GNU/Linux, BSD, Unix, Mac OS X	Windows, Linux, and Mac OS X	Cross-platform	Cross-platform	GNU/Linux, Windows, Cent OS, Windows Server 2003	Windows, Linux, Unix, and Mac OS X	Cross-platform	Cross-platform		
Database server	MySQL	N/A	MySQL	MySQL	MySQL	MySQL	MySQL 5+	MySQL	MySQL, PostgreSQL	MySQL, Oracle
Web server	Apache, Zeus, lighttpd, Abyss, Zazou Mini Web Server, Microsoft IIS, and Jana-Server	N/A	Apache, IIS, Wampler	N/A	Apache, IIS	Apache	Apache	Apache	Apache	Apache Tomcat 7, Apache Http Server
Mobile learning support	Yes, but works still continue	Yes	No	No (only for Brightspace)	Yes	Yes	No, but it can be used with mobile phones and tablets	Yes	No	Yes

Table 2. The comparison of all popular learning management systems.

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design is supported by the two systems by providing course templates, thanks to which instructors can deliver course materials, define study schedules, and plan class activities.

Regarding communication and discussion, both Blackboard and Moodle deliver discussion forums and chat rooms together with exchange of e-mails and files.

The Blackboard Learning System also provides private folders and internal e-mail for students and gives them an option of making their own notes. As for performance assessment, systems incorporate assessment and grading functions.

Course administration is embraced again by both tools by facilitating uploading of student data and course data in batches. The Blackboard Learning System is also equipped with direct data interfaces. It should be noted that there are certain similarities between Blackboard and Moodle such as option of student enrollments in courses, access to discussion forums, or taking quizzes and tests.

The Blackboard Learning System and Moodle are about equal in terms of administrative features, collaboration, and instruction methods.

Other common features are supporting file upload (e.g., Word, PowerPoint, audio), being SCORM compliant, allowing grading, providing course calendar, and monitoring students' participation.

2.4.11.3. Blackboard, eFront, and Sakai

The Blackboard Learning System is superior to Sakai in terms of administrative features and course development. But in terms of collaboration and instruction methods, both are very similar.

When eFront and Blackboard are compared, it is observed that eFront is superior to Blackboard in terms of administrative features but they are about equal in terms of course development and instruction methods.

Sakai is superior to eFront in terms of collaboration.

2.4.11.4. D2L (Brightspace) and eFront

eFront is superior to D2L (Brightspace) in terms of administrative features but in terms of collaboration, course development and instruction methods both of them are about equal.

2.4.11.5. D2L, OLAT, and Sakai

D2L (Brightspace) is superior to OLAT in terms of administrative features and course development, but for collaboration facility, both of them are about equal.

D2L (Brightspace) is superior to Sakai with respect to instruction methods used.

2.4.11.6. Dokeos, Docebo, and eFront

Docebo is superior to eFront with respect to administrative features and course development. But in terms of collaboration methods and instruction methods, eFront and Dokeos are very similar.

2.4.11.7. Moodle, Dokeos, and OLAT

Dokeos looks better and less complex than Moodle in terms of interface [23].

But Moodle is superior to OLAT in terms of administrative features, collaboration, course development, and instruction methods.

2.4.11.8. Moodle and Sakai

Unlike Moodle, Sakai is mainly implemented in Java and can cause some problems in older versions of browsers [23].

Moodle is superior to Sakai in terms of administrative features, collaboration, and course development.

2.4.11.9. OLAT and Sakai

Sakai, similar to OLAT, is a Java-based e-learning system developed by an international alliance of universities, colleges, and commercial affiliates; and both have very similar properties [24].

2.4.11.10. OLAT and the others

Although most of the other e-learning applications in this chapter are PHP based, OLAT (Online Learning and Training) is based on Java and is Apache Licensed [24].

eFront and Moodle are superior to OLAT in terms of administrative features and course development.

3. Conclusion

In this chapter, the literature about distance education and learning management systems are summarized. This chapter also presents a brief comparison of some of the most significant learning management systems used for education.

In summary, the history of distance education shows a constant state of evolution. A stream of new ideas and technologies exist in the historical view of distance education. It is also observed that nontraditional education tries to blend with traditional education while meeting the changing learning theories and developing technologies [13].

The Internet-based distance learning model can be defined as a transmission of educational content with the use of text, image, video, and audio files over the Internet, online or offline. According to the Institute for Higher Education Policy (IHEP), the Internet-based distance education has gained a special status for three basic reasons. First of all, the Internet has become the predominant technology in distance education, due to its increasing telecommunications bandwidth capabilities. Second, the Internet-based distance education allows the teaching and learning process to happen "at any time and any place." Asynchronous

interactive learning environments, especially, have become the signature characteristic of this field. Finally, the Internet-based distance education is, in many ways, fundamentally different than traditional classroom-based education hence attractive for learners [17]. The main difference is that the Internet-based distance education removes the physical barrier and time constraints for students and lecturers.

Within the framework of this study, the open-source learning management systems especially Moodle are widely used particularly in universities and higher education institutions. In general, the commercial learning management systems especially Blackboard are superior to open-source learning management systems in terms of administrative features; however, according to instruction methods that are employed, the open-source learning management systems especially Moodle are superior to the commercial learning management systems. According to existing literatures [25], Moodle still comes out as the top used system among the open-source LMSs. This result also supports our observations that are explained in this chapter.

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