

# **Learning management systems**

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## Introduction

Learning management systems (LMS) are data base software that are designed to track and control information related to students, instructors and administrators as they conduct their tasks of learning, teaching, and managing.

This new breed of software has become increasingly important as corporations, institutions of higher education and government organizations expanded their use of online education and training in recent years. According to W.R. Hambrecht & Co. a financial services firm the online training market is expected to just about double in size every year through 2003, when it will reach a healthy \$11.5 billion in worth. In corporate America, despite the demise of the dot-coms, companies involved in distance education and eLearning are thriving and growing everyday.

In addition, between 1995 and 1997-98 academic year the number of distance learners in higher education grew from 754,000 to 1.6 million throughout the country. (U. S. Department of Education <http://nces.ed.gov>). Today, it is estimated that more than 3 million students in various colleges and universities are involved in some form of distance learning. In recent years, there has been also a dramatic increase in establishing virtual high schools, as well as online charter schools. In corporate America, despite the demise of the dot-coms, companies involved in distance education are thriving and growing everyday.

The use of distance education and eLearning in the government sector has increased too. In 2002 the U. S. Government established <http://www.golearn.gov/> a government-wide resource that supports development of the Federal workforce through simplified and one-stop access to high quality e-Training products and services. The creation of this Center is the first phase of the President Bush's Management Agenda e-Training Initiative and will continue to grow with the addition of products and services that meet the common needs of the workforce.

The US Army also has created Army University Access Online (known as eArmyU). [eArmyU](#) provides access to quality education for enlisted soldiers across the globe, helping them further their professional and personal goals and providing the Army with top preparation for its forces. eArmyU supports the goal of transforming the military into an Objective Force capable of responding to the diverse and complex demands of the 21st century. In addition, other branches of the US military are also very active in online learning. Their combined efforts provide educational services to millions of service men and women around the world at a distance.

Organizing and administering an effective eLearning program depends on having a good LMS. It can make learning more proficient, teaching more effective and managing more efficient. A poorly designed LMS, on the other hand, can make life difficult for everyone involved.

Learning management systems allow administrators, and instructors follow the progress of a student at the course level.

Institutions of higher education have had a longer history of experience with software which is designed to track the progress of a student from the time that s/he applies to an institution to the time that the student graduates. Students' personal information, such as name and social security number are entered and saved in a database. The database usually is designed to contain other information such as the

title of courses a person takes, and grades earned in each of them. This information would allow the university to extract various reports for its own internal use, as well as in response to student's request for a transcript, or in complying with state or federal laws. In the past, very rarely, if ever at all, these databases were used to track the student's activities within a course.

What is different about the new learning management systems is that they allow administrators, and instructors to follow the progress of a student at the course level and keep abreast of such details as which projects have been completed by which student, which course activities are due from a specific person, and a host of other similar details which are important in learning and completing the requirements for a particular lesson, a number of lessons, or an entire course. Some computer-based course authoring tools, such as Authorware, incorporated learning management features in their capabilities as early as the 1980's. However, it was not until the late 90's that software companies focused on what businesses, industries and educational institutions needed in order to track myriad information that is required by administrators, instructors and learners to do their job properly when they work in a computer network environment.

Today, many companies are in the business of selling course authoring tools, and learning management systems of different kinds and capabilities. For a list of these companies and a link to their websites visit [Web Authoring, Course Authoring, Learning Management, And Online Conferencing](#) in the Software Channel of Distance-Educator.com. Some of these companies are start-ups, and it is hard to say at each point in time, which ones will thrive and stay in business, and which ones would disappear, given the current fragile market conditions for these companies. Others, such as Blackboard, WebCT, and SumTotal seem to have developed a firm market for their products. In any case, one of the first decisions in implementing a learning management system in a company or educational institution is to choose between two options. These are, if the institution should create a new system, or purchase and adopt one that is already designed, manufactured and sold in the market. In either case, learning management systems work within the context of organizations. Therefore, first, we turn our attention to the characteristics organizations and how they have changed in the last few years in light of the emergence of information technologies.

Learning management systems come in all shapes, sizes, and prices. However, the industry is very young at this time, and although certain standards are emerging, these solutions are far from being standardized. Nevertheless, in the past few years, since the emergence of LMSs certain features have been deemed as essential by professionals in the field. In this section, features that are essential in an effective LMS will be outlined and described.

### **Global Features**

Organizational and Personal Needs- In most businesses, learning takes place within the context of work. Also, adult learners learn better when their knowledge acquisition is directly related to what they value in life, and in their work.

In explaining how to motivate adults to learn, Wlodkowski (1999) outlined four essential factors:

1. Establishing inclusion: creating a learning atmosphere in which learners and teachers feel respected and connected to one another.

2. Developing attitude: creating a favorable disposition toward the learning experience through personal relevance choices
3. Enhancing meaning: creating challenging, thoughtful learning experiences that include learner's perspectives and values
4. Engendering competence: creating an understanding that learners are effective in learning something they value. (pp. 81).

Learning management systems that can integrate organizational requirements with personal learning needs are more effective than less flexible systems. Learners must feel that they are included in a learning environment that provides them with relevant options to improve their knowledge and skills in areas that they think are worth their time and effort. It is essential that learning management systems take into account the perspective of the learner, as much as those of the instructor, and the eLearning manager, training supervisor, or the HRD department head.

Comprehensiveness- More inclusive software solutions, which can serve various campuses, departments, and functions of an enterprise, will prove to be more effective and less expensive in the long run. Smaller systems might be faster to implement, and less expensive to maintain. However, they might not provide the comprehensive approach which a university or a large corporation might need.

Furthermore, large enterprises are concerned about the compatibility of data bases on their legacy systems with new software solutions that are brought into the market. Different departments might also have implemented different systems internally, without much coordination with the enterprise-wide systems. Design of a good LMS must bring a comprehensive solution to an organization.

Scalability- Comprehensive, enterprise wide solutions must also be scalable in order to accommodate the changing needs of an organization as swiftly and painlessly as possible. Modular, and scalable solutions are preferable, since they reduce the need for changing over to a more scalable version of the same software package, or migrating to a totally different solution altogether.

Longevity- In the contemporary fast moving market environment many companies which were celebrated as the leaders yesterday do not exist today. Obscure companies, on the other hand, which were not in the public eye as much six months or a year ago, have thrived and are providing a stable service to their customers. Although it is very difficult to guess which companies will still be in business two or three years from now longevity must be taken into consideration as a crucial feature. Even software created by industry leaders, such as IBM, Oracle, and others who have been in business for a long time must be questioned against the test longevity. Often these companies stop supporting software on a short notice. It is a good idea to find out what is the install-base of a particular software, and what is the level of the commitment of the software company to support and upgrade it in the future.

Cost Structure- Software solutions vary greatly in cost. Selecting a solution must take into consideration the overall cost structure of a package. For example, some companies provide free client software to the instructor and students. However, they might charge for the use of the server software; provision of technical support to students, and faculty; and hosting the service on their server. Other companies

might merge these costs into a licensing fee they charge for each student that is using their solution in a specific period of time. Because of myriad cost structures and software packages in the market, extra care in fully understanding the cost structure of the product must be exercised when purchasing a LMS.

### **Administrative Feature**

Administrative features employed in learning management systems vary depending on their comprehensiveness, and scalability. For example, an enterprise wide solution for a university campus requires several levels of administrative features, which would be able to satisfy the needs of the

- o university administration
- o colleges and schools within the university
- o academic departments in each college or school
- o degree, non-degree, and certificate programs within each department, and
- o courses within each program

Such a system must be responsive to the information needs of administrators, faculty, students, and others who might be eligible to access and use the database.

In the corporate environment, the situation is similar. Depending on the organizational structure of the corporation, a LMS must be responsive to the needs of those who manage training programs, those who participate in them, and executives who have no direct interest in training per se, but their access to data on employees' training is vital for them to be able to carry out their tasks. Software packages, therefore, might offer different levels of support for learners, instructors, and administrators.

Blackboard.com, an application service provider (ASP) to close to 50 universities, corporations, and school districts in the US and around the world, is a good example of levels of service, which institutions can buy. Version 5 of Blackboard's software supports three levels.

Level One, or the course management system is a single course authoring and management environment, which offers course authoring, online assessment, discussion boards, virtual chats, and access to academic resources.

Level Two, or the academic portal, adds customizable portal modules based on Microsoft's SQL Server or Oracle8i databases. It also, allows clients to plug in outside assessments tools or advanced discussion tools.

Level Three offers a single login for the enterprise users by integrating with existing administrative systems such as Datatel, PeopleSoft, SCT Banner, SCT Plus and organizations' legacy systems.

Furthermore, it automates enrollments, course creation and course templates for a

single instructor, a department, or an entire organization. It also allows organizations to add their own customized modules to the platform.

One of the major issues for adopting or creating a learning management system is how well it could be integrated into the already existing information infrastructure of the organization. In some instances, the information infrastructure could have been built piece meal. In other cases, such infrastructure could be integrated, complex, and advance. Institutions of higher education, as well as many corporations have used main frame computers to store data on their students, or employees. In either case, an important criterion for selecting or developing an LMS is how well it can integrate into the fabric of the information infrastructure that already is in place.

Recently many corporations and government agencies, including university systems have adopted enterprise resource planning (ERP), or enterprise resource management (ERM) software. These software are designed to integrate all of the information resources of an organization into a single platform. In such a system, information from accounting, human resources (HR), and even the supply chain is pulled together into a single database so that the various departments can share information and communicate with each other. It is essential that in implementing a LSM platform its compatibility with ERP or ERM software would be taken into consideration.

Another significant feature of a LMS is its electronic commerce capability. Most training departments in corporations as well as educational institutions charge for student registration. Students either make direct payment, or funds are interlay transferred within a corporation. The better and LMS can keep track of such e-commerce transactions the more useful it can be to the students, as well as to the administrators. For example, in the current global environment, students from other countries might wish to register in course in the United States. It would helpful, if the LMS could hand credit card transactions for international, as well as domestic students.

More specifically, a LMS must be able to:

- Manage registration, including online payments, and other electronic commerce requirements
- Manage online rosters, and attendance records
- Track student participation
- Manage online grade books
- Manage online course calendars
- Manage a public bulletin board
- Administer online surveys
- Manage access to administrative data instructional materials and student conferences

## **Instructional Features**

Teaching and learning is at the heart of a LMS; therefore, its instructional features are essential in selecting a system, or developing one from the ground up. Selection of features or a system as a whole depends on the needs of each organization. Larger and more complex software are not necessarily better. They can be more

expensive to buy, and more complicated to run, and maintain. Although in today's fast changing organizations needs of users for computer software changes all the time, it is important to conduct a needs assessment from potential users of a LMS in advance, before committing to one. Such needs might vary greatly between various divisions, and departments, and they might change over time even within a single entity. However instructional features of a LMS are used by faculty, trainers, and instructors who's primary job is to teach and guide students, and not be concerned with limitations and capabilities of the software platform that is purchased or designed for their use.

More specifically, a LMS must be able to:

- Provide user friendly access to instructors, and students
- Offer different means by which instructors can integrate course materials into the new environment
- Allow for the use of a variety of media files, ranging from simple text and graphics, to more complex video and animation
- Support application, file and screen sharing
- Support synchronous, and asynchronous online threaded conferencing
- Manage separate virtual conferencing environments
  
- Share instructional materials among several course
- Provide test development and scoring capability
- Generate reports on test results for students

### **Technical Features**

One of the reasons that schools, universities and companies sign an agreement with an application service provider to support their online instruction, and training is to avoid responsibility for dealing with technical administration of the system. If that is the case in your organization, you must make sure that the company that is offering the service is capable of offering technical support to administrators, faculty and students who use their system. Technical support must be an important ingredient in making a decision, when adopting a LMS. Such technical support is very important for students, as well as instructors and administrators. When they encounter a technical problem, they must rely on the LMS/ASP company to resolve the issue for them.

If the decision is not use an ASP, and support the LMS in house, then other technical issues must be taken into consideration:

- Server platform compatibility-If the server is compatible with the operating system in use  
Client software compatibility- if various versions of current popular web browsers are compatible with the platform
- Ease of deployment-How easy is it to upload and configure the server software
- Ease of administration- How easy is it to administer the server software

## Standards for Learning Management Systems

Developing courseware is an expensive and time-consuming task. As a rule of thumb, it takes roughly 9 months, and \$500,000 to develop a professional course, which would stand the test of time. One way to reduce costs, and increase the usability of instructional materials is to make such materials reusable. Various organizations, then, can share such learning objects. Learning objects are self-contained modules of instructions. They can be as small as a line of instruction containing only 25 words or so, or as large as a picture, a paragraph, a chapter in a book, or an entire segment of a course.

Given the scale and involvement of various branches of the US military in training and education, the Department of Defense (DOD) has been spearheading the development of a standard for sharing learning objects. Book (2002) stated in the National Defense Magazine: The Defense Department administers approximately 30,000 training courses per year to address the needs of its 2.5 million personnel. It costs about \$15 billion annually to maintain and operate military training installations. This effort in standardizing training software development for managing such a large enterprise has been joined by universities, and high technology companies, has resulted in the development of the Sharable Content Object Reference Model (SCORM). SCORM is a

- Set of specifications to enable the reuse of Web-based learning content across multiple environments and products.
- Set of interrelated technical specifications built upon the work of the AICC, IMS and IEEE to create one unified "content model".
- Reference model that defines Web-based learning objects
- Process to knit together diverse and disparate learning content and protocols to ensure reusability, accessibility, durability and interoperability
- Bridge from general emerging technologies to commercial implementations, and
- Growing and developing document to collect all the "bits and pieces" in one place

For more information about this initiative, and its participating universities, and corporations, visit <http://www.adlnet.org>

Another significant development on an international scale is the formation of the Instructional Management Systems (IMS) [Global Learning Consortium, Inc.](#)

The Instructional Management Systems (IMS) Global Learning Consortium, Inc. develops and promotes open specifications for facilitating online distributed learning activities such as locating and using educational content, tracking learner progress, reporting learner performance, and exchanging student records between administrative systems.

IMS has two key goals:

1. Defining the technical specifications for interoperability of applications and services in distributed learning, and
2. Supporting the incorporation of the IMS specifications into products and services worldwide. IMS endeavors to promote the widespread adoption of specifications that will allow distributed learning environments and content from multiple authors to work together (in technical parlance, "to interoperate").

IMS is a global consortium with members from educational, commercial, and government organizations. Funding comes from membership fees, with organizations choosing to join as either Contributing Members or Developers Network Subscribers. For more information visit <http://www.imsproject.org/>

The mission of IEEE LTSC working groups is to develop technical Standards, Recommended Practices, and Guides for software components, tools, technologies and design methods that facilitate the development, deployment, maintenance and interoperation of computer implementations of education and training components and systems. LTSC has been chartered by the IEEE Computer Society Standards Activity Board. Many of the standards developed by LTSC will be advanced as international standards by ISO/IEC JTC1/SC36 - Information Technology for Learning, Education, and Training <http://ltsc.ieee.org>

The Aviation Industry CBT (Computer-Based Training) Committee (AICC) is an international association of technology-based training professionals. The AICC develops guidelines for aviation industry in the development, delivery, and evaluation of CBT and related training technologies. The objectives of the AICC are as follows:

1. Assist airplane operators in development of guidelines which promote the economic and effective implementation of computer-based training (CBT).
2. Develop guidelines to enable interoperability.
3. Provide an open forum for the discussion of CBT (and other) training technologies.

<http://www.aicc.org>

## **Learning Management and Knowledge Management**

As information tools have become ubiquitous in business and government, managers have realized that their intangible assets, such as knowledge and know-how of their personnel are as important as their tangible properties, if not even more. This realization has led to a new movement to capture, process, and disseminate tacit and explicit knowledge and information that is used in running an enterprise. Although knowledge management and learning management systems have different points of origin in an organization, their goals overlap in certain respects. For example, certain information captured in a knowledge management database, could also easily be used for instructional and learning purposes.

Aspen, a product of Click2learn.com combines these two concepts together. Features such as

- Collaborative authoring,
- Knowledge exchange,
- Expert communities,
- Personalization,
- Blended learning,
- Skills management,
- 360-degree assessment and
- Mapping

Allow instructional designers, course developers, and human resource development professionals to collaborate on developing programs that address knowledge management, and learning needs of an organization as coherently as possible.

### **Multiple Products and Platforms**

As it was mentioned in the case of Blackboard above, companies, which make and market learning management systems offer various levels and lines of products. This product differentiation is to meet the needs of the market as closely as possible. Some buyers are in the market for a course-authoring tool, with some learning management features. Others are looking for larger systems that could respond to many faculty and learners on one campus. Yet a third group might be looking for enterprise wide solutions, which would accommodate various campuses in different geographic locations with thousands of users. Products that are capable of dealing with the range of need here might include different components. Depending on the size and the number of components involved their prices vary greatly as well.

### **Course Authoring Tools, and Learning Management Systems**

Most leading learning management systems in the market have a course-authoring tool imbedded in them. However, like many hybrid solutions, they might not offer as many capabilities to course developers and instructional designers as software, such as ToolBook, or Authorware, which has been designed for developing course content. These solutions provide

- Better support for media, such as video, and computer generated animation
- Advanced editing environments for standard mark-up languages such as XML, and
- Easier test development and administration for instructors

Course authoring tools, therefore, are software solutions, which provide a media rich editing, and scripting environment for developing instructional and training materials including specialized functions for test development and administrations.

### **Selecting a Tool for Course Development**

Course developers and instructional designers have a variety of solutions to choose from, when they approach a new course development project. These solutions range from writing a course-authoring tool from ground-up to selecting a solution that is already developed as is in the market.

Some organizations might choose to develop a course-authoring tool from ground-up using a programming language. With this approach, a programmer must write a line of code for every instruction given to the computer. As you can imagine, this approach would take a lot of time and effort, not to mention the cost. However, if the objective is to create a course-authoring tool that is superior to what is currently available in the market this might be a good approach.

Others might select a friendlier programming environment, such as Visual Basic, to create a new course, or a course-authoring tool. As practical as Visual Basic is, it is still too cumbersome for course development, unless developing an authoring tool would be an objective of the project.

The next level of simplicity is to select an open source scripting language, such as PHP to develop an instructional or training environment. Named for its original application, which was developing personal home page, PHP is a scripting language comparable to Microsoft's Active Server Pages (ASP). Using PHP, scripting codes could be added to HTML to provide increased functionality to websites. These would range from dynamic web pages, which would change depending on pre-set variables, to interactive pages with which the user can interact for responding to a question, or accessing specific information. The major difference is that PHP is an open source language, but ASP is a proprietary technology. Unlike ASP, which comes with a price tag, open source codes are readily available to users. What's more, users share new codes that they have developed among each other. This creates a cooperative environment in which course developers and instructional designers could add functions to their course sites with relative ease, and almost no cost, other than their time and effort.

Less adventurous developers and designers might choose a web-authoring tool to create a course site. Web authoring tools, such as FrontPage, Dreamweaver, and others are designed to simplify and automate routines of web developments. Lines of code could be added to a page by clicking on icons, instead of writing them. As functional and nice these tools are, they leave a lot to be desired for course developers and instructional designers who have specific needs. These needs are dependant at their objective. If the primary objective is to manage students in a course, and interact with the enterprise databases within an organization, then the solution could be found in a learning management system. On the other hand, if the primary objective is to develop a course with rich media and complex interactive features, then a course-authoring tool should be selected. Learning management systems, while could offer excellent tracking, grading, and interoperability with enterprise databases, might not afford rich media and complex interactive features to users.

## Essential Features of A Course Authoring Tool

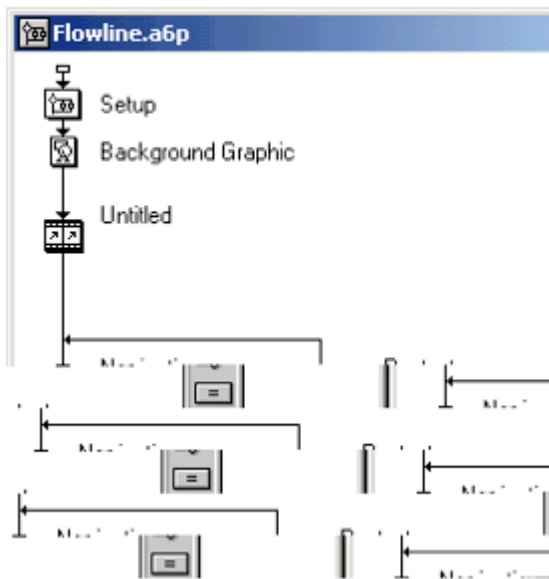
There are many course authoring tools in the market, which offer a variety of features to users. It is difficult to arrive at a certain number at each point in time, since some of the less stable companies go out of business, and new companies emerge almost every month. In recent industry conferences, between 100 to 150 companies have exhibited their products. Two tools, which have been in the market for more than a decade, and are widely, used, by thousands of professionals around the world are Authorware and ToolBook.

Both were introduced to the microcomputer market in the late 1980's; and as such have a long track record. In the following we will review the features of each of these tools to understand their affordances, and what course developers and instructional designers could expect from them.

### Authorware: Object Oriented Authoring Environment

One of the important features of Authorware is its object oriented environment, which allows the user to develop a flowline for the course. As shown in Figure 1, the flowline is a visual outline of the course to which course content could be added. Dragging and dropping media files of all kinds, such as text, graphics, or video into the appropriate icons in the flowline, could accomplish this. The flowline, also depicts the navigation options, and as such, allows the designer to provide a more user-friendly navigation scheme.

Figure 1- Authorware Flowline



### Interactivity

A distinguishing affordance of digital media is interactivity. Unlike a book, or a magazine with which the learner cannot interact, digital media provide for differential responses to learner's action on the computer. While in the earlier days of computer mediated instruction, interactivity was limited to point and click, recent versions of

course authoring tools offer a variety of interactive capabilities ranging from the simple point and click, to more text entries, pull down menus, hot spots on the screen and others. In fact, Authorware offers 11 different kinds of interactivity to the designer, and learner.

### Rich Media Support

The web offers a rich environment in which different media could be used for teaching and learning. Many learning management systems while offer superior administrative functions, they might not support as many media types as course authoring tools do. For example, Authorware includes

- A rich text editor, and anti aliasing function
- Shockwave audio for capturing and compressing narration and music
- MP3 Streaming audio for webcasting course related audio
- Flash for computer generated graphics; and animation, and
- QuickTime for video

This multimedia environment and interactive features provide an extensive array of possibilities to create motivating, and engaging instructional programs.

But recent versions of authoring tools go beyond this already impressive range of capabilities and offer even more. For example, Authorware version 6, under review here provides two functionalities to manage the media files. The Media Management function allows for flexible management of media assets at the disposal of the course designer. These media files could be local and internal, or external and at a distance. As such, external media assets could also be incorporated into projects.

### Reusable Objects

Reusable object-oriented programs are sets of codes that are self-describing and self-contained. As such, they can be re-used to decrease programming time. Authorware 6 has made use of this concept to facilitate the job of course developers, and instructional designer. The software contains several features, with the principle of reusable objects in mind. One of the best applications of this concept is found in Authorware's Knowledge Objects. These are templates that could be used with a wizard to create simple lessons, as well as more sophisticated tests. Advanced programmers could create their own Knowledge Objects and use them for a particular purpose.

Recently, several national and international projects have been established to standardize reusable objects, so programs could exchange data easily. In the previous module SCORM or (Sharable Content Object Reference Model) was introduced. Authorware supports XML (eXtensible Markup Language) in a SCORM Metadata Editor. Using this feature combined with its built-in data tracking capability, courseware developed in Authorware could track learner activities. Learner data collected could then be communicated with standard-based learning management

systems.

Furthermore, Authorware 6 supports ActiveX. This Microsoft technology offers another set of reusable objects and adds more power and flexibility to the program.

In addition to its own scripting language, a calculation editor, the ability to extend command menus, and support for third-party extensions or extras Authorware puts more features such as printing, encryption, and advanced database support at the disposal of developers, and designers.

#### Publishing and Delivery

All these features are only useful, if they could be distributed to learners conveniently, and inexpensively. For this purpose, Authorware supports web publishing, as well as publishing on a CD or a DVD. A streaming playback capability which preloads files for easier access as well as an audio compression component facilitate distribution of courses made by Authorware. Courses made by Authorware could be accessed on the web, even on low-band dial-up networks.

#### Learning For the User

Users of the software are supported by learning aids, as well as a Show-Me-File feature, which provide quick reference for learning new routines, reviewing, and problem solving.

Authorware is a powerful software for online and stand-alone course development. It's open architecture, and standard-based compliance allows it to work with learning management systems. It is however, not inexpensive. Its list price is \$2999.00. Also you should not plan to create a course all by yourself, using Authorware or any other similar course authoring tool for that matter. You get the best results from your course development efforts if you divide the labor among professionals who could concentrate on their own particular art and craft. Although brochures and ads for course authoring tools may make you believe that using the software is easy putting a professional course together takes different expertise and talents. These include:

- Project manager
- Lead instructional designer
- Instructional designers (depending on the size and complexity of the project)
- Subject matter specialist (SME)
- Programmer
- Graphic artist
- Videographer
- Video editor and post production specialist
- Audio producer and editor

- Animator
- Web designer, and master
- Quality control specialist
- Librarian and continuity coordinator

These are professionals that participate in a course development project. Depending on the complexity and skills of each individual involved in a project, a project manager might employ as many as all of them or limit the project to only three or four specialties. Whatever the number, professional development projects, usually include more than one person.

Now that you have a fairly good idea about features and capabilities of Authorware, we turn our attention to ToolBook.

### ToolBook

Similar to Authorware, ToolBook has been in the market for more than a decade. It was developed, first, as a CBT solution for the PC platform. Later, it was upgraded as an authoring tool for the web or other means of distribution. Today, it is one of the most popular course authoring tools in use by business, industry, government, and education.

### Selecting a Company

**Business Considerations** In recent years, many companies have built and introduced learning management systems to the market. Some of these companies have a short history of being in business. They were established during the dot-com boom of the late 1990's, and have remained in business. Their short history, however, is not necessarily a negative point for them. There are other factors that must be taken into consideration, as they will be described in this section. Other companies that provide learning management systems have a longer history of being in business. A good example is a few publishing firms that created their own LMSs, or bought out smaller dot-coms that had created a viable software solution. Likewise, their longevity needs to be considered in relation to other factors.

The dot-com era was supposed to bring an end to the boom and bust business cycle. The prevalent business climate, however, indicate that the cycle is very much in effect. This time, the underlying conditions might not be purely technical in terms of the general health of the economy or the effect that technology has had on productivity or there lack of. It might be due to other factors, such as mismanagement, or outright marginal activities motivated by greed.

Under any economic condition, it behooves of those who are in the market for a LMS to take a serious look at the financial viability of the company that is under consideration. As experience has shown, buying a learning management system is forging a partnership and not a conducting a simple business transaction. This is a partnership that might last for years, if the company is financially strong, and is offering a good product. Therefore it is important to critically analyze the past

business performance of the company, and their current financial statements, and their business plan for the foreseeable future. As in purchasing any other product or service, it is also informative and useful to look at the list of current as well as past clients of the company, and the level of satisfaction of those companies with the company under consideration.

Companies that are involved in offering LMSs have a variety of backgrounds. A few have come to existence; solely to offer a software solution to the market, as was mentioned before. Others, have joined the market with a history in training, publishing, or information technology. Ideally, companies that offer LMSs have expertise in training, as well as information technology, and even publishing or knowledge management. Companies that can offer more just the software, and support their product with personnel that are also knowledgeable in training and information technology should be preferred.

Companies also differ widely in their culture and business philosophy. You should consider the compatibility of corporate culture with which you are going to have a future business relationship, as well as the their business philosophy in supporting their clients in the long term, their commitment to research and development, and how they view their clients as partners, or mere customers.

#### Level 1- Management Guidelines

- o Is the vendor (In-house IT department) qualified?
- o Dose the vendor (In-house IT department) provide sound technical advice?
- o Are the technical staff helpful in troubleshooting and problem solving?
- o Is the company well established?
- o Is the company financially sound?
- Is there positive synergy with the vendor? (In-house IT department)
- o Is the LMS platform compatible with the organization's IT infrastructure?
- o Is server and client software easy to implement?
- o Is the telecommunication infrastructure sufficient?
- o Is client software compatible with the installed computers in employee workstations?

#### Level 2 User Guidelines

##### System Administrator

- o Does the system support both online and offline sessions?
- o Is it possible to set differential access for program administrators, instructors, and learners?

- o Does the system support database for keeping track of
  - ♣ Program administrators
  - ♣ Instructors,
  - ♣ Learners
  - ♣ Instructional materials, and
  - ♣ Instructional resources
  
- o Can potential learners brows course catalogs before registering?
- o Can learners access appropriate pages to register?
- o Can learners pay online?
- o Is it possible to manage different sections of the same course
- o Is it possible to manage different locations in which the same is course is taught by the program administrators?
- o Is it possible to generate rosters, grade sheets, attendance reports, and other databased materials related to learner records?
- o Can system administrator communicate to program administrators, instructors, and learners seamlessly?

#### Program Administrator

- o Can program administrator establish a database that would relate the career path of the learners to their learning and training?
- o Can program administrator share aspects of this data base with the learner and his/her immediate manager, or supervisor?
- o Is program administrator able to review registered learners? records before they are notified of their approval to attend the course?
- o Is program administrator able to block learners? attendance if they do not meet certain prerequisites?
- o Can program administrators establish different sections of the same course for multiple locations?
- o Can program administrators communicate to the system administrator, instructors, and learners seamlessly?

o Are program administrators able to establish necessary databases of resources, and learning materials common to the entire program?

## Instructors

o Can instructor establish a course easily

o Can instructor port digital materials in text and graphics to the course environment

o Can instructor port learning objects and third-party files to the course environment (e.g Flash files, video files, audio files, etc.).

o Can instructor establish

- ♣ Syllabus

- ♣ Course schedule

- ♣ Course calendar

- ♣ Course modules

- ♣ Course objectives

- ♣ Course activities

- ♣ Course assignments

- ♣ Description of deliverables

- ♣ Due dates

- ♣ Can instructor communicate with learner via synchronous

  - Instant messaging

  - Audio

  - Text

  - Video

  - Graphics

  - Whiteboard

  - Third-party applications, such as PowerPoint

- ♣ Can instructor communicate with learner via asynchronous systems

- Email to individual learners
- Email to distribution lists
- Threaded discussion boards

♣ Is the instructor able to create interactive assessment tools

- Multiple choice
- True/False
- Select the right object
- Write in the correct response
- Draw an image
- Record an audio file

♣ Is the system capable of scoring the results?

♣ Is the system capable of informing the instructor of the result?

♣ Is the system capable informing the learner of the results?

♣ Is the system capable informing the program administrator of the results?

#### Learners

- o Can learners browse through course catalog?
- o Can learners register for courses?
- o Can learners receive synchronous academic advising and career counseling?
- o Can learners receive asynchronous academic advising and counseling?
- o Can learners communicate with program administrator seamlessly?
- o Can learners communicate with the instructor seamlessly?
- o Can learners communicate with the instructor via synchronous
  - ♣ Instant messaging
  - ♣ Audio

- ♣ Text
- ♣ Video
- ♣ Graphics
- ♣ Whiteboard
- ♣ Third-party applications, such as PowerPoint

o Can learners communicate via asynchronous systems, by email or threaded discussions with

- ♣ Program administrator
- ♣ instructors
- ♣ Each other?

### **Return on Investment**

Given the high cost, and the extraordinary amount of time that is required to implement an LMS, one way to assess the effectiveness of such systems is to determine the return on the investment made in them. This is not an easy task, since it is fairly difficult to separate the benefits of an LMS from the general effect of the training. Nevertheless, in the current business environment it has become increasingly important to justify the cost of an LMS in terms of its observable and measurable effects.

Another difficulty in cost-benefit analysis for determining ROI is accounting the cost of a system. Such costs include what an organization pays a vendor for purchasing a system outright, or supporting learners in an ASP model. But costs go further than that and include the time of the management and technical staff which is devoted to implementation of an LMS, as well as less visible, tangible, and measurable costs. Similarly, benefits of an LMS in reducing the amount of travel cost for training is readily measurable. However, indicators such as employee job satisfaction are more difficult to measure. Despite these difficulties, determining ROI is a significant determinant for an organization to sustain its LMS. ROIs should be calculated and interpreted with the understanding that they reveal an approximation of the real situation.

The primary reason for implementing learning management systems is to offer flexibility to the learners. Such flexibility could be assessed by the following criteria:

- o Has the LMS made learning and training more accessible for
  - o Partners
  - o Suppliers

- o Employees
  - o Contractors
  - o Employees of out-sourced firms
  - o Clients, and
  - o Customers?
- 
- o Has the LMS reduced the cost for travel?
  - o Has the LMS reduced the amount of time-away-from-task?
  - o Has the LMS increased just-in-time learning and training?

These factors are readily measurable and could provide the primary data required for assessing the benefits of an LMS in relation to its costs.

Other factors for evaluating and LMS include

Satisfaction- This is an intangible measure, but one that could be quantified in an assessment instrument and given a factor in the overall benefit of the acquisition and implementation of an LMS.

- o Did the LMS met the satisfaction of
  - o The Management of the organization
  - o The training and education program administrator
  - o The system administrator
  - o The instructors
  - o The instructional designers
  - o The instructors
  - o The learners'

Knowledge and skill acquisition- These measures are usually obtained by tests given to learners who have participated in a specific course or training session. Test scores are important in the sense that they provide a first tier measure of success or failure for the participants, as well as for the efficacy of the LMS.

Current learning management systems are good in measuring and reflecting knowledge and skills that could be displayed in objective tests, such as a multiple choice exam. Assessing the newly acquired knowledge and skills of learners could also require other measures that are not executed within the LMS environment, such as interviewing users, or asking them to display a certain set of motor skills.

**Improved Performance-** In an academic setting, as well as in a corporate or government organization, a main objective of learning is improved performance in the skills taught in a certain course or a program. For corporate and government organizations, performance is directly related to the overall objective if training has been well designed, and carefully matched with the needs of the learners. It is important therefore, that this measure focus on the extent to which newly acquired knowledge, skills, values and attitudes are transferred from the training situation to the actual on-the-job performance.

**Improved Productivity or Increased Potential Earning Power-** The ultimate measure of success for education and training is improved productivity in business and government organizations, and increase potential earning power for students in academic institutions. These are measures that are more difficult to obtain, but are necessary for demonstrating the efficacy of LMS.

#### Calculating ROI

Industry analysts have different approaches to calculating return on investment. The most straight forward means of determining the benefit of adopting a learning management system is subtracting its cost from the cost of the training system before the new system was implemented.

$$\text{ROI} = \text{COST OF THE OLD SYSTEM} - \text{COST OF THE NEW SYSTEM}$$

Although this might be a relatively simple way of demonstrating the benefits of the new system it is not the most revealing, and precise way of determining ROI. In certain circumstances it also could be misleading. Experience shows that in implementing technology based systems cost of a specific organizational function (e.g. training) could substantially go up at the outset. It is only over time that new technological solutions show their benefit, but not immediately after their implementation. The following formula takes the time factor into account.

$$\text{ROI} = \text{COST OF THE OLD SYSTEM From } t_1 \text{ TO } t_2 - \text{COST OF THE NEW SYSTEM From } t_3 \text{ TO } t_4$$

Another popular means of calculating ROI is determining the total cost of a system and dividing it by the number of students.

$$\text{ROI} = \text{TOTAL COST OF TRAINING} \% \text{ NUMBER OF LEARNERS}$$

This is a more useful measure of ROI, since it makes use of an important organizational benefit, which is the number of students served. Yet the total value of a training program goes beyond the number of students served. It deals with other indicators such as increased in productivity, increased job

satisfaction, etc. The important point here is ascribing a value to these indicators in dollars. Ascribing a dollar amount to some of these indicators, such as increased job satisfaction, is more difficult as compared to, for example, increased productivity. But this method is more comprehensive than the previous two and should be considered first, if possible.

ROI = VALUE OF A TRAINING PROGRAM % TOTAL COST OF THE TRAINING PROGRAM