LEARNING MANAGEMENT SYSTEM (LMS)

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COURSE OUTLINE

TOPIC : Learning Management System

AUDIENCE : Training participants, teachers, lecturers, trainers, instructors, and students

BRIEF DESCRIPTION : This book discusses the concept of *learning management system* (LMS), its characteristics, its function, and the evaluation of LMS for implementation of e-learning. It also describes some examples of LMS, the commercial and non-commercial systems.

GENERAL COMPETENCY : After learning this book, the learners will have comprehensive understanding about the concept, the characteristics and the functions of LMS, and also they will understand the general principle of using LMS.

Basic Competencies	Subtopics	Learning Experience	Other media	References
1. To explain the concept of LMS and its different from other content management system	- The notion of learning management system (LMS) - The different between CMS, LMS, LCMS	- Listening to presentation - Discussion - Exploration		
2. To explain the components of LMS and its educational uses	- How LMS work - Components & features of LMS - The functions & use of LMS	- Listening to presentation - Discussion - Demonstration - Exploration		
3. Able to select the appropriate LMS for implementation of e-learning	- Sources of information on LMS evaluation - The criteria of evaluating LMS - Problems, Trends, Advantages of LMS	- Listening to presentation - Discussion - Exploration		
4. To describe some available LMS that can be used to implement e-learning	- Deploying an LMS - Commercial LMS - Free LMS - Strategy of implementing LMS - Benefit of LMS	- Listening to presentation - Discussion - Demonstration - Exploration		

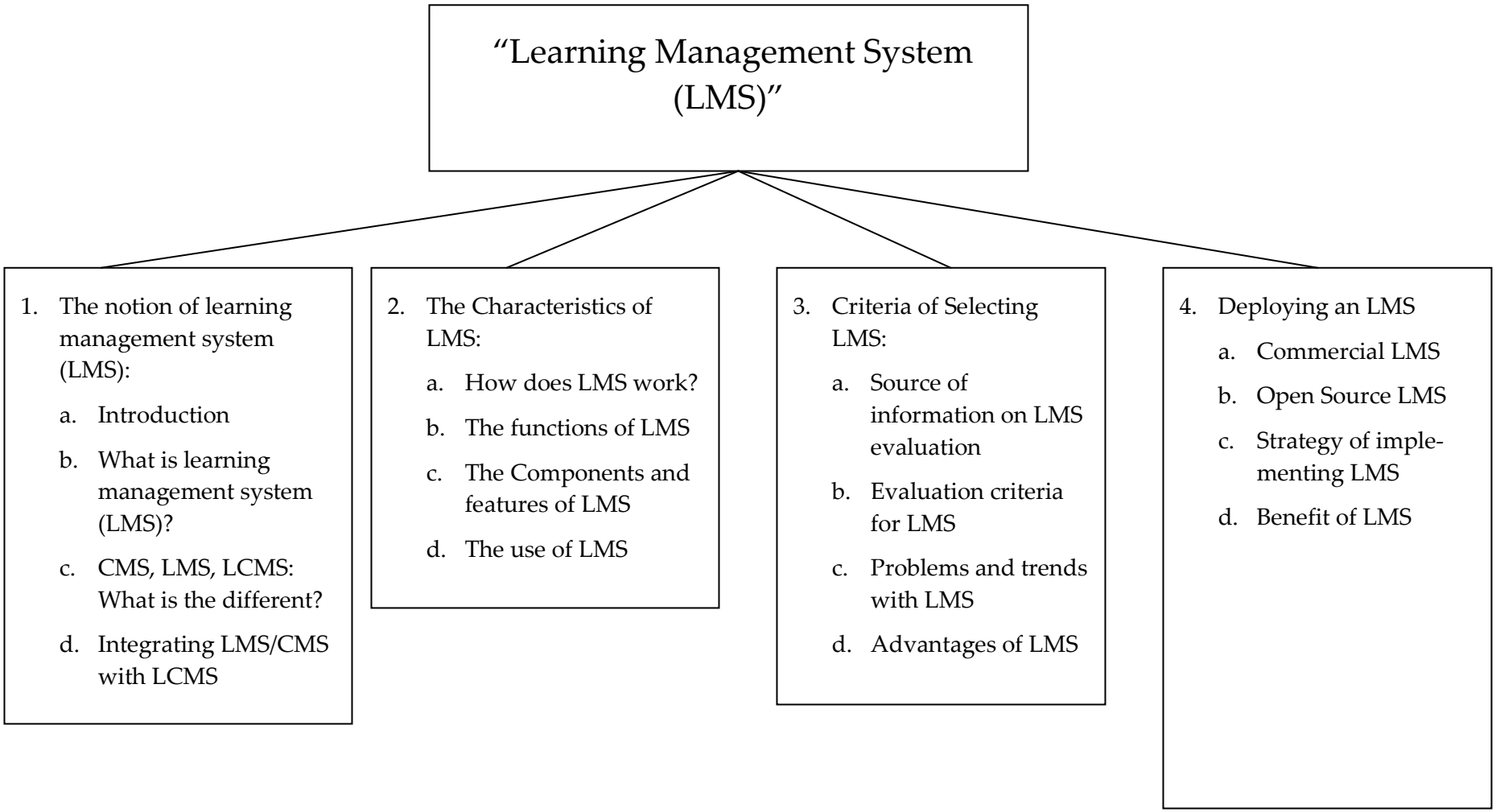
"Learning Management System (LMS)"
1. The notion of learning management system (LMS):
a. Introduction
b. What is learning management system (LMS)?
c. CMS, LMS, LCMS: What is the different?
d. Integrating LMS/CMS with LCMS
2. The Characteristics of LMS:
a. How does LMS work?
b. The functions of LMS
c. The Components and features of LMS
d. The use of LMS
3. Criteria of Selecting LMS:
a. Source of information on LMS evaluation
b. Evaluation criteria for LMS
c. Problems and trends with LMS
d. Advantages of LMS
4. Deploying an LMS
a. Commercial LMS
b. Open Source LMS
c. Strategy of implementing LMS
d. Benefit of LMS

TABLE OF CONTENTS

Chapter 1.
INTRODUCTION TO LEARNING MANAGEMENT SYSTEM (LMS)

A. Introduction

The rapid change and availability of information and communication technology, in particular the Internet, has been influencing the way educational institutions and educators deliver their instructional processes. Web-based learning has been increasingly popular and being accepted by many educational institutions to either support the conventional face-to-face instruction or to support distance learning. This changes result in a new way of learning, that is learning can be done anywhere, anytime, and any age. This is *e-learning*, learning with support of technology!

E-learning promises to deliver just-in-time learning (Ellis, 2001). A learner gains access to a data repository (learning materials), answers questions or submits assignments, communicates with his/her friends and teachers, and writes some notes directly on the online system. Through the e-learning system learning materials can be delivered and learning process can happen without the need of meeting between learners and instructor at the same place. Of course this virtual class requires technology, namely computer network (intranet or Internet) and the supporting software.

There are many kinds of software that can be used to support e-learning. However, in general these softwares are categorized as a *learning management system* (LMS), a *course management system* (CMS), or other term, which will be discussed later in this chapter.

E-learning technology has been widely available since the late of 1990s, and its popularity and use have increased dramatically eve since. Commercial LMSs have been marketed by some vendors and free or open source LMSs have been developed by organizations, individuals, and communities. They have been used by many educational institutions and training companies around the world. In Indonesia, some colleges and universities have adopted certain open source LMS to manage their initiative e-learning. A few institutions have been using a commercial LMS such as WebCT. Among open-source LMSs that are popular, Moodle is very popular to e-learning communities in Indonesia, though other LMSs such as Manhattan Virtual Class, Dokeos, and Claroline, are also used by some Indonesian universities.

In this chapter, the notion of learning management system, its similarity and its different with other terms related to e-learning systems will be described.

B. What is Learning Management System?

It is not a simple question to answer! There are many definitions and terms related to learning management system. Different person/organization may give different definition and use different term to refer to it. However, let's start with your own question, "What

do I need to manage my classes (course contents, student tracks, grades, etc.) through the web?" Or simply, "What do I need to conduct e-learning?" The answer is an LMS! The following is a short list of some definitions of LMS.

- On the online free encyclopedia **Wikipedia** it is defined that a **Learning Management System** (LMS) is a software package, usually on a large scale (that scale is decreasing rapidly), that enables the management and delivery of learning content and resources to students. Most LMS systems are web-based and use external data base system to facilitate "anytime, anywhere" access to learning content and administration.
- Betty (see http://www.brainybetty.com/LMS.htm) **defines a learning management system** as software designed to manage, track, and quantify all of the training, continuing education, employee development, certification and other learning activities in a organization.
- Brandt at. al. **(2003)** defines a **Learning Management System** (LMS) as the infrastructure on which e-learning can be built and delivered. It is an applications software package that contains instructional materials, and manages tracks and deploys all learning across the extended enterprise. Within a higher education environment, the LMS usually focuses on the support and integration of teaching and learning. Specific functions include: Course Development, Content Management, Course/Curriculum Management, Course Delivery, Assessment/Skills-Gap Analysis (pre, ongoing, self, etc.), Communication (individual and group), Tracking/Reporting (across a degree or program or department, participation), Tutor Support, Skills and Records Management, Student Interfaces to all components of the LMS, Administration Processes/Requirements/Registration, etc. Conceivably, an institution can easily deploy thousands of distinct e-learning offerings, hybrid courses, and instructor-led classes and manage them all from one place, the LMS. http://www.mcli.dist.maricopa.edu/ocotillo/papers/index.php?yr=0203&id=3
- The **Learning Circuits** on its *ATDL's Field Guide to Learning Management System* (2005) described that a **learning management system** (LMS) is a software application that automates the administration, tracking, and reporting of training events. In addition, robust LMS should be able to do the following:
    - centralize and automate administration,
    - use self-service and self-guided services,
    - assemble and deliver learning content rapidly,
    - consolidate training initiatives on a scalable web-based platform,
    - support portability and standards, and
    - personalize content and enable knowledge reuse.
- E. Renaux, P.A.Caron, and X. Le Pallec (2005) defines that **LMS** is a software system designed to facilitate administrative tasks as well as student participation in e-learning courses. Further, they mentioned that this term describes a wide range of systems that organize and provides access to online education services for students, teachers, and administrators. These services usually include access control, provision of learning content, communication tools, and administration of user groups.
- Baumgartner and Pater (2005) define a **Learning Management System** (LMS) as a tool for the organization and the coaching process of web based learning.

- Therese van Maanen (2005) mentions that a **Learning Management System** is a platform that supports the management, delivery and reporting of online, face-to-face and blended training. Most LMS will include an assessment tool, support for work place assessments, virtual tutor support and a range of other standard features. An important feature of Learning Management Systems is that they allow internal and external organizations to be mapped in the database, including learners and line management, on which access privileges and training views are based. An LMS provides a high degree of reporting across the entire organization or groups within the organization, particularly for the management of compliance training. Managers can report against their work units, senior management can report against multiple business units or the entire organization if necessary.

From the above list, it can be concluded that a **learning management system** (LMS) is software packages (may consist of several modules) that is designed and can be used to deliver, to manage and to administrate learning contents and resources, to manage and to administrate learning processes and learners activities, to track and to report the learning and learner activities. LMS supports face-to-face, online (web-based), and distance learning. Most modern LMSs are web-based, that is it works under a web server so that learners access learning materials through a web browser, such as MS Internet Explorer. From the users view point LMS looks like a web page, with some restrictions that not all materials are freely open. Usually users must supply a **username** with correct **password** to gain full access to an LMS.

However, if we read books, articles, or other documents related to e-learning, we will find some other terms related to the systems used to implement e-learning. Among these terms are **virtual learning environment** (VLE), **managed learning environment** (MLE), **course management system** (CMS), **learning support system** (LSS), **learning platform** (LP). In the Wikipedia online encyclopedia, it is defined that a Managed Learning Environment (MLE), or a Virtual Learning Environment (VLE), is a software system designed to facilitate teachers in the management of online educational courses for their students. It is mentioned that VLE provides especially help to teachers and learners with course administration. The system can often track the learners' progress, which can be monitored by both teachers and learners. These services generally include access control, provision of e-learning content, communication tools, and administration of user groups. In other word, it can be said that this terms refer to a computer program that facilitates computerized learning or e-learning. It is education via computer-mediated communication (CMC) or Online Education. While often thought of as primarily tools for distance education, they are most often used to supplement the face-to-face classroom.

In the United Kingdom and many European countries the terms VLE and MLE are favored. Becta in the UK have coined the term LP to cover both MLE and VLE. In the United States, CMS and LMS are the more common terms, however LMS is more frequently associated with software for managing corporate training programs rather than courses in traditional education institutions (Wikipedia).

There is one term that stands for two different but related concepts, CMS. This term sometimes stands for **course management system** (similar meaning with LMS), but it also refers to **content management system**. So don't be surprised! The two meanings are however still related. A Content Management System is a system that can be use to manage the web contents. This is not specially for e-learning content (although the web contents itself can be considered as learning materials or learning resources). Its focus is on content management not on learning management. However in e-learning, contents management is also one of important tasks as learning can happen whenever there are learning materials or learning resources. Because of this, there is a new term that seems combine the two concepts, LCMS (**learning content management system**).

C. LMS, CMS, LCMS: What is the different?

Some LMS vendors do not distinguish between LMS and LCMS, preferring to refer to both under the term "LMS", but there is a difference. The LCMS, which stands for "Learning Content Management System", facilitates organization of content from authoring tools, and presentation of this content to students via the LMS (Wikipedia). The following is a discussion about the different between LMS, CMS, and LCMS by describing each term one by one.

1. Learning Management System (LMS)

On an online article "What is the difference between a Learning Management System and a Learning Content Management System?" (http://www.guidetools.com/) it is described that a Learning Management Systems **(LMS)** are reporting systems and generally do not include ways to create new content or to deliver small packets of learning. Furthermore, LMS were created for tracking registration, attendance, class lists, grades, test results, class scheduling, and other administrative requirements of schools and instructor-led classes. According to that article, an LMS helps in running a learning organisation. It does not help create or deploy content. It does not track students through a particular course or measure their performance with learning exercises and tests. It does not enable Tutors to communicate with the students.

Carliner (2005) described that LMSs are designed to support corporate training. Further, he explain that Learning management systems (LMS) refers to software that primarily acts as an electronic registrar by electronically performing various enrollment and related tasks. LMSs were originally designed for workplace learning environments, and specifically perform some or all of the following tasks:

- Registration,
- track participation (classroom attendance, sign-ons and sign-offs of online courses),
- track of completions (including final scores or grades),
- testing,
- follow-up discussions with particpants,
- aggregated reports, such as the number of people registered for particular courses,

- transfer of information to other systems, such as human resource information systems,
- process charges for courses, such as tuition payments and transfer payments among departments,
- course catalog, and
- skills management.

In details, Carliner (2005) also described:

> An LMS provides a central point from which learners access activities. It provides a list of courses available, and lets learners enroll in courses. If learners must complete prerequisite courses, the system can check that. After learners enroll in a course, the system can automatically generate an enrollment confirmation and, later, a reminder about the class. After class, the system can be used to test knowledge, record a course completion, and send the information to the learner's permanent employment record, as well as send follow-up correspondence to the learner. For an e-learning course, the system can launch the course, track student progress, record completions, and send the information to the learner's permanent employment record.
>
> For administrators, LMSs can be used to manage both classroom and e-learning. For e-learning, the system starts the course after the learner registers in the course. For classroom courses, the LMS can provide a variety of resources, including schedules for individual classrooms (that is, facilities tracking capabilities) and class lists for instructors. LMSs can also be used to record and assess training satisfaction (Level 1). In addition, LMSs can generate a number of reports, from the number of students enrolling in particular courses to aggregated records of student performance in particular courses.

Ellis (2001) gave a close-up description about LMS. According to him, an LMS provides a single point of access to disparate learning sources. It automates learning program administration and offers unprecedented opportunities for human resource development. It identifies the people who need a particular course and tells them how it fits into their overall career path, when it's available, how it's available (classroom, online, CD-ROM), if there are prerequisites, and when and how they can fulfill those prerequisites. Once learners complete a course, the LMS can administer tests based on proficiency requirements, report test results, and recommend next steps. In that capacity, LMSs are instrumental in assuring that organizations meet rigid certification requirements in such vertical markets as healthcare, finance, and government.

Ellis (2001) also mentioned the details of LMS capabilities as follows:

- **Support for blended learning.** People learn in different ways. An LMS should offer a curriculum that mixes classroom and virtual courses easily. Combined, those features enable prescriptive and personalized training.
- **Integration with HR.** LMSs that aren't synchronized with HR systems miss the boat. When systems are integrated, a human resources employee can enter a new hire's information into the HR system, and the employee is automatically signed up for training tailored to his or her role within the organization.

- **Administration tools.** The LMS must enable administrators to manage user registrations and profiles, define roles, set curricula, chart certification paths, assign tutors, author courses, manage content, and administer internal budgets, user payments, and charge backs. Administrators need complete access to the training database, enabling them to create standard and customized reports on individual and group performance. Reports should be scalable to include the entire workforce. The system should also be able to build schedules for learners, instructors, and classrooms. Most important, all features should be manageable using automated user-friendly interfaces.
- **Content integration.** It's important for an LMS to provide native support to a wide range of third-party courseware. When shopping for an LMS, keep in mind that some LMSs are compatible only with the supplier's own courseware, and others do little more than pay lip-service to learning content standards. An LMS supplier should be able to certify that third-party content will work within their system, and accessing courses should be as easy as using a drop-down menu.
- **Adherence to standards.** An LMS should attempt to support standards, such as SCORM (**Sharable Content Object Reference Model**) and AICC (**Aviation Industry Computer-Based Training Committee**). Support for standards means that the LMS can import and manage content and courseware that complies with standards regardless of the authoring system that produced it.
- **Assessment capabilities.** Evaluation, testing, and assessment engines help developers build a program that becomes more valuable over time. It's a good idea to have an assessment feature that enables authoring within the product and includes assessments as part of each course.
- **Skills management.** A skills management component enables organizations to measure training needs and identify improvement areas based on workers' collective competence in specified areas. Skills assessments can be culled from multiple sources, including peer reviews and 360-feedback tools. Managers determine whether results are weighed, averaged, or compared to determine a skill gap. Businesses also might use this feature to search their employee base for specialized skills.

2. Course Management System (CMS)

Ullman and Rabinowitz (2004) defined that a CMS is Internet-based software that manages student enrollment, tracks student performance, and creates and distributes course content. In this way, the CMS enables teachers to extend the classroom beyond its traditional boundaries of time and space.

In comparing between LMS and CMS, Carliner (2005) wrote as follows:

> On the surface, the CMSs and LMSs seem similar. Both let you enroll participants in courses, communicate with learners, track performance, and launch learning materials. But the two were designed for very different uses. As a result, although one system may seem intriguing, if you use it for a purpose for which it was not originally designed, problems in applying the system may arise.

According to Carliner (2005), CMSs are designed to support academic classroom courses. He defined that, Course management systems (CMSs) are online systems that were originally designed to support classroom learning in academic settings, such as universities and high schools. CMSs provide instructors with the ability to perform the following tasks:

- **Place course materials online**. Most CMSs provide pre-programmed buttons for the course syllabus, course schedule, and course materials linked to specific lessons, such as copies of readings and **PowerPoint** slides from lectures.
- **Track student progress** through assessment features, which enable instructors to give quizzes and tests online, and an online grade book, where instructors can post student grades.
- **Discussion board**, where instructors and students can discuss readings and continue class discussions between formal class sessions.
- **Other communications tools**, which let instructors send announcements to classes and communicate individually with students
- **Lock box for students**, where students can store class materials in a safe place—either a presentation to give later in class or backing up class assignments in a safe place.
- **Course statistics**, which provide information on the use of the course site, including who used the course site and when.

Examples of CMSs include the commercial products **Blackboard** and **WebCT**, and the open source system, **Moodle**.

Because CMSs enable instructors to easily create a course website by following a template and uploading existing documents in **PowerPoint**, **Word**, **Excel**, **Acrobat** and other popular formats without converting them to a web format (like HTML), they require few specialized skills. As a result, CMSs are easy to learn and were quickly adopted by instructors, even those who might claim to be luddites.

CMSs also have proven popular in managing asynchronous academic distance courses, too, because of their ability to manage discussions. In addition, given that CMSs were already installed and in wide use only adds to their popularity. When using a CMS to manage a distance course, instructors post a core lesson—a master script, of sorts, that guides students through readings, discussions, and learning activities—instead of merely posting readings and PowerPoint slides for each lesson,. Instructors then use the discussion board to manage the course discussions, which are usually more extensive than those used in classroom courses (Carliner, 2005).

From the above quotations, it seems that some writers distinguished Learning Management System (LMS) dan Course Management System. The term "Learning" is most refered to "learning in the workplace environment" or "short-term training", while the term "Course" is most refered to "universities and other academic environment" or "long-term education". But, in principle both are and can be the same system! Only the learning environments distinguished their terms. Eventhough, LMS and CMS are sometimes used to refer the same lerning environment, mostly academic environments such as universities, colleges, and schools.

However, writers provided a real comparation between LMS dan CMS, which can be summerized in the Table 1 (Carliner, 2005).

Table 1. Summary of Differences among LMSs and CMSs

Function	Course Management Systems (CMS)	Learning Management Systems (LMS)
Support for ongoing classroom courses	✓	
Enrollment		✓
Automatically generated confirmation notes		✓
Course catalog		✓
Skills management list		✓
Checks for prerequisites before allowing enrollment		✓
Seamless link to e-learning		✓
Automatically generated follow-up correspondence		✓
Grade book	✓	
Administers tests and quizzes	✓ (with some limitations)	✓
Automatically transfers completion information to the permanent record		✓
Discussion board for between-class "conversation"	✓	Sometimes

In explaining the comparation table, Carliner (2005) write as follows:

> CMSs are ideal for managing classroom courses in universities and other academic environments. The communications capabilities they offer make them ideal for managing long-term, academic distance courses taught in an asynchronous manner, and for which students are expected to do extensive reading. Although they can provide links to other types of asynchronous e-learning, CMSs cannot be used to create them. These include asynchronous e-learning modules with animated (Flash) sequences and narrated lectures that need to be recorded in other formats.
>
> In addition, although they provide record keeping features, CMSs were not designed to record and report course enrollments, final grades, payment for courses, and similar administrative functions. Later versions of commercial CMSs now provide some or all of these features, but because most universities have long-term investments in other systems to handle such tasks, CMSs are not likely to be adopted to handle administrative tasks.
>
> Unlike CMSs, LMSs are ideal for e-learning programs, which can be created in other tools or, when the LMS is part of an LCMS. Similarly, LMSs can also handle a broader range of registration and related tasks than CMSs, because they were designed to do so.

> A client once asked why universities and other academic institutions cannot use LMSs. The answer: because education and training are different types of learning activities, the systems that support them are essentially different. As education is intended to build long-term knowledge, the CMSs that support it are designed to support long-term academic classroom classes. In contrast, as training is intended to build knowledge for immediate application, so LMSs are designed to support a large number of short training events.
>
> In other words, although e-learning is used in both workplace and academic environments, the types of e-learning, the means of assessing it, and the types of records kept with it significantly differ among the two environments. As a result, different systems have been developed to meet the needs of those environments.

3. Learning Content Management System (LCMS)

Betty (2006) mentioned that an LCMS is focused purely on managing and delivering the appropriate e-learning content for users when they need it. The Learning Content Management System provides an infrastructure that can be used to rapidly **create**, **modify**, and **manage content** for a wide range of learning to meet the needs of rapidly changing business requirements. The LCMS can use its detailed data on learner scores, question choices, and navigation habits to give content managers crucial information on the effectiveness of the content when combined with specific instructional strategies, delivery technologies, and learner preferences.

An article titled "What is the difference between a Learning Management System and a Learning Content Management System?" on the **GuideTools website** (http://www.guidetools.com/) described that the need for companies to be able to create their own SCORM compliant learning objects drove the development of the LCMS. Business on the internet is in real time, therefore content development and knowledge access must also be in real time.

As quoted by Ellis (2001), Guillermo Leija, product manager for **Global Knowledge's LCMS Knowledge Pathways** said:

> An organization has training content, such as Word files, PowerPoint presentations, Flash animations, and assessments, spread throughout its departments. Using an LCMS, an organization can aggregate content in a single system, then manipulate it and apply structure to create and deliver courses. An LCMS lets an organization take control of content.

Ellis (2001) also quoted Harvi Singh who highlights another advantage of LCMSs in his "Achieving Interoperability in E-Learning" that data repositories allow multiple developers and subject matter experts to share content and its components over the network (see (http://www.learningcircuits.org/mar2000/singh.html). Furthermore, Ellis describe how an LCMS works as follows.

> Delivery of learning via an LCMS begins with a pre-assessment that targets content. Based on the learner's profile, the system extracts content from the data repository to either deliver individual content chunks or assemble full courses.

> But success relies largely on effective development and use of learning objects, which are reusable, media-independent chunks of information organized by a meta data classification system. Learning objects are the modular building blocks of e-learning content, and can include such media types as text, graphics, audio, video, animation, games, tests, and simulations.

IDC defines an LCMS as a system that creates, stores, assembles and delivers personalized e-learning content in the form of learning objects. Though an LMS manages and administers all forms of learning within an organization, an LCMS concentrates on online learning content, usually in the form of learning objects (Greenberg, 2002).

A **learning object** is a self-contained chunk of instructional material. It typically includes three components: a **performance goal** (what the learner will understand or be able to accomplish upon completion of the learning), the **necessary learning content** to reach that goal (such as text, video, illustration, bulleted slide, demo, task simulation), and some form of **evaluation** to measure whether or not the goal was achieved. A learning object also includes **metadata**, or tags that describe its content and purpose to the LCMS. Metadata may include information such as author, language, version level, and more.

Inside an LCMS learning objects are stored in a central repository for instructional designers to retrieve and assemble into personalized courses. This benefits developers and learners because traditional courses tend to contain more content than any single learner can absorb or needs to absorb about a topic. By breaking course content into learning objects and serving them up on an as needed basis, content developers can deliver just-in-time and just-enough learning. The end result is increased productivity because employees aren't wasting time wading through irrelevant material. The arrangement of learning objects for supporting learning process to achieve a specific learning objective is sometimes called a **learning path** (as in LCMS **Claroline**).

Robbins (2002) mentioned that LCMSs are the corporate version of traditional course management systems that were initially developed for higher education. These systems are designed to enable subject matter experts, with little technology expertise, to design, create, deliver, and measure the results of e-learning courses rapidly. LCMS applications fundamentally change the value economics of e-learning content delivery by offering organizations a scalable platform to deliver proprietary knowledge to individual learners without bearing a prohibitive cost burden. The LCMS also can provide certification and tracking for individual learners, who need specific knowledge to certify for regulatory needs, professional licensure, or quality control.

Ellis (2001) described that an LCMS provides **authoring**, **sequencing**, and **aggregation** tools that **structure content** to facilitate the **learning process**. He quoted the IDC white-paper, "**Learning Content Management Systems: Comparative Analysis of Emerging Technologies**," that the components of an LCMS as an authoring application, a data repository, a delivery interface, and administration tools (see also Greenberg, 2002).

- **Automated authoring application.** This application is used to create the reusable learning objects that are accessible in the repository. The application automates development by providing authors with templates and storyboarding capabilities that incorporate instructional design principles. Using these templates, authors may develop

an entire course by using existing learning objects in the repository, creating new learning objects, or using a combination of old and new objects. Authors may be subject matter experts, instructional designers, media production artists, a community of practice leaders, and so forth. The tool may also be used to rapidly convert libraries of an organization's existing content, typically by adding media, customized interfaces, and instructional methodologies. An author may reside within an organization or at an outsourced provider.

- **Learning object repository.** The learning object repository is a central database in which learning content is stored and managed. It's from this point that individual learning objects are either dispensed to users individually or used as components to assemble larger learning modules or full courses, depending on individual learning needs. The instructional output may be delivered via the Web, CD-ROM, or printed materials. The same object may be used as many times and for as many purposes as is appropriate. The integrity of the content is preserved regardless of the delivery platform. XML serves this function by separating content from programming logic and code. The data repository uses metadata to store and manage individual learning objects.
- **Dynamic delivery interface.** To serve up a learning object based on learner profiles, pretests, and/or user queries, a dynamic delivery interface is required. This component also provides user tracking, links to related sources of information, and multiple assessment types with user feedback. The delivery interface dynamically serves content that can be modified to reflect a certain look or feel, such as organizational branding. The look and feel may also be localized to the user's region.
- **Administrative application.** This application is used to manage learners' records, launch e-learning courses from course catalogs, track and report the progress of learners, and provide other basic administrative functions. This information can be fed into an LMS designed with more robust administrative functionality.
- In addition, some LCMSs offer **collaboration tools**, including chat, integrated email, and threaded discussion groups.
- A quality LCMS adheres to **industry standards** such as **IMS** (***Instructional Management System***) and ADL's **SCORM** (***Sharable Courseware Object Reference Model***).
- It supports and manages internally and externally (third party) created learning content, and thus preserves the investment companies are making in learning content.
- To be a learning content management system, the content should also be aware of learners. At a minimum, learning content should recognize who the learner is and record information about the learner's experience. When the learner logs on to the system and launches the content, they should be taken straight back to where they last left off. As the learners interact with the content, results are passed back to the system. The system can also change its behavior based on real time student interaction. This would be based on test scores, learning style preferences, skills, communication abilities, organizational roles or any other relevant data.

It can said that LCMS is a combination of LMS (learning management system) and CMS (content management system). As underlined by Ellis (2005), that in essence, an LCMS combines the learner administration capabilities of an LMS with the content creation and storage capabilities of a CMS. Although many LCMSs offer basic course administration features, their functionality isn't as robust as that found in most LMSs. Similarly, LMSs use skill assessments to track learners' competencies and recommend courses, but most systems lack the capability to dynamically deliver personalized courses or track user access to the individual learning object. Greenberg (2002) argued: "In fact, an LMS and an LCMS are complementary but very different systems that serve different masters and address unique business challenges".

Some points distinguish LCMS from LMS are listed below [see Ellis (2001), Greenberg (2002)]:

- An LMS solves running a learning organization, and an LCMS gets the right content to the right people at the right time.
- If a organization needs to create and take control of its electronic content, phase one may start with an LCMS. As the organization starts to merge e-learning with other types of content deliverables, it will want to add an LMS.
- An LMS can manage the communities of users, allowing each of them to launch the appropriate objects stored and managed by the LCMS. In delivering the content, the LCMS also bookmarks the individual learner's progress, records test scores, and passes them back to the LMS for reporting purposes.
- In essence, an LMS is a high-level, strategic solution for planning, delivering, and managing all learning events within an organization, including online, virtual classroom, and instructor-led courses. The primary solution is replacing isolated and fragmented learning programs with a systematic means of assessing and raising competency and performance levels throughout the organization. For example, an LMS simplifies global certification efforts, enables companies to align learning initiatives with strategic goals, and provides a viable means of enterprise-level skills management. The focus of an LMS is to manage learners, keeping track of their progress and performance across all types of training activities. It performs heavy-duty administrative tasks, such as reporting to HR and other ERP systems but isn't generally used to create course content.
- In contrast, the focus of an LCMS is on learning content. It gives authors, instructional designers, and subject matter experts the means to create e-learning content more efficiently. The primary business problem an LCMS solves is to create just enough content just in time to meet the needs of individual learners or groups of learners. Rather than developing entire courses and adapting them to multiple audiences, instructional designers create reusable content chunks and make them available to course developers throughout the organization. This eliminates duplicate development efforts and allows for the rapid assembly of customized content.
- LCMS's purpose is to add value to content by manipulating it as needs change, and to deliver that same content as quickly as possible with context and meaning.

- Both an LMS and an LCMS manage course content and track learner performance. Both tools can manage and track content at a learning object level, too. An LMS, however, can manage and track blended courses and curriculum assembled from online content, classroom events, virtual classroom meetings and a variety of other sources. Although an LCMS doesn't manage blended learning, it does manage content at a lower level of granularity than a learning object, which allows organizations to more easily restructure and repurpose online content. In addition, advanced LCMSs can dynamically build learning objects based on user profiles and learning styles. When both systems adhere to XML standards, information is passed easily from the object level to the LMS level.

Table 2. Comparation between LMS and LCMS

	LMS	**LCMS**
Who benefits?	All learners; organization	Content developers; learners who need personalized content
Provides primary management of	Learner performance; learning requirements; learning programs and planning	Learning content
Manages e-learning	Yes	Yes
Manages traditional forms of training, such as instructor-led	Yes	No
Tracks results	Yes	Yes
Supports learner collaboration	Yes	Yes
Includes learner profile management	Yes	No
Allows HR and ERP systems to share learner data	Yes	No
Schedules events	Yes	No
Offers competency mapping/skill gap analysis	Yes	No
Includes registration, prerequisite screening, and cancellation notification	Yes	No
Creates test questions and test administration	Yes	Yes
Supports dynamic pretesting and adaptive learning	No	Yes
Supports content creation	No	Yes
Organizes reusable content	Yes	Yes
Includes workflow tools to manage content creation process	No	Yes
Develops content navigation controls and user interface	No	Yes

Table 2 (Greenberg, 2002, based on Brandon Hall' research) summarizes the capabilities and differences between LMS and LCMS.

D. Integrating LMSs (or CMSs) with LCMSs

In practice it may be not so easy to distinguish which system is realy an LMS, CMS (course managenement system not content management system) dan LCMS. The trend is that new e-learning technologies are trying to provide facilities to authoring and managing learning contents (learning objects), delivering learning objects, managing learners records, tracking learning activities, administrating the system, dan reporting statistics. Most popular systems like WebCT and Moodle provide the functionalities of LMS, CMS, dan LCMS to some extent. Of course this is the point of view from common people. However, some still argue that both (or three) are really distinguishable and the separable, at least on their stressing function.

Ellis (2001) wrote that a merging of the two systems (LMS & LCMS) may be where the market is heading, but a separation of content generation and delivery capabilities from administration tasks may currently be what is best for developing e-learning efforts. He emphasize that the outgrowth of LCMSs has generated interest in the quality of content that has been lacking in recent years. Furthermore, he wrote:

> More important, as LCMSs develop, so may their influence on e-learning instructional design. Because an LCMS's strength is its ability to modularize and manipulate content, developers can begin exploring new learning techniques. For instance, Leija believes that LCMSs are poised to address adaptive learning. "An inherent capability of LCMSs is adapting content to fit a learner's personal profile, not just by delivery mode but learning styles."
>
> Likewise, IDC's report on the LCMS market predicts that LCMSs may bridge the gap between knowledge management and e-learning. "An LCMS's efficiencies, such as learning content reusability, portability, accessibility, and speed of conversion, and the targeted nature of the learning experiences it delivers, make it an ideal component of any enterprise-scale knowledge management program."

Meanwhile, Greenberg (2002) wrote that a good LMS provides an infrastructure that enables a organization to plan, deliver, and manage learning programs in any format it chooses. It will support multiple authoring systems and integrate easily with the leading LCMS systems. In its role as a catalyst for the overall learning environment, an LMS can integrate LCMS learning objects via technical specifications and standards and assume responsibility for all content management, including delivery and tracking, storage in a content repository, assembly and reassembly of content objects, incorporation of content objects into blended curriculums, and tracking learner progress through courses.

According to Greenberg, the key to integration success is an open, interoperable approach. Currently, leading LMS and LCMS suppliers are launching certification programs that proactively address compatibility issues and ensure interoperability between their products. The certification approach gives buyers the freedom to choose both the LMS and LCMS that best meets their needs.

Figure 1 illustrates how an LMS can launch courses developed by an LCMS and incorporate LCMS performance measurements into reports (Greenberg, 202, based on the IDC report, *The Learning Content Management System: A New E-Learning Market Segment Emerges*).

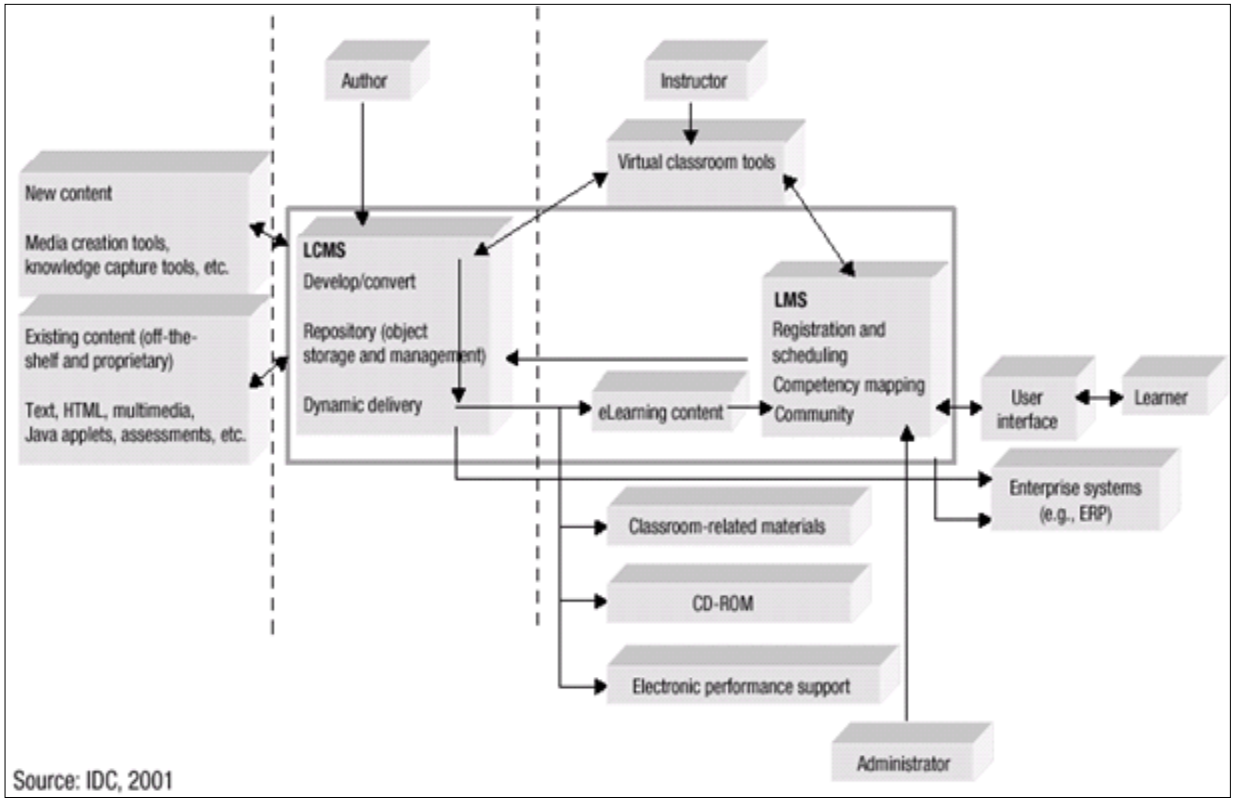

Figure 1. LMS-LCMS Integration in Learning Ecosystem

To summarize the above discussion about LMS, CMS, LCMS and their related concepts, in this book it will not distinguished among them. For simplification, what mean by LMS in the next explanation is an e-learning system that combines (perhaps) all functions of LMS, CMS (as *course management system*) and LCMS as discussed above. The only exception is that the notion of CMS as content management system is excluded, because this meaning is related to web management, not to e-learning.

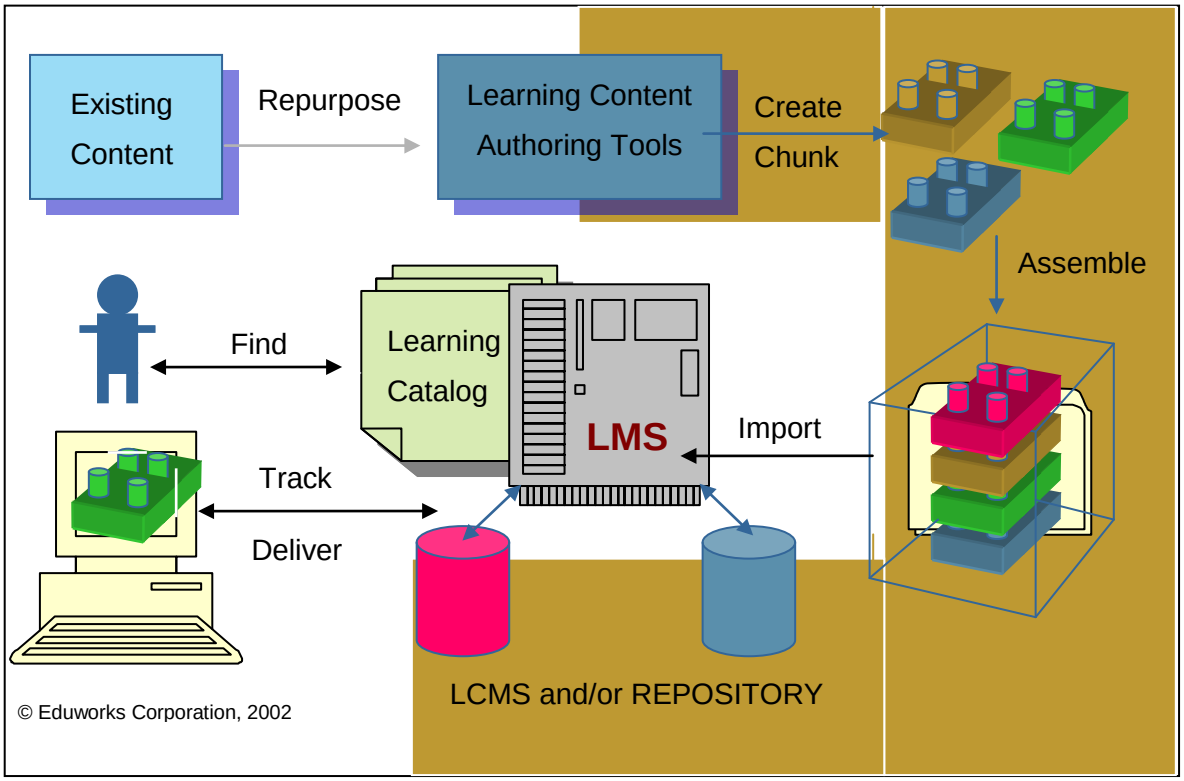

Figure 2. The position of LMS and LCMS within E-learning Flow

Chapter 2.
CHARACTERISTICS OF LEARNING MANAGEMENT SYSTEM

A. How does LMS Work?

This question is actually a little bit technical. However, it is not worst to know about technical matter, as sometimes it is really required!

As mention before, most LMSs work under web server. These systems usually run on servers, using one or more databases and a programming or scripting language such as PHP to serve the course to students as web pages. This means that user only needs a web browser like MS IE, Mozilla Firefork, or Netscape Navigator to access the e-learning system. Of course the Internet connection is required. However, the core technology used inside LMSs can be different form one system to another. Most current open-source LMSs like Moodle, Claroline, and Dokeos use PHP as scripting (programming) language and MySQL as supporting database. Some other LMSs use C programming (e.g. Manhattan), Perl programming (e.g. WebCT), Java (e.g. Sakai), Microsoft .NET, or other server-side programming.

Figure 3 and Figure 4 describe the e-learning architecture and e-learning software architecture. An LMS (as course management software) may work together with an adaptive learning engine, corporate information system, e-commerce transaction system, and the central database. Users (learners) access e-learning system through the corporate portal that provide link or interface to the LMS login page.

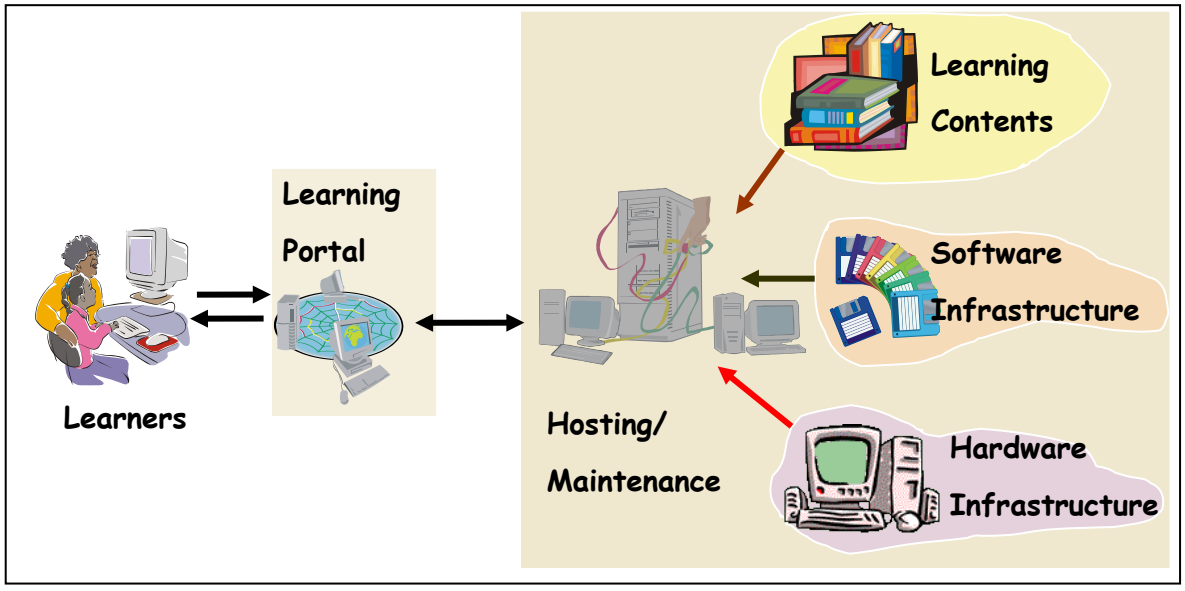

Figure 3 Architecture of e-learning

B. The Functions of LMS

At a minimum, the LMS usually allows for student registration, the delivery and tracking of e-learning courses and content, and testing, and may also allow for the management of instructor-led training classes. In the most comprehensive of LMSs, one may find tools such as competency management, skills-gap analysis, succession planning, certifications, virtual live classes, and resource allocation (venues, rooms, textbooks, instructors, etc.). Most systems allow for learner self-service, facilitating self-enrolment, and access to courses.

As in conventional instructional processes, e-learning involves at least three interest-groups: instructors, administrators, and students. In conventional (face to face classes) instructors usually have tasks to set goals & contents, to prepare materials and learning resources, to present or to deliver the materials to students, to organize classes, to communicate with students, to evaluate students, and so forth. Administrators have tasks to register students, to make course catalog/offering, to schedule courses, to manage examination, to record students' grades, and so forth. Students as learner have tasks to select/take courses, to follow classes, to acquire learning resources, to read learning materials, to communicate with other students and instructors, to do & to submit assignments, and to take test/examination.

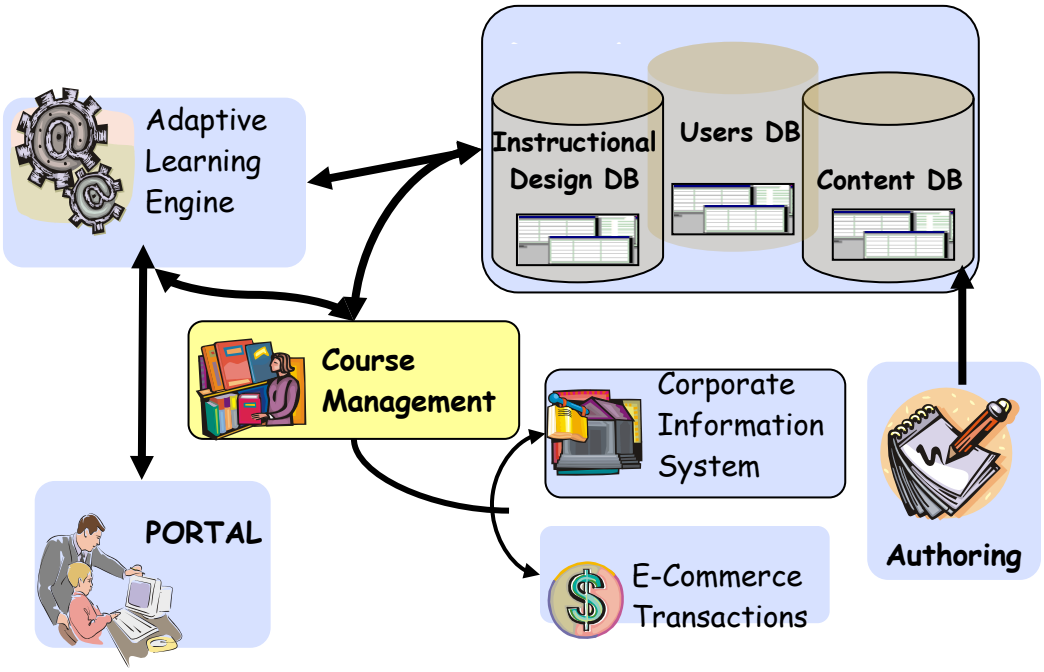

Figure 4 Architecture of e-learning software

C. The Components and Features of LMS

Because in learning process there are at least three groups of interests, an LMS should provide tools and facilities to support each the three groups. The three groups are instructors (teachers/lecturers), students, and administrators.. An LMS must have facilities for instructors to manage their courses, provide tools for students to follow the courses, and facilitate administrators to administer courses within the e-learning system.

The features of LMS to support instructors, students, and administrator are described below (see e.g. Beshears, 1999; Wikipedia).

1. **Instructors Tool Set for Course Website Development and Management:**
   a. Web-based file management (upload, modify, and create documents)
   b. Course website backup, download, & upload facilities
   c. Course announcements and calendar administration tool
   d. Course website glossary building tool
   e. Course website indexing system Student account administration tools (including student group administration)
   f. Templates that can be used by instructors to create content pages, discussion forums, chat, quizzes and exercises such as multiple-choice, true/false and one-word-answer.
   g. Assignment publishing
   h. Examination/Quiz/Survey development tool
   i. Online grade book (grade reporting tool)
   j. Student access tracking (i.e. how many news articles have they posted/read, which pages have they accessed)
   k. Webpage access tracking (i.e. how many students have accessed a page, when did each student access the page)
   l. Communication tools (internal e-mail, chat rooms, discussion forums, etc.)
2. **Students Tool Set:**
   a. Student accounts for webpage publishing
   b. Course materials and resources accesses
   c. Course content annotation facility and bookmarks
   d. Group work areas for collaborative webpage publishing (**Wiki**)
   e. Assignment submission tool
   f. Student self-evaluations
   g. Communication tools (Web-based email and discussion groups, chat rooms, white boards, etc.)
   h. Individual grade and progress status reports
3. **Administrator Tool Set :**
   a. Course management (course website creation, change, duplication, backup, downloading/uploading, rostering, and deletion)
   b. The course syllabus management
   c. Administrative information including the location of sessions, details of pre-requisites and co-requisites, credit information, and how to get help
   d. A notice board for up-to-date course information
   e. Users account management (create/modify/delete lecturers/students accounts), and if necessary payment options for students
   f. System setting (change access policy, interface, appearance, etc.)
   g. Course website statistics:
      i. number of students enrolled in a course
      ii. file space used by a course website
      iii. number of hits on a course website
      iv. first and last access date
      v. space capacity and usage.

All components of an LMS to support instructors, students, and administrators can be categorized in general into (Ullman & Rabinowitz, 2004; Robbins, 2002): **authoring/publishing tools, virtual community,** and **data management**.

Content Authoring/Publishing Tools

These tools allow the instructor to publish files to a section of the LMS for students to read or download, or simply publish a list of hyperlinks that students can click through to read additional materials online. Some systems also allow the students to upload files, but this functionality is frequently avoided as bandwidth and server space limitations can quickly complicate hosting the LMS.

In addition, these tools facilitate the creation and publication of Web pages — typically, template-driven forms consisting of text and images. Audio or video streams also may be accessed through the LMS, usually by means of a hyperlink. The most common example of these tools is the creation of online tests. Test-authoring tools, in particular, support a variety of question formats (e.g., multiple choice, short answer, essay, etc.). Some tools only support text forms, whereas others support the embedding of graphics and hyperlinks into the test.

A key benefit of LMSs is the capability for knowledge experts – with little or no programming experience – to author knowledge content quickly, without the assistance of third-party suppliers or information technology resources. A strong LMS offers easy-to-use, automated authoring applications embedded in the system, including a WYSIWIG editor that eliminates the need for HTML knowledge.

In addition to the content authoring/publishing, an LMS should also provide assessment tools. In order to link learning to individual performance, the LMS must assess the learner's prior knowledge and what he or she learns from a particular course or learning object. Robust management and reporting features that analyze the effectiveness of courses and individual learning objects must be available. The system should be able to accommodate multiple assessments of varying levels of difficulty and security.

Virtual Community (Communication and collaboration functions)

E-learning is more effective when the learner interacts with the technology, a coach/mentor, or other learners. In addition to the self-study mode, the LMS should provide the ability for learner collaboration, coaching by subject matter experts, and the creation of learning communities. Every LMS enables instructors and students, individually and as a group, to communicate online. Communication and collaboration can be facilitated through synchronous (as in chat), whereby two or more people exchange text messages in real time, or it can be a virtual classroom that usually includes chat with a whiteboard, and/or PowerPoint slides. The communication can also be asynchronous, as in a threaded discussion **(bulletin board)** and **Wiki** (collaboration notes), whereby multiple users enter text comments based on a general question or in response to a previous user's comments.

Data Management

For students to access course material, the LMS must allow for the creating of classes, as well as the assigning of one or more instructors and a number of students to that class. Most platforms also allow students to register for a class online rather than being registered by a teacher or system administrator. This form of registration may capture information beyond simply confirming the legitimacy of the student's access to the content; for instance, the student's e-mail, home address and similar personal information may also be collected. Alternatively, the LMS might be connected to the database of the university's registrar, whereby student data is automatically supplied to the LMS.

Some platforms also enable students to pay for a course, which might be included in the LMS itself, or "pass through" to the university's online e-commerce system. Typically, access for both instructors and students is rigorously password protected, as password management by a system administrator is an important feature in every LMS. The LMS must be able to function as a stand-alone system that manages enrollment and progress of learners, as well as course content, timing, and tracking.

Each system also offers the ability to capture students' performances on tests and their resulting grades. Grading functionality usually includes the ability to enter grades for papers, projects or tests not done online. Thus, the system becomes the complete online grading book for the instructor, regardless of the amount of testing done online. Most systems' grading functionality also enables teachers to compute weighted averages of the students' grades throughout the semester to generate a final grade. In addition, students can access their previous coursework online, including the tests they submitted, notes saved and the like.

As mentioned by Robbins (2002), that an effective LCMS also takes into account that all organizations create and deploy learning in different ways, and must maintain the flexibility to incorporate those differences. The LCMS must provide for different types of materials, learning methods, and schedules.

In addition to serving as a stand-alone application, the LMS must interface effectively with enterprise systems, including the ability to download employee, member, or customer information and upload performance and completion data. These interfaces must support basic integration formats as XML and industry standards, including IMS, SCORM, and AICC.

To address the e-learning standards, an LMS support reusable learning objects. Every piece of knowledge within the LMS must be stored as a reusable learning object – a chunk of distinct knowledge that can be kept as a resource for content designers within the LMS, or delivered as a stand-alone object. This enables organizations to gain leverage and consistency of knowledge, while reducing redundant and contradictory knowledge across the enterprise.

Due to the proprietary nature of content within an LMS, the system must contain robust security and encryption mechanisms to protect content and user data. The LMS must maintain a secure set of user privileges, which determine permission levels that users need to control, manage, and update content.

Most companies maintain a body of proprietary knowledge and learning content in a wide variety of file formats. The ability to rapidly repurpose content for online use can accelerate deployment times; therefore, the LMS must offer easy-to-use conversion tools.

An LMS should also provide flexible course design and delivery. Every organization possesses unique content, and training processes, target audiences, sophistication levels, and instructional designs. An LCMS should recognize that and enable substantial flexibility within the system for aligning the LCMS to unique organizational attributes. Content creators must be able to use standard authoring tools that they're familiar with rather than being forced to use tools embedded in the LCMS.

To support IT professionals in deploying e-learning system and the educational institutions in implementing e-learning an LMS provides automated implementation processes. The most robust LMS offerings allow for deployment within hours or days, with implementation rarely taking longer than 30 days. The LMS must have several pre-packaged process options that a customer can simply turn on during deployment -- based on their unique organizational requirements. If the majority of the implementation is automated, the customer doesn't need to involve third-party consultants or pay for expensive customization, but still deploys a solution that's uniquely aligned to their business.

In details, Brandt at al, (2003) mentioned that an LMS should provide some benefits to the instructors/lecturers, students, administrators, and IT professionals.

In order to provide benefits for instructors/lecturers, an LMS should allow them to:

1. increase the efficiency and effectiveness of course/content management efforts;
2. improve assessment capability and increase assessment opportunities;
3. decrease course preparation time;
4. improve content availability;
5. improve content sharing within the course, among instructors, and across disciplines;
6. improve intraclass and interclass communications; and
7. increase their overall productivity.

To give benefits for students, a LMS should:

1. enhance the personalized nature of the learning experience;
2. provide additional, timely, convenient academic support;
3. provide personalized academic support opportunities;
4. increase course completion opportunity/capability; and
5. improve overall learning;

An LMS should also give benefits for administrators (institutions) by:

1. allowing the institution to serve a greater number of students;
2. improving student performance tracking;
3. increasing student retention; and
4. increasing administrative efficiency and decrease expenses (for long time periods).

Brandt also added that an LMS should give benefits for IT Professional by:

1. being scalable and reliable in terms of performance;

2. promoting standards compliance, quality control, and integration across product and vendors;
3. allowing for easy campus-wide deployment and management; and
4. increasing IT operational efficiency.

Evangelisti (2002) explained that an LMS must provide an infrastructure that allows its users to plan, deliver, and manage e-learning programs in any existing and future formats. According to him, an LMS must have the **basic features, enhancement features,** and **infrequently/limited used features**.

The basic features of an LMS are:

1. **Supports blended learning.** People learn in different ways. Some students learn by hearing lectures and seeing lecturer explanation, some students learn by reading and trying by their self, and so forth. An LMS can be used to support conventional face-to face lectures, by proving all teaching materials and resources that can be demonstrated during the classes and can be studied individually by each student. Combined, these features enable prescriptive and personalized training. An LMS should contain basic teaching materials and additional resources, including reading materials, and links to outside resources in libraries and on the Internet. These may be the complete content of the course, if the LMS is being used in a distance learning context, or copies of visual aids used in lectures or other classes where it is being used to support a campus-based course.
2. **Integration with HR.** This is especially within the work environment learning (training). When systems are integrated, a human resources employee can enter a new hire's information into the HR system, and the employee is automatically signed up for training tailored to his or her role within the organization.
3. **Administration.** The LMS must enable administrators to manage user registrations and profiles, define roles, set curricula, chart certification paths, assign tutors, author courses, and administer internal budgets, such as user payments (for commercial e-learning systems). Administrators need to have complete access to the training database, enabling them to create standard and customized reports on individual and group performance. Reports should be scalable to include the entire workforce. The system should also be able to build schedules for learners, instructors, and classrooms. Most important, all features should be manageable using automated user-friendly administration screens. An LMS should make it possible for a course designer to present to students, through a single, consistent, and intuitive interface, all the components required for a course of education or training. In addition, an LMS should be capable of supporting numerous courses, so that students and instructors in a given institution (and, indeed, across institutions) experience a consistent interface when moving from one course to another.
4. **Content integration.** It's important for an LMS to provide native support to a wide range of third-party courseware. Some LMSs may be compatible only with the vendor's own courseware, and others do little more than pay lip-service to learning content standards. An LMS vendor should be able to certify that third-party content will work within their system, and accessing courses should be as easy as using a drop-down menu.
5. **Adherence to standards.** An LMS should attempt to support standards, such as SCORM and AICC. Support for standards means that the LMS can import and

manage content and courseware that complies with standards regardless of the authoring system that produced it. Without with features, using different LMSs will results extra works to create contents suitable for the systems.

The enhancement features of an LMS are:

1. **Assessment.** Evaluation, testing, and assessment engines help you build a program that becomes more valuable over time. It's a good idea to have an assessment feature that enables authoring within the product and includes assessments as part of each course. Assessment tool should be integrated with grade tool, to automate the learning results evaluation.
2. **Skills management.** A skills management component enables organizations to measure training needs and identify improvement areas based on workers' collective competence in specified areas. This feature is important fore-learning (training) within work environments.
3. **Configurability.** An LMS should easy to configure to adjust the need and taste of institutions or individuals, such as modifying the website appearance, adding/inserting institution logos, and so forth without the need of advanced programming inside the LMS scripts.

The limited use features include:

1. **Online communities.** A community learning or collaboration component supports communication across an organization through chat rooms, bulletin boards, newsgroups, online support, help desks, and so forth. This capability lets learners supplement information from instructors and online courses with knowledge from other learners. The online community features will eliminate critics that technology use will reduce humanity aspects in e-learning. Technology should not reduce but increase the connectivity and collaboration among instructors and students.
2. **Content management capabilities.** By this feature administrators or instructors can easily to develop, manage, and reuse learning objects between different e-learning systems or different course within the same LMS.

D. The Use of the LMS

How the LMS is implemented usually is left to the individual university — or sometimes, the individual instructor. This position, in fact, is common in the software industry. It's practically an axiom for companies to know their products are succeeding when customers use their software in ways that were never fully imagined by the programmers (Ullman & Rabinowitz, 2004).

However, that attitude assumes that users of the system explore every function in a creative fashion. While such a paradigm might work for other kinds of software, instructors usually don't have the time or inclination to explore some new technology. Also, the Instructional technology departments of most universities are not prepared to train their lecturers on anything beyond the simplest use of new software, while the companies themselves usually avoid suggesting a specific pedagogy with their software in order to appeal to the broadest possible audience. Consequently, how a CMS effects the organization, implementation and even the *meaning* of a class has rarely been explored.

1. LMS as Supplement

The use of LMS within a training organization can be as supplement or as course organizer (Ullman & Rabinowitz, 2004). The use of LMS as supplement assumes that instructors have commitment to spend their time to prepare their classroom activities. Many educators teach the same class year after year, and while they update their materials periodically and learn from past experiences, the general framework of the class is set. Therefore, lecturers can use their university's LMS as a supplement to their preferred teaching style. The instructor uses the LMS functionality as an add-on to the course. This includes the use of LMS as authoring/publishing tool, as a tool for creating virtual learning community, and as a data management tool.

Typically, lecturers might use the LMS to put content on the site, including publishing their syllabi and class assignments. Students can then check the LMS for their assignments and due dates. Lecturers sometimes create **PowerPoint** presentations of their lecture notes which they can upload to their online classes. In addition, lecturers often post **Word** or **PDF** files for reading materials or links to online references from the Internet. This content provides support for the course experience, but doesn't substantially affect how the class is organized or what happens in the classroom. The content is usually text-based and not intended to stand alone. Lecturers also sometimes use the test-authoring tool, mostly to generate a series of simple multiple-choice questions that can be graded automatically.

Lecturers frequently ask students to write a number of comments on threaded discussions. The lecturer then uses the student responses as part of his or her classroom participation and grades accordingly. Some LMS provide internal e-mail that can be used to person-to-person communications. Usually other one–to-many (such as course announcement) and many-to-many (such as bulletin board and discussion forum) communication are available within some LMSs. These communication tools are helpful to support the learning processes.

Instructors may move their grading and some other simple data management functions to the LMS. The LMS, in this case, replaces stand-alone software (such as MS Excel) that lecturers often use to maintain their grading. Overall, a lecturer who supplements his or her class by using an MS to post reading assignments, promotes student communication through a threaded discussion, and uses the gradebook feature, seems to be extracting some value of LMS. However, there is a better alternative use, i.e. LMS as organizing course.

2. LMS as Organizing Course

The use of LMS as organizing course also assumes that lecturers have committed a lot of time and effort to prepare their classroom activities. They have taught the course many times and have a good sense of what information needs to be covered. Given their understanding of the content, the first step would be to review all the functionality of the LMS and determine how to distribute the content and student-lecturer interactions across the LMS and classroom experience.

Rather than thinking of the LMS as a collection of individual functionalities, the lecturer may consider the CMS and classroom as an integrated experience. From the organizing perspective, the instructor uses the LMS to outline the course as if it were a table of

contents, except it actually directs the student to the different aspects of the course. All course materials and activities, including listing the classroom sessions, would be presented in their proper sequence. This sequence is sometimes called ***learning path***. Hyperlinks giving students access to the content itself or to the areas within the LMS would be provided. There might also be text, **PowerPoint**, audio or video created by the instructor to provide a context for the readings and activities.

Using the LMS in this way enables students to have a richer experience with the material. For instance, the LMS can direct students to read the first part of a PDF and then go to a different section of the LMS that provides a hyperlink to a simulation available on the Web illustrating what they just read. Students then can be directed to a different text, provided by the lecturer, which explains the relation between the PDF and the simulation, and provides a transition back to the original PDF.

The data capture of student input now can be used, or not used, more creatively than an ordinary summative assessment. The course table of contents also can include open-ended questions for student reflection on the LMS online notepad.

The notepad also would track the student's own learning process throughout the semester. Although conceivably the notes could be printed at the end of the course and turned in as part of the student's grade, it might be more effective to keep the notes private, thereby encouraging students to take more responsibility for their own learning. In addition, students could be asked questions as they progress from one reading selection to another in the LMS, or be told to go back to the LMS to answer a question before finishing a reading assignment. The value of these questions would once again be to provoke thought; perhaps more interestingly, the instructor could distribute some of the students' responses to the rest of the class in order to begin a discussion or student activity. Because it is the students' opinions that are being discussed rather than the lecturer's, using the students' responses for questions in the LMS would be an effective technique for getting the students to participate more actively in the discussion.

Since students would have much more participation in the actual class, the threaded discussion and chat would be used to enable students to review concepts from previous classes and prepare for future class discussions.

In this way, the virtual community functions actually would be used to create a virtual community of students sharing information and learning from each other, rather than participating just because they would be graded. In addition, the virtual classroom functionality could be used by the instructor for selected students as a reinforcement of the course concepts, as well as a way for subgroups of students to get feedback from the lecturer.

By using the LMS for the course's organization, then the purpose of class time would be almost exclusively devoted to discussion and student activities. Freed from having to repeat past activities, instructors could become more engaged in the process of sharing ideas. The students could become more active learners, taking more responsibility for what they learn and becoming more important in the dynamic of the classroom.

In summary, by using the LMS as a supplement rather than as the spine, lecturers are taking a technology that could help reinvent their teaching style and making it fit into their old lecture-based teaching styles. Rather than rethinking what happens in the

classroom, lecturers use the latest technology to defend the old factory model of education. Although, using a LMS to its fullest extent would enable us to redefine what happens in the classroom — essentially redefining what a classroom experience is. Reorganizing a course in this light is ultimately a political issue. Classroom activity that consists of a lecturer lecturing is a classroom the lecturer dominates. However, classroom activity that consists of a lecturer and students in group discussion is a classroom where power is to some degree shared.

Chapter 3.
CRITERIA OF SELECTING LEARNING MANAGEMENT SYSTEM

The fisrt step before deploying an e-learning system is to characterized what features of LMS required to implement the e-learning. The criteria can be different from one institution to another, because each organization may have specific needs. Instructors, students, and support staff may have specific preferences to the e-learning system. However, the decision maker should make careful selection of LMS that will be used based on the institutions needs and also instructors, students, and support staff preferences.

A. Information Sources of LMS Evaluation

There are several websites provide guide for comparing and evaluating LMSs, such as (Beshears, 1999, 2001):

1. http://www.ctt.bc.ca/landonline/: The websites by Dr. Bruce Landon of Douglas College provided for comparative analysis of Learning Management Systems. Also, **Edutools Course Management Systems** (http://www.edutools.info/course/) by Dr. Bruce was "built to assist higher education in using a more rational decision making process to review the many options for a course management system. This site reviews each product by researching and describing more than 50 product features."
2. http://socrates.berkeley.edu/~cccpb-it/question-naire/: UC Berkeley Faculty Survey (1998), ranked faculty interest in various features of technology-based teaching and learning.
3. http://socrates.berkeley.edu7521/webctsurvey/: UC Berkeley WebCT Survey (1999), assessed faculty views of Learning Management Systems in general and WebCT in particular.
4. http://www.osc.edu/education/webed/Tools/review.shtml: **WebEd Online Tools Reviews and Comparisons** a rather extensive list (much more than this one!) of links of tool comparisons from other organizations.
5. http://www.chest.ac.uk/datasets/vle/: **VLE (Virtual Learning Environment) Comparison Grid** is a comparison pilot of five popular VLE products (**Blackboard**, **Learning Environment**, **LearnWise**, **Virtual Campus**, and **WebCT Campus Edition** conducted by a UK Higher Ed group, **CHEST** (Combined Higher Education Software Team).
6. http://www.sitetrainer.com/platformcomparison.htm: **Online Course Management Platform Comparison** a feature by feature comparison from **SiteTrainer**.
7. http://sunil.umd.edu/webct/: **Evaluation and Selection of Web Course Management Tools** by Dr. Sunil Hazari describes the process, criteria, and results done by the University of Maryland as they compared **BlackBoard CourseInfo**, **Web Course-in-a-box**, **Lotus LearningSpace**, **TopClass**, **WebCT**, and **WebMentor**.
8. http://www.umanitoba.ca/ip/tools/courseware/: **Tools for Developing Interactive Academic Web Courses** by (Jean-Paul) Simbandumwe, University of Manitoba, is an excellent analysis of four systems for creating instructional web sites.

9. http://www.usafa.af.mil/iita/Publications/CourseManagementSoftware/cmseval.htm: **Evaluation of Web-based Course Management Software from Faculty and Student User – Centered Perspectives** a study by the US Air force Academy, "The objective of this study was to evaluate the usability and usefulness of course management software to support traditional classroom instruction from both the faculty and student perspective. This study was done in two parts, the first part asked participants with no experience using course management software to evaluate several packages and choose the one they preferred, and the second part was a follow-up analysis after both faculty and students had used the software for an entire semester."
10. http://software2.bu.edu/webcentral/research/courseware/: **BU WebCentral Research: Courseware Comparison** was Boston University's project to compare the features and specific functionalities of **Blackboard 5.0**, **WebCT 3.**5 and **Prometheus 4.1**.
11. http://socrates.berkeley.edu/~fmb/articles/demystifyinglms/: **Demystifying Learning Management Systems** a presentation by Fred M. Beshears, University of California-Berkeley that includes "Overview of Learning Management **Systems**", **Do It Yourself** - vs. - **Web-based LMS**", and "**WebCT and CourseInfo Comparison**"
12. http://socrates.berkeley.edu:7521/articles/webct/NewToolsToHelpInstructors.html**: New tools help instructors create and maintain course websites** describes why UC Berkeley chose WebCT over TopClass, Web Course in a Box, and CourseInfo.
13. http://webclass.cqu.edu.au//index.txt.html: **Building a Web-based Education System** by David Jones and Colin McCormack of Central Queensland University, Australia, compiled information for a book they're writing on Web-based teaching that includes input on the experiences of users of WebCT, WebFuse and TopClass.
14. http://www.zdnet.com/pcweek/reviews/0818/18ibt.html: **Computer-based training on the Web** from the August 18 1997 issue of PC Week, describes a comprehensive comparison between TopClass, Lotus LearningSpace, Macromedia Authorware 4. Allen Communication Inc.'s QuestNet+, Asymetrix ToolBook II, and Pathlore Software Corp.'s Phoenix for Windows.
15. http://teleeducation.nb.ca/content/media/03.2000/ddd-ibte/index.html: **The Design, Development and Delivery of Internet Based Training and Education** is a report to assist in narrowing the selection choices for a web-based learning environment.
16. http://cleo.murdoch.edu.au/teach/guide/res/examples/course-servers.html: **Comparing software for online teaching** is Murdoch University's experiences in evaluating a number of software tools designed to support online teaching and learning.
17. http://demo.cstudies.ubc.ca/integrated.html: **Integrated Applications** is University of British Columbia's Department of Distance Education and Technology comparison of FirstClass, TopClass and WebCT
18. http://www.convergemag.com/Publications/CNVGApr00/OnlineCourses/HighEdAdOnlineCourses.shtm: **Webifying Courses: Online Education Platforms** is an article in the April 2000 issue of Converge Magazine that reviews the important issues in selecting a web course management system.
19. http://courses.uiowa.edu/comparison/index.html: "**Web-based Course Services: Which Should I Use?"** from the University of Iowa, which supports both BlackBoard, WebCT, and "free-form" Web space for their course material. This site provides a general feature comparison to help you decide.

Those websites are useful as consideration in selecting suitable LMS for educational institutions before they deploy certain LMS to support their e-learning.

However, as stated by Beshears (1999), the choice of appropriate learning management system software to support the development of technology-based courses is complex for several reasons. Among these reasons are:

1. there is a wide range of LMS available,
2. new products appear all the time, and
3. existing products may be substantially improved in later versions.

Course developers need to be aware of general software developments that can dramatically affect technology-based teaching, such as

1. Learning Objects (see Educational Object Economy website http://www.eoe.org);
2. New languages such as Java, video servers, screen sharing, search engines.

B. Evaluation Criteria for LMS

The following are some general guidelines in selecting an LMS. Beshears (2001), gave some major criteria for selecting a LMS, that are:

1. **Known Requirements**

   The LMS ability to meet the university's current academic and administrative requirements, and future requirements that are currently known to exist.

2. **Unknown Future Requirements**

   The LMS should be easily adjusted to meet the university's new requirements as they become known.

3. **Implementability**

   The LMS could be implemented easily.

4. **Supportablility**

   The availability of supports from LMS vendor (for commercial LMS) or LMS users community (for free or open source LMS) to solve problems faced by university in using the LMS.

5. **Cost**

   This cost may include the initial LMS seting (implementation) as well as ongoing maintenance.

In details, Brandt at al, (2003) gave evaluation criteria for LMS are as follows.

1. **Instructional Competence**

   The system should be built on a strong pedagogical foundation. The system should promote successful interactions between learners and content, and among learners, instructors, and content. The LMS should provide extensive support for content management.

2. **Ease of Use**

The system must be highly intuitive. Access, delivery, and presentation of learning materials must be transparent. The learning experience must be automated and personalized to the needs of the individual learner. Users must immediately be familiar with the functions of tools or menu available within the LMS, without the need of intensive training.

3. **Scalability**

   The infrastructure must scale easily and incrementally to meet growth in both increased instruction capacity/bandwidth and user volume. LMS should support increasing number of users, courses, or even institutions (for collaboration for example).

4. **Administrative Capability**

   The LMS includes registration, tracking, curriculum management, and feedback mechanisms. The administrative capability of LMS must help instructors in managing their courses, system administrators in managing the e-learning system and maintaining the LMS itself, and also students in acquiring learning materials and resources and submitting assignments.

5. **Service and Vendor Stability**

   The LMS provider is financially sound and is expected to stay in business long-term. Further, the vendor has a proven track record for superior support after the sale. The LMS developer, either commercial vendor or non-profit open-source organization, must responsible in developing the software and make it up to date to meet future users needs or to remove bugs that may exist.

6. **Compatibility and Interoperability**

   The system must integrate well with third-party content providers and multiple vendors' hardware/software solutions. The LMS should comply with open industry standards for Web deployments (XML, SOAP, or AQ) and support the major learning standards (AICC, SCORM, IMS, and IEEE). In addition, the LMS should be implementable on the diversity of computer systems (or platforms) such Windows, UNIX, or Linux servers.

7. **Pricing**

   Level of investment required to purchase or to implement a system that meets organizational training needs. As mentioned before the costs include initial setting, implementations, and maintenance costs. This may also include costs for preparing human resources to use the LMS.

8. **High Availability and Product Stability**

   The LMS is based on an infrastructure that can reliably manage a large institutional implementation running 24 hours seven days. The LMS is robust enough to simultaneously serve the diverse needs of instructors, learners, and administrators.

9. **Security**

   The LMS selectively controls access to system assets like content, services, course offerings, learning objects, student records, and so on. The LMS should provide security for the system and also data. This may include the ability of LMS to detect unauthorized users to enter the system.

C. Problems and Trends with LMS

There are some problems involving the reserching and selecting LMS. Beshears (1999) quoted Bates (2000) from his "Managing Technology Change" several problems, such as:

1. Free Style Course Websites vs. Learning Management Systems
   - Some instructors or lecturers always want to use their own personal home page to interface their courses instead of using LMS provided by university.
   - The campus may select a favored LMS, but lecturers should not be forced to use the favored LMS.

   This problem may result in integration problem if university wants to integrate the e-learning system with their academic system, such as student database, administration database, and so on.
2. Make vs. Buy
   - Some institutions may favor incrementally developing an in-house Learning Management System (e.g. by expanding the on-line class schedule).
   - Why not both? The contra is that it would be cheaper to support one enterprise level LMS. However the pro argument is that if the campus decides to link one (or more) commercial packages to the registration system etc., this doesn't preclude the option of also incrementally developing a LMS in-house. The option of doing both may avoid conflict. It also gives lecturers more options.
3. Use one LMS or use different LMSs together?

   The pro reason for campus using a single Enterprise Level Learning Management System is that students could have a unified portal view of all their course websites on the system. However, the contra side is that instructors would have a limited set of options to choose from. The compromise solution is having a favored LMS, but also offers a select number of other systems that can also be connected to backend registration databases. Of course, more than one LMS could be integrated with the registrar's databases, but probably not hundreds of separate LMS (e.g. one for each department).

Although easy to use and widely installed, LMSs pose a few challenges for their users. Some other issues regarding the use of LMS are (see e.g. Curliner, 2005; Wikipedia, 2006):

1. Course Design Flexibility Problems (Challenges in customization)

   Each training organization manages its operations in a particular way — and most LMSs are designed to manage operations in a different way. For example, most LMSs provide instructors with a limited flexibility in designing course. LMSs typically come with standard sections that instructors must provide, and the section names are not easily altered. However some open-source LMSs support multilingual interface that enabling course designers to use sections or menu in their own language.

   Although LMSs can be customized (and this has become easier with time), many cannot handle every unique need of a training organization. Organizations may have to do commission custom programming to achieve their goals.
2. Transferring course content problems

Often there no easy way of transferring a course site from one LMS to another, so that the considerable investment in time required to fit a course to one LMS package is likely to be wasted if an institution changes its LMS, if an instructor moves from one institution to another that uses a different LMS, or if institutions using different LMSs wish to collaborate. Some organizations have addressed this issue by defining standards for learning objects, such as the *Shareable Content Object Reference Model* (**SCORM**) used by the US Department of Defense and the **IMS** Global Content Packaging specification.

The ability to exchange course data will be increased as systems start to publish their course metadata in a metadata registry. This allows Vocabulary-based transformation.

Some institutions have attempted to combat this problem by agreeing in collaborative to share common platforms. Use of open source LMSs such as **Moodle** has more recently enabled institutions to share content more easily.

Because LMSs are supposed to provide a one-stop shop to learners as well as track all learning activities, these systems should easily provide links to all online learning programs and easily share tracking information, test results, and similar material with courses. Although e-learning standards assist in these efforts, making sure that materials conform to e-learning standards requires a fair amount of work by the technical staff.

Also, while LMSs are primarily designed to manage e-learning, they can also be used to manage all of a training organization's learning programs, including traditional classroom learning (or blended learning).

3. Limited capability to provide interactive e-learning

   To add more imaginative and interactive e-learning via authoring tools like **Flash** and **Dreamweaver**, instructors must link to separately created materials. That is, the lesson cannot be created and uploaded in the LMS. The material must be created with different tools and stored elsewhere. Some LMS provide solution to this issue by separate modules that support contents from third-party authoring tools, like Flash, Java applet, and so forth.

4. Limited testing and record keeping abilities

   Although LMSs let instructors test students online, the tests must usually conform to templates and e-learning primarily consists of reading transcripts. Also, some lack the security measures to verify that students are really who they say they are and some have lost tests that students completed before transmitting them to the instructor for grading. In addition, although most LMSs have added capabilities to automatically transfer grades from the gradebook to other systems used to track student progress, this capability is not available in all LMSs and often increases the cost significantly.

   Similarly, because most universities use other systems to enroll students and manage payments, most LMSs cannot check that students have prerequisite courses. Or, to be blunter, academic institutions need a means of making sure that graduating students have paid their library fines before awarding a diploma, and LMSs do not provide such capabilities because universities have already made large investments in other systems to do that. The system that is most widely used in universities to manage

enrollments and grades, and link to other university records systems is an administration system called Banner.

5. Cost Problem

   As the market matures and software publishers add complex features (especially to appeal to the corporate market), prices for LMSs have risen sharply in recent years. Although cost has driven some universities to strengthen their commitments to their LMSs, it has driven other universities to drop their LMSs and provide open source tools that do not carry a lease or purchase cost. The case also happens to initially open-source LMS, after the software being well-developed mature system the developer changes the LMS as being commercial system. Users must pay to use the mature system. As mentioned by Curliner (2005), that analysts in the online learning industry comment that learning management systems are often the most expensive learning investment made by organizations. Costs can easily range from $500,000 to several million dollars.

The major trend in Learning Management Systems (LMS) is a move from searching for the one commercial-off-the-shelf vendor solution that serves all the needs of the entire institution to finding numerous component solutions that easily integrate. As part of this marketplace shift, reusable learning objects and adherence to learning standards take on even greater importance. For example, compliance with standards for data exchange makes system integration across vendor solutions no only doable, but ultimately maintainable.

The technology used for LMSs has changed extensively recently. Some moved from inflexible to more flexible platforms. Others added many of the features of a learning content management system, which is used to manage electronic source files for courses, so the material can be easily reused in other courses.

As effects of trends in technology developments, some open-source LMS provide installable third-party modules to enhance its functionality. Also, as results of standard compaliant awareness, some LMSs already accommodate e-learning standards such as AICC, SCORM, or IMS. Another implication is the availability of institutions provide commercial or free contents for e-learning.

D. Advantages of LMSs

Despite the well-recognized problems, LMSs do provide some advantages to their users. Universities and other institutions of higher education are increasingly turning to LMSs in order to:

- Economize on the time of teaching staff, especially when they are also involved in research and administration. The extent of the economy over traditional "talk-and-chalk" teaching is not yet clear, but using an LMS almost certainly absorbs less instructor time (and requires less expertise, while producing a more professional result) than creating a home-grown website for a course.
- Provide a service for students who increasingly look to the Internet as the natural medium for finding information and learning resources.

- Ensure that quality control requirements are met by providing a standard vehicle for collecting the required information.
- Facilitate the integration of distance and campus-based learning or of learning on different campuses.

You may find other advantages that can be added to the list!

Chapter 4.
DEPLOYING A LEARNING MANAGEMENT SYSTEM

There three choice of LMS that can be used to manage e-learning: (1) create "home brand" LMS, (2) buy commercial LMS, or (3) use the downloadable free open-source LMS from the Internet. If the educational institutions don't want to manage their own LMSs to serve e-learning, they also can use LMS hosting, which provide space and facility to manage e-learning. This alternative may be the simplest way to get start with e-learning, but everything may depend on the hosting organization. Training organization has no free customization of the LMS used by the hosting organization until the hosting company provides customizable choice (usually with extra costs). There is a growing number of on-demand LMSs which don't require any software installation. One example of LMS hosting is **LMS Hosting Service**: (http://www.e-learningconsulting.com/products/lms-hosting.html). Some free open-source LMS sites also provide LMS hosting for trial but without technical supports nor warranty of undeleted data.

The first choice requires high skilled-programmers to develop LMS that meets the institution requirements. To develop own LMS may also take time, but the developed LMS will fully satisfy all requirements specified by the institution.

Choosing commercial product will require extra costs because usually commercial LMS charged based on number of users and require annual payment. However, there is usually full support from LMS vendor, which mean the institution may not need to hire high-skilled IT professional to maintain the LMS.

While most systems are commercially developed, free and open-source models do exist. Other than the most simplistic, basic functionality, all LMSs cater to, and focus on different educational, administrative, and deployment requirements.

For those who wishing to deliver e-learning there are many free open source and several proprietary LMSs available for use. Open source LMSs are increasingly popular and can be easily installed and customized with little programming knowledge. On-demand e-learning services are also a popular choice because they can be deployed in minutes and don't require instructors & institutions to run their own servers.

Setting up an LMS that is not provided on-demand typically requires access to a web server which supports the language that the LMS is written in (PHP is common), as well as a database backend. MySQL and PostgreSQL are popular whilst proprietary backends like MS SQL and Oracle are not frequently used with open source LMSs.

A. Commercial System

There are a number of commercial LMS software packages available. In higher education, the leading commercial LMS providers are **Blackboard**, **WebCT**, **IT's Learning**, **eCollege**,

Desire2Learn, and **ANGEL Learning**. In the commercial and K-12 space there is **Gradepoint**, **Lotus Learning Space**, **Skillsoft** and **Digication**. The following is a short description about some LMS vendors (Beshears, 1999; Wikipedia, 2006).

1. **BlackBoard Inc. (http://company.blackboard.net)** is a member of **IMS** (Instructional Management System) project. Its products are
   a. **CourseInfo** - an entry level LMS: costs $5,000/year
   b. **CourseInfo Enterprise** - an industrial strength LMS: costs $250K/year (list price, ask for 50% to 75% discount) , $80-$100K one time installation and integration fee.
2. **WebCT/Universal Learning Technologies (http://www.webct.com, http://www.ult.net)** is a member of **IMS** project. Its products are:
   a. WebCT Learning Management System
   b. Bravo Content Server

   Costs is unlimited single server license $3,000/year

   Now WebCT and Blackboard have merged together (http://www.blackboard.com).
3. **IBM/Lotus** is a member of **IMS** pro**,** with products:
   a. **LearningSpace** - LMS from **Lotus** (http://www.lotus.com/learningspace)

      Costs: 1 - 4 CPU server $2,500 plus software subscription $950/year domino/notes $900 plus software subscription $250/year one time per user client access fee $9/license
   b. **Digital Library** - Content Server from IBM (http://www.software.ibm.com/is/diglib)

      Costs: Base system $9,400 plus maintenance contract $1,650/year
   c. **Pathware** - LMS acquired from Macromedia
   d. **JCollaborate** - middleware from **Infocal** (http://www.infocal.com) to connect LearningSpace and Digital Library

      Costs: $170K installation fee
4. **WBT Systems** (http://www.wbtsystems.com) is a member of IMS project, with product: **TopClass** (Cost $1,500/year for entry level 25 concurrent user license).
5. **Docutek.com** (http://www.docutek.com) with product: **ERes**.

   The ERes v4 license carries a flat one-time $5,000 customization, setup, and installation fee, plus a yearly based on full-time equivalent (FTE) student enrollment. The annual fee is $0.80 US per FTE, with a minimum license of $4,000 and a maximum of $14,000.

Mergers, Acquisitions and Corporate Alliances

- 1998 BlackBoard acquired CourseInfo and creates two tier product strategy entry level CourseInfo system and enterprise level BlackBoard Campus product.
- May 17, 1999 UNIVERSAL LEARNING TECHNOLOGY ACQUIRES WebCT Universal Learning Technology TM (ULT) announced that it has acquired WebCT Educational Technologies Corporation. The combination of the two companies creates the

largest installed base of more than two million seats at over 700 colleges and universities in 36 countries. ULT is committed to supporting WebCT's current products, enhancing WebCT development, and maintaining WebCT's aggressive pricing policies.

- July 17, 1999 PeopleSoft, ULT, and BlackBoard Integrate Campus and Web-Based Courses. The solution will allow campus administrators to leverage the PeopleSoft Student Administration application with educational content and technologies from partners Universal Learning Technology (ULT) and Blackboard. In PeopleSoft's integrated solution is based on the open standards for learning system interoperability being developed by the (EDUCAUSE IMS initiative).
- August 17, 1999 Macromedia and Lotus Provide New Online Learning Solution Macromedia and IBM's Lotus have agreed to create a comprehensive online teaching and learning solution. The agreement will join Lotus LearningSpace and Macromedia Pathware into a single platform. Lotus will purchase Macromedia's Pathware business. Lotus will also distribute other Macromedia Web authoring software such as Authorware and Dreamweaver, and license Shockwave and other technologies for use with Lotus and IBM products.

Currently, there are more available commercial LMS packages. Among them are as follows:

1. **ANGEL Learning LMS and ePortfolio**: http://www.angellearning.com/
2. **Anlon**: www.anlon.com/.

   Anlon 4.0 is an enterprise level, web-based course management software platform that enables academic institutions, professional associations, and corporations to develop, deliver, and manage courses over the Internet. Anlon 4.0's features include flexible course delivery that supports self-paced learning as well as instructor-facilitated courses, pre- and post-assessment tools, and a variety of communication options, including asynchronous and synchronous discussion, chat, and shared whiteboard tools. Anlon's encryption algorithms are designed to securely protect all user and instructor data.

3. **Apple Instructional Management Solution** (AIMS) by Apple Computer:

   http://www.apple.com/education/solutions/instructionalmanagement/

4. **author42**: http://www.bureau42.de/front.php?language=en
5. **Blackboard** (which has acquired **WebCT)**: http://www.blackboard.com/

   Blackboard 5's e-Learning software platform includes a course management system, customizable institution-wide portals, online campus communities, and an advanced architecture allowing easy integration of multiple administrative applications. Blackboard 5 can be licensed at three different levels. Level One-Course Manager enables instructors to provide their students with course materials, discussion boards, virtual chat, online assessments, and a dedicated academic resource center on the Web. Level Two-Course and Portal Manager provides customizable institution-wide portals for faculty, students, staff, and alumni with access to more than 150 personalized news and information services from across the Web. The platform can be customized with institutional branding and a tailored look and feel. It facilitates

campus online communities, Web-based email, calendar, announcements and tasks. It also allows for a central access point to all of an institution's online services. Level Three-Advance Course and Portal Manager is a complete end-to-end e-Learning solution. In addition to the Course and Portal Manager, Level Three provides advanced Java-based API's for unifying diverse online campus systems into one integrated platform, allowing for user-driven single log-in service delivery, as well as capabilities that allow each school, department or campus within the institution to maintain its own customized environment.

6. **Brinbox**: http://www.brinbox.nl/
7. **ClassAct & ClassCampus**: http://www.ljgroup.com
8. **Connected Learning**: http://www.connectedlearning.com

   Connected Learning's implementation of the Intralearn Learning Management System platform provides a fully integrated e-learning platform for institutions seeking a packaged solution for online instruction. The package includes such features as centralized control of the entire system, comprehensive system-wide reporting, e-commerce capabilities, and built-in course creation and testing. Course creation tools allow users to use pre-set wizards and templates, import courses created in authoring tools and saved in HTML, and edit content with Word, among other features. All of the product's features can be switched on or off.

9. **Convene Izio:** http://www.convene.com

   Convene's collaborative enterprise learning platform, **IZIOPro** is a completely outsourced technology platform with an intuitive user interface in a collaborative Web environment. IzioPro provides a hosted Web technology for blended learning solutions that allows quick migration from the classroom to the Web. Instructors can build their courses using IzioPro's collaboration, communication, and course management tools. Both real-time and asynchronous learning environments are possible using the Convene product.

10. **Desire2Learn**: http://www.desire2learn.com/
11. **eCollege**: http://www.ecollege.com/

    eCollege offers three applications for lecturers in distance education: eToolkit is a free application that provides introductory e-learning tools for on-campus instruction; eCompanion is a classroom-based tool that enhances content with Internet resources, Web-based field trips, online assignments, group collaboration, and practice tests; and eCourse is their distance learning solution. eCourse offers threaded discussion, chat, email, calendar, and an online journal, as well as Internet research tools and content solutions from various providers.

12. **eduX** VLE systems: http://www.edux.co.uk/
13. **e-Learning Consulting Learning Management System**:

    http://www.e-learningconsulting.com/products/learning-management-system.html

14. **Embanet:** http://www.embanet.com

    Offering a complete turnkey solution for creating a virtual campus, Embanet e-learning solutions are tailored from a suite of tools to fit the institution's unique needs.

Each solution includes course conversion, 24/7 tech support, course development tools, instructional design, hosting, and online instructor training. Features include fully-integrated email; audio, video, and text chat rooms; real-time group collaboration; threaded discussion areas; student progress tracking; student home pages; customizable design and layout; collaborative and private work areas; collaborative white boards; asynchronous and synchronous communication, and more.

15. **eWebUniversity and eWebClassroom:** http://www.ewebuniversity.com

    eWebClassroom is a virtual classroom software platform that enables any lecturer or instructor to create an online learning environment without having any sort of background in HTML. Instructors can author high-quality, interactive online course content in any discipline using the tools provided in eWebClassroom. Modular platform design allows colleges and universities to implement and brand virtual campus features as their own, including a customized front-end portal, online registration and payment processing. A complete interactive campus can be deployed within 90 days. eWebUniversity's platform and content offerings can be implemented quickly and seamlessly on a stand-alone basis, or within legacy systems. What's more, eWeb University's entire suite of products is handheld computer-compatible and works smoothly on even low bandwidth Internet connections.

16. **FirstClass**: http://www.softarc.com/

    Centrinity's FirstClass communications platform works on multiple operating systems (Windows, Mac, UNIX, and handheld computer). In addition, it provides users with a seamlessly integrated and secure environment with public discussion areas, shared workspaces, private mailboxes, individual and group calendars, as well as knowledge management and publishing capabilities. Organizations can exchange and share resources in real-time and asynchronous forums (chats and conferences). Combined with FirstClass Unified Communications technology, users now have the ability to access all of their voice and text messages from one unified mailbox instead of relying on a number of traditional repositories for mission-critical information. Users also now have the power to access and transfer information from a central collaborative digital store, because FirstClass Unified Communications provides a single network-based access point from which users can manage all of their information and messages using any number and variety of access devices (PC, Web user interface, phone, handheld, etc.) regardless of connection path (LAN, Internet, telephone) or operating system (Windows, Mac, UNIX, handheld).FirstClass Unified Communications features a single message store on a single server and is based on an open, standards-based architecture. It is designed to scale to several millions of users. The latest version offers several new enhancements and features to users including advanced customization abilities, a newly designed web user interface and security upgrades.

17. **Fourpoint Learning**: http://www.fourpointlearning.com/
18. **Fronter**: http://www.fronter.com/
19. **Gradepoint**: http://www.gradepoint.com/
20. **Horizon Live:** http://www.horizonlive.com

Horizon Live 2.0 is a system for live presentations, whether that be for online lecture or collaboration. Features include integrated chat, instant polling, live streaming audio and video, a whiteboard for both instructor and student use, application screening, and a One-Click Archive that records live sessions for on-demand review. Horizon Live is accessible on any standard Web browser and runs on Mac, UNIX, or Windows platforms.

21. **IntraLearn:** http://www.intralearn.com

    IntraLearn is a comprehensive learning management tool for providing online learning. Highly scalable and secure, the shrink-wrapped IntraLearn SME can be easily installed and configured in just a few hours and deployed in just a few days. Courses may be created directly inside IntraLearn or imported from industry leading third-party suppliers. IntraLearn SME offers a complete, end-to-end integrated online learning system. IntraLearn SME is e-commerce enabled with remote registration, content delivery, learner profiles, multimedia, exams and assessments. Reports on learner progress and skill attainment are automatically generated. Interactivity and collaboration are built-in with chat, threaded discussions, email, white boards, Internet links, and teams.

22. **IBM Lotus Learning Management System**:

    http://www.lotus.com/lotus/offering6.nsf/wdocs/homepage

23. **Inquisiq**: http://www.inquisiq.com/

24. itsolutions (**its-Learning**): http://www.itsolutions.no/

25. **Jenzabar**: http://www.jenzabar.com/

    Jenzabar course publishing tools use a Web-based interface. There is no software to install or download. Jenzabar offers instructors and students continuous, single-login access to all course information, course publishing tools, and a full service Web-portal, plus a personal calendar (optionally prepopulated with course information), online course management, easy customization of style and content for course pages, and easy upload/download of electronic syllabi, handouts, PDF files, and audio/video files. The password-protected system also features streamed discussion forums for online office hours, chat rooms for study and review courses, and a grade book.

26. **Johns Hopkins Center for Technology in Education's Electronic Learning Center**:

    http://cte.jhu.edu/

27. **Jones Knowledge e-Education:** http://www.jonesknowledge.com

    The Jones e-education platform is a fully-hosted turnkey solution for distance learning. It provides a scalable open architecture, giving instructors the freedom to fashion their own instructional design framework. Content can be added or drawn from Jones Knowledge's content collection. New to the platform is an enhancement called Rapid Course Development Templates, which offer an optional approach to loading online courses through customizable templates. RCDT course templates were developed for the most commonly used word processors and employ a "fill-in-the-blank" approach to instructional design, with descriptions and suggestions. They permit a simple cut-and-paste method of transferring material from existing course

and training documents/presentations. While users are not obligated to use the templates, they do provide a quick and easy solution for harried instructors. Only the most basic word processor skills are required to create a course in Jones e-education. Features include asynchronous threaded discussion, chat, whiteboard, and collaborative spaces.

28. **Learn.com**: http://www.learn.com/
29. **learn eXact**: http://www.learnexact.com/
30. **LearnLinc**: http://www.edtlearning.com/ or http://www.allencomm.com/index.cfm

    LearnLinc 5 is an instructor-led, interactive virtual classroom featuring IP audioconferencing with multiple synchronized content choices and learning tools. LearnLinc features instructor/student floor control, class coordination, synchronized multimedia or Web-based courseware, application sharing, whiteboard, text chat, record/playback, and breakout groups. TestLinc offers comprehensive web based testing and assessment. In addition, LearnLinc maintains a selection of communication options, including audio conferencing, streaming video, and IP multicasting. LearnLinc is now owned by Mentergy.

31. **Lotus LearningSpace:** http://www.lotus.com/

    The LearningSpace family consists of software and services for the creation and delivery of online training and education. LearningSpace provides native support for self-paced, collaborative, and virtual classroom learning. It lets instructors incorporate content from almost any source. And it provides comprehensive tracking and reporting capabilities. LearningSpace 5.0 provides a scalable solution with a new student interface, additional management tools, and more live virtual classroom features. Learners are able to work at their own pace on course material and to meet instructors and classmates online for a "live" virtual class at a specific time and date.

32. **Macromedia eLearning Suite**: http://www.macromedia.com/software/elearningsuite/
33. **Microsoft Learning Gateway**:

    http://www.microsoft.com/emea/education/microsoftLearningGateway

34. **MyCourse.com:** http://www.course.com/

    MyCourse.com is an online syllabus builder and course enhancement tool that is hosted and developed by Course Technology, a Thomson Learning company. MyCourse.com provides new content that corresponds with the course textbook for learning reinforcement. Instructors can use MyCourse.com to customize the online material for the course, or directs students to www.mycourse.com where they can enter the ISBN of the text and start learning from a pre-assembled course. MyCourse content includes objectives, topic review, case projects for each chapter, practice tests, and related web links. With MyCourse.com instructors can build a syllabus, post class announcements, merge material from more than one text, and add custom material

35. **MyGrid4Learning**:

    http://www.netmedia-ed.co.uk/netmedia/mygrid4learning/mydesktop.cfm

36. **NauLearning**: http://www.naumen.com/

37. **NetDimensions Enterprise Knowledge Platform** (Gold/Silver/Bronze):

    http://www.netdimensions.com/

38. **NetSupport School:** http://www.netsupport-inc.com

    NetSupport School is a software-based remote control training tool that allows instructors to show their screen to students in a classroom and view student screens. The instructor can monitor student work individually or as a class. Students request help and communicate with the instructor by selecting an open chat dialogue window. NetSupport School Pro adds the ability to distribute files to all student workstations, launch applications, and lock a student's keyboard and mouse. It requires no additional hardware and is easy to install on any Windows-based PC.

39. **OCCAM** Learning Management System: http://www.easyi.com/OCCAM

40. **PING PONG**: http://pingpong.se/

41. **Scholar360** (social network - learner management system):
    http://www.scholar360.com/

42. **SumTotal** systems (formed by the merger between Docent and Click2Learn/Aspen):

    http://www.sumtotalsystems.com/

43. **Studywiz**: http://www.studywiz.com/

44. **SyberWorks Training Center** (Enterprise or Professional):
    http://www.syberworks.com/

45. **TopClass**: http://www.wbtsystems.com/

    TopClass 5, a course development system from WBT Systems, is based on a reusable Learning Object architecture and designed to support the rapid migration, delivery and tracking of learning content. Course content is stored in a Learning Object library for scalable course management and easy editing, making it easy to assemble, reuse, and update courses. Using its testing and assessment engine, TopClass creates personalized learning paths for each learner on the fly. Learners and instructors collaborate through built-in discussion groups, class announcements, and internal or external email.

46. **Virtual Campus VLE**: http://www.teknical.com or http://www.vcampus.com

    VCampus is an application service provider that develops, manages and hosts turn-key Web-based learning environments for corporations, academic institutions, and government agencies. VCampus offers a full delivery platform, customized for each organization's unique brand, a student registration and tracking system, pre-testing, dynamic assessment, and complete reporting. VCampus's services include courseware design, professional education, business skills management training, and technical skills training.

47. **Virtual-U Suite (VU)**: http://elearningsolutionsinc.com/

48. **Web-4M:** http://www.jdhtech.com

Web-4M is a customizable multi-platform collaboration and groupware solution. Features include audio conferencing, multimedia chat facilities, instant messaging, interactive slide shows, phone, news, email, calendar, and shared documents. Web-4M is securely accessible via a common web browser. Web-4M transforms traditional chat rooms into multimedia forums for collaboration that are integrated with mail, news, Web documents, and a distributed file system. Operating over intranets or the Internet, Web-4M features browser accessible local and global communication. Web-4M eliminates software distribution, provides platform independence, and reduces administration.

49. **WebCT** (has been bought by Blackboard): http://www.webct.com/

    WebCT's Campus Edition course development, delivery, and management tool has been designed especially for those institutions that wish to efficiently scale their online learning programs and/or integrate their course tools platform with campus-wide portals and student information systems. To enable efficient scaling, the product license allows for multiple servers and includes additional systems administration support. Version 3.6 of Campus Edition includes a new global calendar function, ability to download material to a Palm handheld device, and enhanced accessibility tools to better comply with the Americans with Disabilities Act.

50. **XanEdu:** http://www.xanedu.com

    XanEdu offers powerful new course resources online, in print, or in combination. Digital XanEdu CoursePacks offer deep content, easy-to-use tools, and on-demand access to already copyright-cleared materials. The impressive volume and scope of resources available through XanEdu has been made possible through an exclusive content distribution agreement with its parent company, ProQuest Information and Learning. Distinctive XanEdu collections encompass primary sources from the 15th century to up-to-the-minute information. The XanEdu product family also offers research tools for both students and faculty, including XanEdu ReSearch Engine, MBA ReSearch Engine, and the new Education ReSearch Engine.

B. Free and Open Source System

Free and open source LMS is growing fast in the education and business world. Some examples of free software and open source LMS are **OLAT**, **ATutor**, **Bazaar**, **Moodle**, **Claroline**, and **Dokeos**. The **Sakai Project** (founded by the University of Michigan, Indiana University, MIT, Stanford, the uPortal Consortium, and the Open Knowledge Initiative (OKI)) is backed by several universities, and is available free under a BSD-like license. Most of them provide all or nearly all the LMS facilities as described before, though the user interface is not smooth in all cases for all tasks.

Most open source LMSs are developed by individual or group of individuals, non-profit organizations, educational institutions, or special interest community. The community which surrounds a particular open source LMS is often the determining factor in its success. New or less popular open source LMSs might be distributed "as is," leaving the users to fend for themselves. Popular LMSs however, (such as **Moodle, Claroline,** and **Dokeos**)

provide both free tech support communities as well as pay-for-support vendors from a variety of sanctioned companies.

The following is a list of some free/open source LMSs:

1. **.LRN** (Dot LRN): software and a development kit based on **OpenACS** for supporting innovation in collaborative education and learning and research communities, (GNU-GPL). http://www.dotlrn.org/
2. **Adept**: http://sourceforge.net/projects/adept
3. **ATutor:** PHP-based, (GNU-GPL), course generator. http://atutor.ca/
4. **Bazaar** - Open Source Learning Management System. Written in Perl. http://bazaar.athabascau.ca/
5. **Bodington:** http://bodington.org/
6. **Bolinos**: http://www.med-ia.ch/med-ia/bolinos/
7. **BSCW** : http://bscw.gmd.de/
8. **Claroline:** http://www.claroline.net
9. **ClassWeb**: http://classweb.ucla.edu/
10. **Colloquia**: http://www.colloquia.net/
11. **CoMentor:** http://comentor.hud.ac.uk
12. **COSE**: http://www.staffs.ac.uk/COSE
13. **DoceboLMS:** PHP, MySQL-based, SCORM 1.2 compliant, (was Spaghetti learning) (GNU-GPL). http://www.docebolms.org/index.php?special=changelang&newLang=english
14. **Didactor**: Java-based, (MPL). http://www.didactor.nl
15. **Dokeos** http://www.dokeos.com/ PHP-based, (GNU-GPL)
16. **e-Learning XHTML Editor** project - Developed at the University of Auckland, by the **Centre for Flexible and Distance Learning**. (GNU-GPL), editing tool for lecturers to publish web content that can be delivered via most e-learning platforms. http://exe.cfdl.auckland.ac.nz/
17. **Eledge**: http://eledge.sourceforge.net/
18. **Fle3**: Zope/Python - based, free software (GNU-GPL). http://fle3.uiah.fi/
19. **Freestyle Learning Home** 3.0: http://pcwi122.uni-muenster.de/fsl/index.php
20. **GaneshaLMS:** http://www.anemalab.org/
21. **ILIAS:** http://www.ilias.de/ios/index.html (GNU-GPL)
22. **Interact**: Interact is an Online Learning and Collaboration platform developed by the Christchurch College of Education, New Zealand. PHP, Apache, and MySQL based. http://www.interactlms.org/
23. **Knowledge Environment for Web-based Learning** (KEWL): http://kewl.uwc.ac.za/
24. **KEWL.Nextgen**: Part of the AVOIR (Africa Virtual Initiatives and Resource) project's work. KEWL.Nextgen is an advanced web-based system with extensive features. Still under active development. PHP, Apache, and MySQL based. http://www.kngforge.uwc.ac.za/
25. **LearnWise**: http://www.learnwise.net
26. **learnOnline:** http://www.learnonline.org.uk
27. **Ludwig:** named after Ludwig Wittgenstein. http://sourceforge.net/projects/ludwig
28. **Merlin:** http://www.hull.ac.uk/merlin
29. **Mimerdesk:** http://mimerdesk.org/community/engine.html

30. **Moodle:** PHP-based, (GNU-GPL). http://moodle.org/
31. **OLAT**: Learning Management System. Winner of **MeDiDa-Prix** 2000. Java based, developed by University of Zurich since 1999. http://www.olat.org/bin/view
32. **OpenUSS**: platform itself and **sourceforge** site - Java J2EE. http://www.openuss.org/
33. **Sakai:** http://www.sakaiproject.org/
34. **Segue:** Developed at Middlebury College, PHP-based, (GNU-GPL). http://segue.sf.net/
35. **Seaport**: developed at Coastline Community College http://dlearning.coastline.edu, in addition to being a fully functional course management system, Seaport prompts the instructor into using effective distance learning techniques and it allows for rapid export of content to any standard digital format or storage device.
36. **Stud.IP**: Learning Management System.
37. **TelEduc**: PHP-based, Development by NIED/UNICAMP, Brazil, (GNU-GPL). http://teleduc.nied.unicamp.br/
38. **Whiteboard:** http://whiteboard.sourceforge.net/
39. **Workforce Connections**: http://www.workforceconnections.dol.gov/

One of information sources on the Internet that provide LMS comparison is **EduTools** (www.edutols.info/course).

C. Strategy of Implementing LMS

A common concern for those wishing to deliver e-learning is whether to use open source or proprietary LMSs. Because many open source LMSs are also free, they are favorites of educators and others operating on a low budget. While open source systems allow the very tech-savvy the opportunity to customize their LMS or help fix bugs many users of open source LMSs have no programming experience whatsoever.

Setting up an open source LMS typically requires access to a web server which supports the language that the LMS is written in (PHP is common), as well as a database backend. MySQL and PostgreSQL are popular. Use of proprietary backends like MS SQL and Oracle are not frequently used with open source LMSs.

The community which surrounds a particular open source LMS is often the determining factor in its success. New or less popular open source LMSs might be distributed "as is," leaving the user to fend for themselves. The more popular LMSs, however, (such as Moodle and Dokeos) provide both free tech support communities as well as pay-for-support vendors from a variety of sanctioned companies.

Given the rising popularity of systems which are both functional and free, some have speculated that the cost of proprietary MLEs will soon drop to more competitive prices, or else focus on particular niches (such as with Knowlagent, which is designed to integrate with the PBX systems of call centers and push content during times of low call volume.)

Maron (2002) gave some guidelines on how to buy LMS. According to him, there are two success factors in selecting and implementing LMS. Firstly, there must be a corporate learning blueprint that clearly articulates the current learning environment and the

desired future state. The blueprint should be aligned with organizational learning goals and have buy-in from leadership. Secondly, it should be noted that seamless LMS integration doesn't exist. Therefore, you need to acknowledge sizable costs associated with (1) migrating databases, (2) constructing digital connectors to other enterprise software systems, (3) developing or migrating content, and (4) customizing reports.

The implementation must be planed through three steps: (1) **internal assessment**, (2) **procurement**, and (3) **implementation**. Some standard assessments to focus the effort in defining future learning blueprint include: strategic analysis, IT infrastructure assessment, cultural readiness assessments, and administrative process analysis.

1. **Strategic analysis** identifies the organization's business objectives as they relate to workforce development, defines high-level priority target areas for knowledge and skills transfer, and describes--in basic terms--the current and desired future learning environment.
2. **IT infrastructure assessments** provide baseline information about the current configuration of the organization's IT backbone and detail programs that exist on desktops across the enterprise. This assessment should define connectivity that remote learners and those closer to the central IT hubs will experience. Explore internal or external hosting options. For example, if your organization will host the LMS internally, the IT department needs to understand that the LMS will require continued support. That translates to bandwidth and labor costs that are not often factored into a organization's investment decision. An additional collateral benefit from conducting this sort of assessment is that it engages the IT department at the beginning of the process. Support from IT is critical to a successful LMS implementation, whether the solution is hosted internally or externally.
3. **Cultural readiness assessments** help determine an organization's ability to embrace new learning strategies. Often, LMS implementation projects address all of the technical aspects adequately but overlook political, cultural, and practical implications. That oversight generally results in a stalled or failed initiative. A cultural readiness assessment helps define parameters for success, such as whether you need intense internal marketing for your programs.
4. **Administrative process analysis** maps existing administrative efforts that govern the training function and identifies procedures that will change due to an LMS implementation. Examples include how to handle overbooked classes and capturing and recording learner results and feedback. Analysis will also determine where the LMS needs to connect to existing HR software systems and databases.

Those assessments will help organization develop a clear picture of required functionality and create LMS bid specifications that most closely align with e-learning needs. Most leading LMS providers offer substantially more functionality than basic administrative, tracking, and reporting options, including competency modules and tool sets for developing online course content. In addition, many companies need to add functionality that's unavailable in a standard LMS package. Basic LMS functionality combined with expanded utilities and other learning software applications is referred to as a learning architecture. Some questions to consider when developing e-learning architecture are

- Will you host the solution?

- Do you need content development tools?
- Do you need specific noctent display facility such as mathematical notations, flash player, Java applet, etc?
- Do you require a competency module that helps define skills gaps for building individualized learning plans?
- Is there an e-commerce piece?
- Will you build links to additional organization or external information sources?
- Does a synchronous online component enable e-mentoring and the creation of online learning communities?
- Do you need online assessment capabilities?
- Will you need to connect to external communities, such as suppliers or customers?

The next step after conducting internal assessment is procurement (in case to buy) or LMS searching and evaluation. See the evaluation criteria as described on chapter 3. After finding the required LMS that meet defined functionality, the last step is to implement it.

The standard implementation process begins with development of an Interface Requirements Document (IRD) that specifies all of the LMS touch points, such as where software interfaces exist or will need to be constructed. There are three primary sections of the IRD. The first component describes content requirements and, more specifically, content that will be loaded onto the LMS platform. The second segment addresses one-time data migration, which includes existing databases that need to be loaded. Examples are students databases, student learning records, course catalogs, and so forth. The third component defines databases that must integrate with the LMS. In this case, data flows in a continuous stream between a database and the LMS. Examples might include integration with an existing academic system application, or a synchronous learning application outside of the standard LMS offering (e.g. external videoconference system).

The final step is to prepare an Implementation Design Document (IDD) that outlines the process and procedural steps necessary to load the LMS and implement its interface requirements. The IDD will contain actual screen shots, database tables, and integration methodology for each of the LMS's touch points. It will also serve as the roadmap for testing all connections, databases, and the functionality of each page; simulating full-load conditions (referred to as a stress test); and listing procedures for signing off on final acceptance of the application.

In relation to LMS selection, Egan (2002) reminded the top 10 LMS purchasing mistakes (and how to avoid them).

1. **Skirting senior management.** If you don't make a persuasive business case to senior management early, you'll have a hard time getting their signatures on the purchase order. More important, be sure to present your case in terms your organization leaders can relate to. Learning isn't about altruism; it's about creating smarter employees and a measurable competitive advantage for companies.
2. **Failing to spell out your needs.** If you don't enumerate your needs from the first conversations with your LMS vendor--and clarify the technical environment and

cultural issues that an LMS must deal with--you're likely to end up with a product that doesn't do what you need it to.

3. **Comparing apples and oranges.** Be aware that several tools that are marketed toward LMS buyers aren't LMSs. For instance, some HR Information Systems have learning modules, but they don't launch and track e-learning or manage training budgets, classrooms, instructors, grades, skills, certifications, and so on. Knowledge management systems may have features that support learning, but they're a whole other animal as well.
4. **Excluding IT from the process.** If an LMS doesn't fit into your technical environment, you're in trouble. IT generally has the power to quash any new application anyway, so it's imperative to involve them at the outset. In addition, the IT team will ask the right questions to help you make cost-effective decisions. Consequently, don't let IT run the entire show.
5. **Focusing more on price than value.** Insisting on an excellent cost/benefit ratio for your LMS investment is wise; trying to measure your best options merely on purchase price is not. For example, many companies have bought low-price LMSs for certain divisions only to face another purchasing decision later on. Your organization might need an enterprise LMS that will consolidate all of its learning initiatives and scale to meet the needs of large, widely dispersed learner communities.
6. **Overlooking scalability**. Scalability results primarily from open multi-tier architecture; Your IT team knows what that is (see Mistake #4). Basically, it's a system that consists of Web browsers pointing to Web servers that present data that application servers summon from databases. Companies can scale their LMSs as needed by adding computing power at any tier rather than replacing the entire system. Presuming (and you should!) that your organization's learner population will grow in the future, you need to ensure that your LMS can keep up with growth and change.
7. **Ignoring LMS interoperability.** Some LMSs only work with their own embedded authoring tools or content that the LMS vendor offers. Are you willing to bet that any single vendor will be able to forecast every type and mode of content, or that every tool you may need to create your own content exists within the LMS? Make sure the LMS you buy supports the latest versions of e-learning standards such as **SCORM** and **AICC**.
8. **Overlooking vendor track records.** Don't bet your purchase decision on a battle of press releases. What's more important than reviewing good PR is finding a vendor with customers that look like your organization, have actually implemented an LMS, are happy with the results, and are willing to talk to you about it.
9. **Reinforcing old ways.** Too many companies buy LMSs that automate the customer's dated business processes rather than enabling new ones that significantly improve the way the organization does business. Look for an LMS that can accommodate the former while helping you migrate quickly toward new processes that grow with your business needs.
10. **Selecting customization instead of configurability.** Custom code is an enemy of flexibility, scalability, and efficiency. Your LMS should be easily configurable to your

strategic business processes and be able to change with them. Hard-coded, one-off customizations require extensive programming from ground zero every time business conditions change.

D. Benefit of LMS for E-Learning Organizations

Universities implement a learning management system because they're committed to continued learning, development and knowledge transfer for students, society, and alumni. Knowledge and expertise is a powerful edge in today's complex business climate. The use LMS do provide benefit for learning organization (see e.g. Robbins, 2002).

An LMS has the potential to provide unprecedented value to universities. An enterprise-class LMS enables universities to deploy and evolve content delivery systems at a fraction of traditional costs, further accelerating return on investment.

1. **Competitive advantage through proprietary knowledge.** The fundamental business advantage for organizations that invest in LMS solutions comes from the ability to create and share internal proprietary knowledge of products, services, and processes.
2. **Cost reduction.** LMS solutions allow for the online delivery of highly customized learning objects to individuals, based on their unique existing knowledge, expertise, and learning requirements. In traditional training models, the ability to deliver individual learning solutions is impossible due to cost issues. With an LMS solution, every learner in the extended enterprise gets information that they need to increase performance, while the organization eliminates the travel and collateral costs of large-scale training initiatives.
3. **Accelerated product launches.** When a complex product is introduced, sales people, channel partners, service representatives, customers and others need to be educated in order for a smooth market entry to be achieved. Inefficient and expensive training initiatives can have a negative impact on product rollouts. LMS applications allow for the rapid creation, delivery and evolution of proprietary content in support of product launches.
4. **Consistent and timely content.** LMS applications allow large organizations to maintain a single delivery mechanism for all enterprise knowledge, which can be used to dynamically transfer knowledge in real-time across the globe. Information is current and consistent, and may be continuously analyzed for its effectiveness in reaching and educating an enterprise-wide audience. The costs of inaccurate or redundant knowledge are eliminated as every individual receives the proprietary content they need to perform at optimal levels.

Institutions that have invested in earlier stages of e-learning technology evolution without achieving the desired organizational impact, as well as companies that have yet to invest in e-learning initiatives, are now poised to enjoy substantial business benefits from a learning content management system. An LMS that's linked to learning management systems and other internal applications will become the product of choice and necessity for companies that need to achieve measurable results from their e-learning investments.

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GLOSSARY

Accessibility: A characteristic of technology that enables people with disabilities to use it. For example, accessible Websites can be navigated by people with visual, hearing, motor, or cognitive impairments. Accessible design also benefits people with older or slower software and hardware.

ADL (Advanced Distributed Learning): Initiative by the U.S. Department of Defense to achieve interoperability across computer and Internet-based learning courseware through the development of a common technical framework, which contains content in the form of reusable learning objects. See also SCORM and the ADL Website (http://www.adlnet.org/).

AICC (Aviation Industry Computer-Based Training Committee): An international association of technology-based training professionals that develops training guidelines for the aviation industry. AICC has and is developing standards for interoperability of computer-based and computer-managed training products across multiple industries. This is a standard in e-learning. See the AICC Website (http://www.aicc.org/).

API (application program interface): The set of tools used by a programmer to create a computer program.

Applet: A small application. See also Java applet.

Application: Computer software; also called a *program.* There are many types of software that fit into the category of application. Application software is distinct from other forms of software, such as operating system and utility software.

ASCII (American Standard Code for Information Interexchange): A computer code in which characters such as letters and symbols are converted into numbers that the computer can understand.

ASP (Active Server Pages): A programming environment that combines elements of HTML and scripting. Webpages built with ASP can change dynamically based on user input.

Assessment: The process used to systematically evaluate a learner's skill or knowledge level.

Assessment item: A question or measurable activity used to determine whether the learner has mastered a learning objective.

Asset: 1) Intellectual property. See knowledge asset. 2) Hardware and software owned by an organization.

Asynchronous E-Learning - Computer-assisted training where the instructor and participants are involved in the course, class or lesson at different times (not sychronized, or ansychronous). Examples include job aids and programs on a shared drive, web-based training (WBT), electronic bulletin boards, blogs, and email listservs.

Asynchronous methods allow participants to access training materials 24/7, even when other students and/or the instructor are not present.

Asynchronous learning: Learning in which interaction between instructors and students occurs intermittently with a time delay. Examples are self-paced courses taken via the Internet or CD-ROM, Q&A mentoring, online discussion groups, and email.

Authoring tool: A software application or program used by trainers and instructional designers to create e-learning courseware. Types of authoring tools include instructionally focused authoring tools, Web authoring and programming tools, template-focused authoring tools, knowledge capture systems, and text and file creation tools.

BBS (bulletin board system): An online community run on a host computer that users can dial or log into in order to post messages on public discussion boards, send and receive email, chat with other users, and upload and download files. BBSs are text-based and often related to the specific hobbies or interests of their creators.

Blended learning: Learning events that combine aspects of online and face-to-face instruction.

Blog (Weblog): Similar to an electronic bulletin board, except that only one individual or group can create the initial post and participants can only respond to the post. An example is http://www.blogger.com. An extension of the personal Website consisting of regular journal-like entries posted on a Webpage for public viewing. Blogs usually contain links to other Websites along with the thoughts, comments, and personality of the blog's creator.

Broadcast: (noun) Television or radio signals designed to reach a mass audience. (Some Websites offer original or redistributed broadcasts--see Webcast.) (verb) 1) To transmit television or radio signals. 2) To email or fax a message to multiple recipients simultaneously; to transmit information simultaneously to everyone on a network.

Browser: A software application that displays World Wide Web pages originally written in the text-based HTML language in a user-friendly graphical format.

CAI (computer-assisted instruction): The use of a computer as a medium of instruction for tutorial, drill and practice, simulation, or games. CAI is used for both initial and remedial training, and typically does not require that a computer be connected to a network or provide links to learning resources outside of the course. See also CBT.

CBL (computer-based learning): See CBT.

CBT (computer-based training): An umbrella term for the use of computers in both instruction and management of the teaching and learning process. CAI (computer-assisted instruction) and CMI (computer-managed instruction) are included under the heading of CBT. Some people use the terms CBT and CAI interchangeably. CBT is a general term that relates to all training that is delivered with the assistance of a

computer. Deliver of CBT can be via CD, the Internet, or shared files on a network. Some people also call CBT as e-learning. See e-learning.

Certification: 1) The awarding of a credential acknowledging that an individual has demonstrated proof of a minimum level of knowledge or competence, as defined by a professional standards organization. Professional certification can be used as a screening tool and verification of an individual's skills and knowledge. 2) Program that evaluates products or tools according to predetermined criteria, such as ASTD's E-Learning Courseware Certification (eCC) (http://www.astd.org/astd/marketplace/ecc).

Chat: Real-time text-based communication in a virtual environment. Chat can be used in e-learning for student questions, instructor feedback, or even group discussion.

Chat room: A virtual meeting space on the Internet, an intranet, or other network, used for real-time text discussions. Unlike one-to-one instant messenger applications, chat rooms enable conversations among multiple people at once.

Chunk: (noun) A discrete portion of content, often consisting of several learning objects grouped together. (verb) To separate content into discrete portions or aggregate smaller content elements into customized configurations.

CLO (Chief Learning Officer): The executive with primary responsibility for strategic human capital development. The CLO ensures that all learning investments focus on accomplishing the organization's mission, strategy, and goals; provides a single point of accountability for those investments; develops the corporate learning strategy; creates a culture of continuous learning; fosters communities of practice; integrates training functions; drives cultural transformation; and measures the impact on organizational performance. The CLO increasingly reports to either the CEO or senior vice president of HR. He or she is to learning what the CFO and CIO are to finance and information technology.

Classroom training: See instructor-led training.

C-learning: See instructor-led training.

CMI (computer-managed instruction): The use of computer technology to oversee the learning process, including testing and record keeping.

CMS (content management system): A centralized software application or set of applications that facilitates and streamlines the process of designing, testing, approving, and posting e-learning content, usually on Webpages.

Coaching:.A process in which a more experienced person, the coach, provides a worker or workers with constructive advice and feedback with the goal of improving performance. (See also mentoring, which focuses on career development and advancement)

Collaboration technology: Software, platforms, or services that enable people at different locations to communicate and work with each other in a secure, self-contained

environment. May include capabilities for document management, application sharing, presentation development and delivery, whiteboarding, chat, and more.

Community: See online community.

Competency management: A system used to evaluate skills, knowledge, and performance within an organization; spot gaps; and introduce training, compensation, and recruiting programs based on current or future needs.

Compliant (standards-compliant): E-learning that meets established standards of, and has received official approval from, an accrediting organization. See also conformant.

Conformant (standards-conformant): E-learning that meets the standards of an accrediting organization but that has not gone through the formal application process to be deemed compliant.

Content: What is taught in a course, class, or lesson. The training objectives are often a list of the content of a course. Information captured digitally and imparted to learners. Formats for e-learning content include text, audio, video, animation, simulation, and more.

Cookie: Information stored on a user's computer after he or she visits a Website. The cookie tracks data about that user but can be disabled in the browser.

Corporate university: A learning organization with a governance system that aligns all learning with the corporate or agency mission, strategy, and goals. The governance system typically includes a governing board consisting of the CEO and other senior executives and a chief learning officer (CLO) who has overall responsibility for managing the organization's investment in learning. CEOs of best-practice learning organizations leverage their corporate university to achieve performance goals, drive cultural transformation, reform and integrate training departments, and establish and sustain competitive advantage through learning.

Courseware: Any type of instructional or educational course delivered via a software program or over the Internet.

CSS (cascading style sheets): An HTML feature that enables Webpage developers and users to specify the way a Webpage appears when displayed in a browser, by applying a number of different style sheets to the page. Each style sheet controls a different design element or set of design elements.

Customer-focused e-learning: Technology-based learning programs offered by a organization and targeted at their current and prospective customers. The intent is to increase brand loyalty among existing customers and attract new business

Cyberspace: The nebulous "place" where humans interact over computer networks; term coined by William Gibson in *Neuromancer*.

Default: A setting that the computer system uses automatically, unless it is changed by the user.

Delivery: Any method of transferring content to learners, including instructor-led training, Web-based training, CD-ROM, books, and more.

Development: 1) Learning or other types of activities that prepare a person for additional job responsibilities and/or enable him to gain knowledge or skills. 2) The creation of training materials or courses, as in *content development* or *e-learning development.*

Digital: An electrical signal that varies in discrete steps in voltage, frequency, amplitude, locations, and so forth. Digital signals can be transmitted faster and more accurately than analog signals.

Discussion boards: Forums on the Internet or an intranet where users can post messages for others to read.

Distance education: Educational situation in which the instructor and students are separated by time, location, or both. Education or training courses are delivered to remote locations via synchronous or asynchronous means of instruction, including written correspondence, text, graphics, audio- and videotape, CD-ROM, online learning, audio- and videoconferencing, interactive TV, and FAX. Distance education does not preclude the use of the traditional classroom. The definition of distance education is broader than and entails the definition of e-learning.

Distance learning: The desired outcome of distance education. The two terms are often used interchangeably.

Download: (noun) A file that's transferred or copied to a user's computer from another connected individual computer, a computer network, a commercial online service, or the Internet. (verb) To transfer or copy a file to a user's computer from another connected individual computer, a computer network, a commercial online service, or the Internet.

DVD (digital versatile disc): Optical disks that are the same size as CDs but are double-sided and have larger storage capacities.

DVI (digital video interactive): A format for recording digital video onto compact disk, allowing for compression and full-motion video.

E-learning (electronic learning): a general term that relates to all training that is delivered with the assistance of a computer. Delivery of e-learning can be via CD, the Internet, or shared files on a network. Some people call e-learning also CBT. Generally, CBT and E-learning are synonomous, but CBT is the older term, dating from the 1980s. The term E-learning evolved from CBT along with the maturation of the Internet, CDs, and DVDs. E-learning covering a wide set of applications and processes that includes Internet-based Learning, computer-based learning, Web-based Learning, virtual classrooms, Online Learning, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio and videotape, satellite broadcast, interactive TV, CD-ROM, and more.

Electronic bulletin board - A method of communication where topics or questions are posted to a website and participants can respond.

Email (electronic mail): Messages sent from one computer user to another.

Email list: A form of one-to-many communication using email; a software program for automating mailing lists and discussion groups on a computer network.

End user: The person for whom a particular technology is designed; the individual who uses the technology for its designated purpose. In e-learning, the end user is usually the student.

Enterprise-wide e-learning: E-learning that's intended for all or most employees within a organization. It's often part of a strategic change of direction with a very short timeline, but is also used to support a core process such as sales.

EPSS (electronic performance support system): 1) A computer application that's linked directly to another application to train or guide workers through completing a task in the target application. 2) More generally, a computer or other device that gives workers information or resources to help them accomplish a task or achieve performance requirements.

ERP (enterprise resource planning): A set of activities supported by application software that helps a organization manage such core parts of its business as product planning, parts purchasing, inventory management, order tracking, and customer service. Can also include modules for finance and HR activities. The deployment of an ERP system can involve considerable business process analysis, employee retraining, and new work procedures.

E-training: See TBT.

Evaluation: Any systematic method for gathering information about the impact and effectiveness of a learning offering. Results of the measurements can be used to improve the offering, determine whether the learning objectives have been achieved, and assess the value of the offering to the organization.

Extensibility: The ability to expand and adapt an e-learning application or infrastructure by adding features, components, or services to a core set of capabilities.

F2F (face-to-face): Term used to describe the traditional classroom environment. Also see ILT.

FAQ (frequently asked questions): An informational list, in question and answer format, of common inquiries from users about a topic or application and standard responses. FAQs appear on Websites and discussion boards and within desktop applications.

Flash: Software by Macromedia that enables designers to use simple vector graphics to create computer animations, which can be viewed by any browser with the correct plug-in.

Full-motion video: A signal that allows the transmission of the complete action taking place at the origination site.

Fully interactive video (two-way interactive video): Two sites interacting with audio and video as if they were colocated.

GIF (Graphics Interchange Format): The ile format developed by CompuServe to store images. GIFs support 256 colors and are often used for Web images because they compress well.

Globalization: 1) The tailoring of an offering to include clear, grammatically correct text that eliminates slang, gender references, and cultural or generational idioms. 2) The process of deploying a single system worldwide that meets a variety of needs. 3) Integrating several working systems into one.

GUI (graphical user interface): A computer interface using icons or pictures. For example, Windows.

Homepage: A document that has an address (URL) on the World Wide Web, is maintained by a person or an organization, and contains pointers to other pieces of information.

Host: (noun) A computer connected to a network. (verb) To store and manage another organization's technology and/or content on your own servers.

HRD (human resource development): 1) A term coined by Leonard Nadler to describe the organized learning experiences, such as training, education, and development, offered by employers within a specific timeframe to improve employee performance or personal growth. 2) Another name for the field and profession sometimes called *training* or *training and development*.

HTML (Hypertext Markup Language): The programming language used to create documents for display on the World Wide Web.

HTTP (Hypertext Transfer Protocol): The set of rules and standards that govern how information is transmitted on the World Wide Web.

Hypermedia: Applications or documents that contain dynamic links to other media, such as audio, video, or graphics files.

Hypertext: A system for retrieving information from servers on the Internet using World Wide Web client software. Hypertext consists of key words or phrases in a WWW page that are linked electronically to other Webpages.

ILS (integrated learning system): A complete software, hardware, and network system used for instruction. In addition to providing curriculum and lessons organized by level, an ILS usually includes a number of tools such as assessments, record keeping, report writing, and user information files that help to identify learning needs, monitor progress, and maintain student records.

ILT (instructor-led training): Usually refers to traditional classroom training, in which an instructor teaches a course to a room of learners. The term is used synonymously with on-site training and classroom training (c-learning).

IMS (Instructional Management System) Global Learning Consortium: Coalition of government organizations dedicated to defining and distributing open architecture interoperability specifications for e-learning products. See the IMS Website (http://www.imsproject.org/).

Information architecture: A description or design specification for how information should be treated and organized. In Web design, the term describes the the organization of online content into categories and the creation of an interface for displaying those categories.

Infrastructure: The underlying mechanism or framework of a system. In e-learning, the infrastructure includes the means by which voice, video, and data can be transferred from one site to another and be processed.

Instructional designer (ID): An individual who applies a systematic methodology based on instructional theory to create content for learning.

Intellectual property: An idea, invention, formula, literary work, presentation, or other knowledge asset owned by an organization or individual. Intellectual property can be protected by patents, trademarks, service marks, and/or copyrights.

Interactive media: Allows for a two-way interaction or exchange of information.

Internet: An international network first used to connect education and research networks, begun by the US government. The Internet now provides communication and application services to an international base of businesses, consumers, educational institutions, governments, and research organizations.

Internet-based training: Training delivered primarily by TCP/IP network technologies such as email, newsgroups, proprietary applications, and so forth. Although the term is often used synonymously with Web-based training, Internet-based training is not necessarily delivered over the World Wide Web, and may not use the HTTP and HTML technologies that make Web-based training possible.

Internet Explorer: Browser software that enables users to view Webpages.

Interoperability: The ability of hardware or software components to work together effectively.

IT (information technology): The industry or discipline involving the collection, dissemination, and management of data, typically through the use of computers.

IT training: A combination of desktop training and information systems and technical training. Includes training in areas such as system infrastructure software, application software, and application development tools.

Java: An object-oriented programming language developed by Sun Microsystems. Java isn't dependent on specific hardware and can be launched from within an HTML document or stand- alone.

Java applet: A small Java program launched through a browser.

JavaScript: A scripting language that's simpler than Java and can add interactivity to Webpages. JavaScript commands allow tasks to be completed by the Web browser when a user views a Webpage. (For example, making a graphic change when a user moves the cursor over it.)

JPEG (Joint Photographic Experts Group): 1) A format for image compression that enables the user to weigh image quality against file size. JPEG is a lossy compression method, meaning that when the image is compressed, the file is made smaller by discarding some of its information. The more the file is compressed, the more information is discarded, and the more the image quality is degraded. 2) The subgroup of the International Organization for Standardization responsible for setting the standards for the image file format that bears its name.

Just-in-time: Characteristic of e-learning in which learners are able to access the information they need exactly when they need it.

KMS (knowledge management system): See knowledge management.

Knowledge asset: Intellectual content possessed by an organization. Any piece of information that a worker at a organization knows, from customer names to how to fix a piece of machinery, can be considered a knowledge asset. Assets can be codified in a variety of formats, such as PowerPoint slides, Word documents, audio and video files, and so forth.

Knowledge base: A specialized database that stores knowledge assets.

Knowledge management: The process of capturing, organizing, and storing information and experiences of workers and groups within an organization and making it available to others. By collecting those artifacts in a central or distributed electronic environment (often in a database called a knowledge base), KM aims to help a organization gain competitive advantage.

LCMS (learning content management system): A software application (or set of applications) that manages the creation, storage, use, and reuse of learning content. LCMSs often store content in granular forms such as learning objects.

Learning: A cognitive and/or physical process in which a person assimilates information and temporarily or permanently acquires or improves skills, knowledge, behaviors, and/or attitudes.

Learning environment: The physical or virtual setting in which learning takes place.

Learning object: A reusable, media-independent collection of information used as a modular building block for e-learning content. Learning objects are most effective when

organized by a meta data classification system and stored in a data repository such as an LCMS.

Learning objective: A statement establishing a measurable behavioral outcome, used as an advanced organizer to indicate how the learner's acquisition of skills and knowledge is being measured.

Learning platforms: Internal or external sites often organized around tightly focused topics, which contain technologies (ranging from chat rooms to groupware) that enable users to submit and retrieve information.

Learning portal: Any Website that offers learners or organizations consolidated access to learning and training resources from multiple sources. Operators of learning portals are also called content aggregators, distributors, or hosts.

Learning solution: 1) Any combination of technology and methodology that delivers learning. 2) Software and/or hardware products that suppliers tout as answers to businesses' training needs.

Learning space: An imaginary geography in which the learning enterprise flourishes. Mapped by market analysts and mined by consultants, this territory is a recent annexation to the business landscape.

Link: The result of HTML markup signifying to a browser that data within a document will automatically connect with either nested data or an outside source. Used in the design of hypertext.

LMS/LCMS - Learning Management System/Learning and Content Management System. A system (software package) that automates the administration of training. It is used for management and tracking of the involvement of participants with specific content, usually with the assistance of database. The LMS/LCMS registers users, tracks courses in a catalog, records data from learners; and provides reports to management. Typically the system tracks who is scheduled to participate in specific training programs, who has begun the program, who has completed the trainings, and what were the participants' test scores. An LCMS also contains the training content so that the courses are delivered directly via the LCMS. An LMS is typically designed to handle courses by multiple publishers and providers. It usually (not all) doesn't include its own authoring capabilities; instead, it focuses on managing courses created by a variety of other sources.

Log in/Log on: To establish a connection over a network or modem with a remote computer to retrieve or exchange information.

Log off: To terminate a connection to a computer or network.

LRN: Microsoft's Learning Resource Interchange, a format that gives content creators a standard way to identify, share, update, and create online content and courseware. LRN is the first commercial application of the IMS Content Packaging Specification.

LSP (learning service provider): A specialized ASP offering learning management and training delivery software on a hosted or rental basis.

M-learning (mobile learning): Learning that takes place via such wireless devices as cell phones, personal digital assistants (PDAs), or laptop computers.

Markup: Text or codes added to a document to convey information about it. Usually used to formulate a document's layout or create links to other documents or information servers. HTML is a common form of markup.

Mentoring: A career development process in which less experienced workers are matched with more experienced colleagues for guidance. Mentoring can occur either through formal programs or informally as required and may be delivered in-person or by using various media.

Metadata: Information about content that enables it to be stored in and retrieved from a database.

Metatag: An HTML tag identifying the contents of a Website. Information commonly found in the metatag includes copyright info, key words for search engines, and formatting descriptions of the page.

Modular: E-learning that's made up of standardized units that can be separated from each other and rearranged or reused.

MOO (MUD, object oriented): A MUD created with an object-oriented programming language.

MPEG (Moving Picture Experts Group): 1) A high-quality video file format that uses compression to keep file sizes relatively small. 2) The subgroup of the International Organization for Standardization responsible for setting the standards for this format.

MP3: A format for music file compression that enables users to download music over the Internet.

Multimedia: Encompasses interactive text, images, sound, and color. Multimedia can be anything from a simple PowerPoint slide slow to a complex interactive simulation.

Online: The state in which a computer is connected to another computer or server via a network. A computer communicating with another computer.

Online community: A meeting place on the Internet for people who share common interests and needs. Online communities can be open to all or be by membership only and may or may not be moderated.

Online learning: Learning delivered by Web-based or Internet-based technologies. See Web-based training and Internet-based training.

Online training: Web- or Internet-based training.

Open source software: 1) Generally, software for which the original program instructions, the source code, is made available so that users can access, modify, and

redistribute it. The Linux operating system is an example of open source software. 2) Software that meets each of nine requirements listed by the non-profit Open Source Initiative in its Open Source Definition.

Origination site: The location from which a teleconference originates.

PDF (portable document format): File format developed by Adobe Systems to enable users of any hardware or software platform to view documents exactly as they were created--with fonts, images, links, and layouts as they were originally designed.

Personalization: Tailoring Web content to an individual user. Can be accomplished by a user entering preferences or by a computer guessing about the user's preferences.

Plugfest: A biannual event sponsored by the Advanced Distributed Learning Network that brings together early adopters of the SCORM specifications to validate and document their process in meeting requirements for reuse, adaptability, interoperability, cost-effectiveness, and global access.

Plug-in: An accessory program that adds capabilities to the main program. Used on Webpages to display multimedia content.

PNG (Portable Network Graphics): The patent-free graphics compression format developed by Macromedia expected to replace GIF. PNG offers advanced graphics features such as 48-bit color.

Portal: A Website that acts as a doorway to the Internet or a portion of the Internet, targeted towards one particular subject. Also see learning portal.

Post: To place a message in a public message forum. Also, to place an HTML page on the World Wide Web.

Power users: Advanced, sophisticated users of technology (usually a computer application or an operating system) who know more than just the basics needed to operate it.

Practice item: 1) A question or learning activity that serves as an informal validation and reinforcement of instruction. 2) A sample question that precedes a test, designed to ensure that the learner understands the mechanics of the testing system.

Practices: A set of methods or procedures to be followed, as in *best practices* or *standard practices*. In e-learning, the methods used to communicate the content to the learner.

Prescriptive learning: A process in which only coursework that matches a learner's identified skill and knowledge gaps is offered to him or her, with the goal of making the learning experience more meaningful, efficient, and cost-effective.

Pull technology: In reference to the Internet or other online services, the technology whereby people use software such as a Web browser to locate and "pull down" information for themselves. See also push technology.

Push technology: In reference to the Internet or other online services, the technology whereby information is sent directly to a user's computer. See also pull technology.

Real-time communication: Communication in which information is received at (or nearly at) the instant it's sent. Real-time communication is a characteristic of synchronous learning.

Repurpose: To reuse content by revising or restructuring it for a different purpose than it was originally intended or in a different way.

Reusable: E-learning content that can be transferred to various infrastructures or delivery mechanisms, usually without changes.

RIO (reusable information object): A collection of content, practice, and assessment items assembled around a single learning objective. RIOs are built from templates based on whether the goal is to communicate a concept, fact, process, principle, or procedure. (Pronounced "REE-O")

RLO (reusable learning object): A collection of RIOs, overview, summary, and assessments that supports a specific learning objective. (Pronounced "R-L-O")

ROI (return on investment): Generally, a ratio of the benefit or profit received from a given investment to the cost of the investment itself. In e-learning, ROI is most often calculated by comparing the tangible results of training (for example, an increase in units produced or a decrease in error rate) to the cost of providing the training.

Role play: (noun) A training technique in which learners act out characters in order to try out behaviors, practice interactions, communicate for a desired outcome, and/or solve a dynamic problem. Role plays can reinforce learning and help people apply new information, skills, and techniques. (verb) To participate in a role play.

Scalability: The degree to which a computer application or component can be expanded in size, volume, or number of users served and continue to function properly.

Schema: 1) A relatively simple textual description or representation of the internal structure of a database, including table names, element names, and relationships between elements. 2) One of several new entities that define the structure and content parameters for XML documents.

SCORM (Sharable Content Object Reference Model) defines a Web-based learning "Content Aggregation Model" and "Run-Time Environment" for learning objects. The SCORM is a collection of specifications adapted from multiple sources to provide a comprehensive suite of e-learning capabilities that enable interoperability, accessibility and reusability of Web-based learning content. A set of specifications that, when applied to course content, produces small, reusable learning objects. A result of the Department of Defense's Advance Distributed Learning (ADL) initiative, SCORM-compliant courseware elements can be easily merged with other compliant elements to produce a highly modular repository of training materials.

Script: A program or set of instructions not carried out by the computer processor but by another program. Code is interpreted at run time rather than being stored in executable format.

Scripting language: See Script.

Self-assessment: The process by which the learner determines his or her personal level of knowledge and skills.

Self-paced learning: An offering in which the learner determines the pace and timing of content delivery.

The Semantic Web: A concept proposed by World Wide Web inventor Tim Berners-Lee. States that the Web can be made more useful by using methods such as content tags to enable computers to understand what they're displaying and to communicate effectively with each other. That, says Berners-Lee, will increase users' ability to find the information they see.

Simulations: Highly interactive applications that allow the learner to model or role-play in a scenario. Simulations enable the learner to practice skills or behaviors in a risk-free environment.

Skill gap analysis: Compares a person's skills to the skills required for the job to which they have been, or will be, assigned. A simple skill gap analysis consists of a list of skills required along with a rating of the employee's level for each skill. Ratings below a predetermined level identify a skill gap.

Skills inventory: A list of skills or competencies that an individual posssess, usually created by self-evaluation.

SME (subject matter expert): An individual who is recognized as having proficient knowledge about and skills in a particular topic or subject area.

Soft skills: Business skills such as communication and presentation, leadership and management, human resources, sales and marketing, professional development, project and time management, customer service, team building, administration, accounting and finance, purchasing, and personal development.

Specification: A plan, instruction, or protocol for e-learning that's established or agreed upon. *Specification* is often used interchangeably with *standard*, but the two terms are not truly synonymous. Specifications become standards only after they've been approved by an accrediting agency.

Standard: An e-learning specification established as a model by a governing authority such as IEEE or ISO to ensure quality, consistency, and interoperability.

Storyboard: (noun) An outline of a multimedia project in which each page represents a screen to be designed and developed. (verb) To create a storyboard.

Streaming media (streaming audio or video): Audio or video files played as they are being downloaded over the Internet instead of users having to wait for the entire file to download first. Requires a media player program.

Studying: The self-directed practice of reviewing instructional material (usually as a follow-up to instruction) to improve retention and understanding. Aims to increase or

improve skills or knowledge in the long-term, although some people argue that studying only places information in the short-term memory and mainly serves the goal of improving performance on tests.

Style sheets: In traditional print publishing and on the Web, style sheets specify how a document should appear, standardizing such elements as fonts, page layout and line spacing, repeated content, and so forth. Web style sheets help ensure consistency across Webpages, but HTML coding can also override the sheets in designated sections of the pages. Also see CSS.

Synchronous E-Learning - Computer-assisted training where the instructor and participants are involved in the course, class or lesson at the same time (synchronized). Web conferencing is an example of synchronous e-learning. Participants can log on with a trainer and interact with participants at multiple facilities or locations. Using LCD projectors and conference telephones, the audience of a web conference can be increased to include many staff at any location.

Synchronous learning: A real-time, instructor-led online learning event in which all participants are logged on at the same time and communicate directly with each other. In this virtual classroom setting, the instructor maintains control of the class, with the ability to "call on" participants. In most platforms, students and lecturers can use a whiteboard to see work in progress and share knowledge. Interaction may also occur via audio- or videoconferencing, Internet telephony, or two-way live broadcasts.

TBT (technology-based training): The delivery of content via Internet, LAN or WAN (intranet or extranet), satellite broadcast, audio- or videotape, interactive TV, or CD-ROM. TBT encompasses both CBT and WBT.

Teaching: A process that aims to increase or improve knowledge, skills, attitudes, and/or behaviors in a person to accomplish a variety of goals. Teaching is often driven more toward the long-term personal growth of the learner and less toward business drivers such as job tasks that are often the focus of training. Some people characterize teaching as focused on theory and training as focused on practical application. See also Training and Learning.

Telecommunication: The science of information transport using wire, radio, optical, or electromagnetic channels to transmit and receive signals for voice or data communications.

Teleconferencing: Two-way electronic communication between two or more groups in separate locations via audio, video, and/or computer systems.

Thread: A series of messages on a particular topic posted in a discussion forum.

Training: A process that aims to improve knowledge, skills, attitudes, and/or behaviors in a person to accomplish a specific job task or goal. Training is often focused on business needs and driven by time-critical business skills and knowledge, and its goal is often to improve performance. See also Teaching and Learning.

Training management system: See LMS.

Tutorial: Step-by-step instructions presented through computer or Web-based technology, designed to teach a user how to complete a particular action.

Upload: To send a file from one computer or server to another.

URI (uniform resource identifier): Name and address of information--text, graphics, audio, video, and so forth--on the Internet. A URI usually identifies the application used to access the resource, the machine the resource is located on, and the file name of the resource. A Webpage address or URL is the most commonly used type of URI.

URL (uniform resource locator): The address of a page on the World Wide Web. For example, .

Usability: The measure of how effectively, efficiently, and easily a person can navigate an interface, find information on it, and achieve his or her goals.

Videoconferencing: Using video and audio signals to link participants at different and remote locations.

Virtual: Not concrete or physical. For instance, a completely virtual university does not have actual buildings but instead holds classes over the Internet.

Virtual classroom: The online learning space where students and instructors interact.

Virtual community: See online community.

WBT (Web-based training): Delivery of educational content via a Web browser over the public Internet, a private intranet, or an extranet. Web-based training often provides links to other learning resources such as references, email, bulletin boards, and discussion groups. WBT also may include a facilitator who can provide course guidelines, manage discussion boards, deliver lectures, and so forth. When used with a facilitator, WBT offers some advantages of instructor-led training while also retaining the advantages of computer-based training.

Web-based learning: See Web-based training.

Webcast: (*Web + broadcast*) (noun) A broadcast of video signals that's digitized and streamed on the World Wide Web, and which may also be made available for download. (verb) To digitize and stream a broadcast on the World Wide Web.

Web conference: (noun) A meeting of participants from disparate geographic locations that's held in a virtual environment on the World Wide Web, with communication taking place via text, audio, video, or a combination of those methods. (verb) To participate in a Web conference.

Webinar: (*Web + seminar*) A small synchronous online learning event in which a presenter and audience members communicate via text chat or audio about concepts often illustrated via online slides and/or an electronic whiteboard. Webinars are often archived as well for asynchronous, on-demand access.

Webpage: A document on the World Wide Web that's viewed with a browser such as Internet Explorer or Netscape Navigator.

Website: A set of files stored on the World Wide Web and viewed with a browser such as Internet Explorer or Netscape Navigator. A Website may consist of one or more Webpages.

Whiteboard: An electronic version of a dry-erase board that enables learners in a virtual classroom to view what an instructor, presenter, or fellow learner writes or draws. Also called a smartboard or electronic whiteboard.

WWW (World Wide Web): A graphical hypertext-based Internet tool that provides access to Webpages created by individuals, businesses, and other organizations.

WYSIWYG (what you see is what you get): Pronounced "wizzy wig," a WYSIWYG program allows designers to see text and graphics on screen exactly as they will appear when printed out or published online, rather than in programming code.