
Learning Management Systems for the Rest of Us

An assessment of open source learning management systems

A research report presented by



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CONTENTS

Introduction	3
Background on Open Source Software	3
Supplemental Technologies	4
Apache	4
PHP	5
MySQL	5
Available Open Source Learning Management Systems	6
Claroline	Error! Bookmark not defined.
Ganesha	8
Ilias	9
Moodle	11
The Manhattan Virtual Classroom	13
Evaluation and Recommendation	15
Conclusion	18
About CUE	19
REFERENCES	20

Introduction

So, you need a learning management system. You do your research, talk to sales people, perhaps even hire a consultant, define your requirements, put out a request for proposal, and then... Ouch! The proposals come back and you realize that you really have no viable options that meet your needs unless you can get your VP to sign off on a long-term commitment to spend hundreds of thousands of dollars. That is correct. Industrial strength learning management systems for large- to medium-sized business are in that price range.

What if you were able to tell your VP that your company can have an LMS for free? Seriously – an LMS for zero dollars! You can download several of them right now from various web sites. Sounds interesting, does it not? Well, it is, but the story is a little more complicated than that. To get to the bottom of whether this really is a viable option for your company, we have to dig deeper.

This white paper explores learning management systems that have been built using something called open source software. You may be surprised to learn that there is a whole world of training technology out there that you will never find out about by attending the big training and human resource trade shows.

Five open source LMSs are evaluated here with suggestions for what it may take to make this a viable solution for your company. First, however, here is some history on free software.

Background on Open Source Software

The history of open source software is very closely related to the history of the Internet itself. It can be traced to post-Sputnik initiatives during the Eisenhower administration. Because the Eisenhower administration did not want to concentrate technology research in the Pentagon, money was provided to universities and new non-military government entities such as NASA and the Advanced Research Projects Agency (ARPA). These agencies and universities became heavily involved in developing computing and communications technologies.

One of their main challenges was getting one computer to talk to another computer. By now, of course, we know that they were very successful in doing so. However, what most every-day users of the Internet forget is that Microsoft software is not really what powers the Internet. Unix is.

So what is Unix and do we really need to know about it in order to select an LMS? The answer to that question is no. Let your software vendors worry about those details and you can worry about training and making sure that your VP signs all those checks. If you are interested in having a free LMS, however, you do have to know what Unix is in order to explore what your options are.

Unix is an operating system that was developed by Bell Labs in the 1960s mainly to power the switches that rout telephone calls. Bell also licensed Unix to universities and government research agencies, mostly for research into making computers talk to each other as efficiently as possible. Several different versions of Unix evolved, mainly in two categories – proprietary and non-proprietary. An example of a proprietary Unix version is Sun Microsystem's Solaris operating system. It is very expensive and runs on very, very expensive computers so we are not going to worry too much about Solaris here.

The non-proprietary version of Unix that many of us know about is Linux. Linux has its roots in the desire by hackers and university researchers to have their own non-proprietary version of Unix because they were increasingly frustrated with non-access and rigidity in proprietary Unix standards. To get their own version, they needed what is called a kernel, the core of the system. Developers around the world volunteered their time to create Linux, a truly robust operating system that anyone can have for free.

Supplemental Technologies

Having an operating system is a start, but to have an LMS, we need more. Considering that the history of Linux is synonymous with the history of the Internet, it should come as no surprise that all of the learning management systems in this report are web based. The beauty of web-based systems is that they are so accessible across distance and across computing platforms. This is easy to see from the user's perspective. Behind the scenes, on the server side, things are more complicated.

It helps to understand the concept of multi-tiered computing. Most web-based applications have at least three tiers: The browser, the server and a database. The browser/user sends a request to the server. The server takes the request and fetches data from the database, formats it in some way, and sends the data back to the browser.

In addition, an applications layer, or a middleware, is needed. This is key as this middle layer is where the actual business rules reside. In the Microsoft world this would be some thing like Active Server Pages. Cold Fusion is another popular middleware.

There are many proprietary learning management systems available that use ASP or CFM pages. If you decide to buy one of those systems, you are paying for the expensive server software, the database and the application software that make up the LMS. That is where the story started. Now, let's take a look the equivalent technologies that are available for free.

Apache

Apache is an open source server platform. It handles the IP numbers where websites reside and the scripts that service those websites use, and so on. According to Netcrafts Web Server Survey of October 2002, Apache holds over 60 percent of the server market

worldwide. Compare that to Microsoft's 25 percent. Interestingly, Microsoft uses several Apache servers itself as part of its web services. Hm...

Apache evolved much in the same way that Linux did. The name itself explains it. Several developers were working on different pieces of the project until one day one of them said: "Boy, this is a patchy software." Apache.

How does one get Apache? Download it for free. Nice!

PHP

PHP is the middleware of choice for the Apache server. It is an open source language of tags that the Apache server reads to perform functions. This usually involves fetching data from a database, but it could be many, many other things such as executing forms, performing calculations or writing data to a database.

PHP stands for Hypertext PreProcessor. It is hard to say exactly how popular PHP is. Easily, there are millions of websites that use PHP for functionality. All of the learning management systems that we shall look at in more detail below use PHP for their application logic. PHP is free, of course, and is usually provided as a free service by web hosting companies.

MySQL

This is the last, but not the least, piece of the technology puzzle. This is the database. By any measure, MySQL is a robust and popular database. It should be said that it does not have the industrial strength of Oracle, for example. However, in the web applications food chain, the LMS is not the most complex and difficult application to build. Perhaps that is why there are so many LMSs. It is certainly not as complex as supply-chain management or online stock trading, for example.

Developers tend to like the combination of Linux, Apache, MySQL and PHP (LAMP for short) for these reasons: It is free, it is easy to develop in and, most importantly, it just plain works. This becomes obvious when one takes a look at the available applications that use this potent combination. Take a look at this list:

- Content management systems
- Secure, database-driven shopping carts
- Web auction systems
- Online photo albums
- Project management suits
- Intricate personal planners with calendars and contact database
- Chat and message boards
- And so on...
- All free

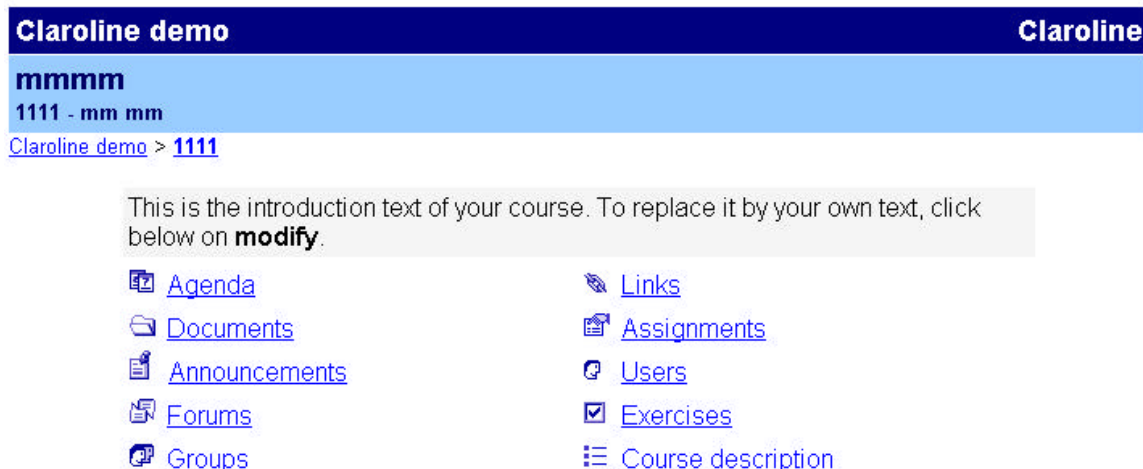
And, lest we forget, there are several learning management systems.

Available Open Source Learning Management Systems

Before reading these brief reviews, it is useful to set expectations at a realistic level. Like so much of the open source applications that are available, the tools listed here have been conceptualized and created to fill a need in the university setting. Keep in mind the different priorities that exist in that environment. Corporate universities are focused on business outcomes in the form of competencies and expense control. Learning management systems in the university setting are focused on online collaboration, often as a supplement to classroom education.

None of these tools have all the robust functionalities of a mature commercial LMS that result from many years of effort to build a tool that suits specific corporate needs. Instead, look for the potential that these LMSs have and how you can realize that potential. The proverbial glass is half full – not half empty. One of these applications may just be very close to filling your needs. Remember, developing features and functionalities in the PHP language is comparatively easy and inexpensive. More about what it would take to make one of these systems work for you in the concluding section.

Claroline



The screenshot shows a web interface for a course. At the top, there is a dark blue header with 'Claroline demo' on the left and 'Claroline' on the right. Below this is a light blue banner with 'mmmm' and '1111 - mm mm'. A breadcrumb trail reads 'Claroline demo > 1111'. The main content area has a grey box with the text: 'This is the introduction text of your course. To replace it by your own text, click below on **modify**.' Below this is a two-column menu of links, each with a small icon: 'Agenda' (calendar), 'Documents' (folder), 'Announcements' (megaphone), 'Forums' (speech bubbles), 'Groups' (people), 'Links' (hand cursor), 'Assignments' (document with checkmark), 'Users' (person), 'Exercises' (checkbox), and 'Course description' (list icon).

URL

<http://www.claroline.net/>

Origin

Claroline was created to provide instructors at the Université Catholique de Louvain, Belgium, with an e-learning platform that is easy to use. The maturity of Claroline can be attributed to having a large user base that has contributed to its development.

Features

- Course description
- File Manager
- Agenda
- Announcements
- Links
- Exercises
- Forums
- Users management
- Groups
- Assignments
- Statistics
- Help

Strengths

Claroline's main strength is ease of use. The interface is very intuitive. It is very simple for instructors and course developers to upload documents, type in text, manage groups and send out announcements. There is no need to learn HTML or any other formatting language. Claroline lends itself extremely well to asynchronous e-learning. Announcements, message boards and contact lists encourage collaboration. Claroline's documentation is excellent and provides good insights into what the system can and cannot do.

Weaknesses

Claroline is weak in defining competencies and tracking them. This could be remedied by adding additional dimensions to the user group administration area. What is termed "exercises" in the interface is really a quizzing and testing tool. It does not track individual scores, however, only group scores. The reason for this is that the system is not sufficiently secure. There are really only two user levels – student and instructor. An instructor can assign a student as a tutor. This does not provide additional administrative rights, only the right to belong to several groups at the same time. The assumption is that the instructor will give an assignment and that the student will upload a paper to complete the assignment. It has no shopping cart as part of the system. Also lacking are the business rules that are part of most proprietary LMSs, where pre-registration, waitlists, reminders, and so on make training administration a lot easier. Announcements are manually driven.

Current User Community

Claroline has been adopted mostly by universities around the world. The interface and support text has been translated to 15 languages, which should tell us something about how broad the user community is. A list of users can be found on Claroline's website.

Ganesha

Un stagiaire
Pour accéder dans la plate-forme en tant que stagiaire, voici quelques exemples de comptes déjà disponibles en démonstration :

Groupe A	
Identifiant	Mot de passe
Guest1	Guest1
Guest2	Guest2
Guest3	Guest3
Guest4	Guest4
Guest5	Guest5

Un tuteur
Pour accéder dans la plate-forme en tant que tuteur, voici quelques exemples de comptes déjà disponibles en démonstration :

Groupe A	
Identifiant	Mot de passe
Tuteur1	Tuteur1
Tuteur2	Tuteur2

Accès à l'exemple
Identifiant :
Mot de passe :
[Rappel login/password](#)
[Les visiteurs 2.0](#)

Un Administrateur

URL

<http://www.anemalab.org/commun/english.htm>

Origin

This LMS was almost left off this list because the site is entirely in French. Wisely, the creators put a link to the Google site translation tool, allowing the site to be read in bumpy, yet understandable English. It was developed by Anemalab Formation, a company specializing in consulting, training trainers in e-learning and the design of web-based courses. Their effort grew out of a frustration with the complexity and cost of proprietary platforms. Note that this is a private company that develops open source software and gives it away for free. More about this in the concluding section under the sub-head “Approach.”

Features

This system is full-featured and well-designed. The creators have taken a flexible approach that often yields wonderful results in open source software development. This involves integrating existing components developed by other groups. For example, instead of building a quizzing and testing tool from scratch, they have integrated Hot Potatoes, a popular existing quiz tool.

Strengths

Ganesha tracks student attendance. This is an important feature that is missing in some of the other systems.

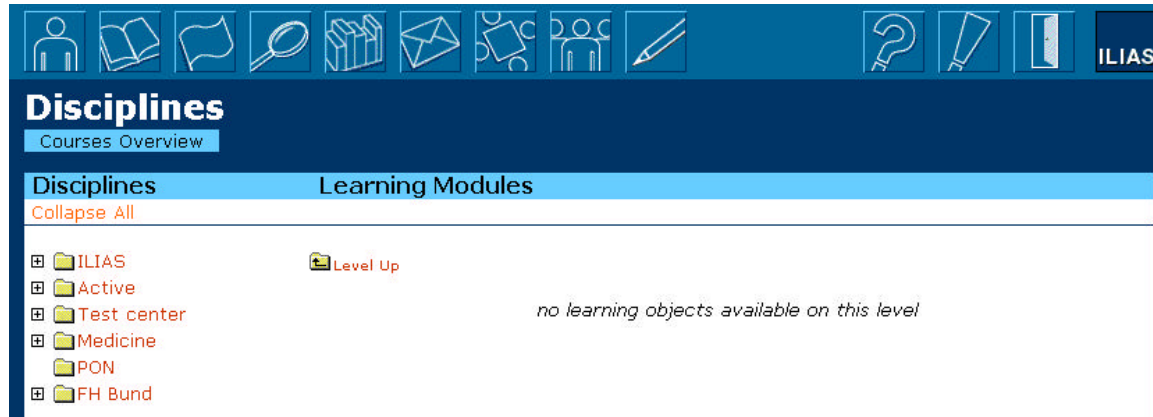
Weaknesses

The fact that most of the documentation is in French will present a challenge for many readers of this report. An English language version is allegedly under development.

Current User Community

With 4,000 installations and over 1,000 messages posted on the message board, this is one of the more mature open source LMSs. This includes several universities in France. A list is available on the web site.

Ilias



URL

<http://www.ilias.uni-koeln.de/ios/index-e.html>

Origin

Ilias open source is a joint project of the University of Cologne, the Faculty of Economics, Business Administration and Social Sciences at the University of Cologne, the Sal. Oppenheim Foundation and the Department of Education, Science and Research of the State of Northrhine-Westphalia, Germany. Its purpose is to supplement classroom training by creating areas for what are called self-regulated learning and collaborative learning.

Features

- Personal desktop for each user with information about last visited courses, new mails or posts
- Learning environment with personal annotations, test, glossary, print function, search engine, offline-version
- Course management system
- Communication features such as news system, discussion forums and chat
- Group system for collaborative work and organizing members and resources
- Integrated authoring environment (Editor) to create courses without HTML

- Support of metadata for all levels of learning objects
- Context-sensitive help system for learners and authors
- User and system administration interface
- System languages: English, German, French, Spanish, Norwegian, Swedish, Danish, Polish

Strengths

Ilias has several strong features that one might find in a mature LMS: User self-service pre-registration, multiple active content formats including (flash, various movie formats, VRML and an image mapping tool), XML meta tag tools for all contents types, excellent online help documentation, discussion boards, group management and group communication tools. Unlike Claroline, tests in Ilias are tied to the individual user. Tests can be skills checks by module, exercises or formal end-of class tests. It has very powerful content creation tools with a nicely structured modular system for assembling courseware.

Weaknesses

There is no module for competency assessment. The system is set up with no clear links to reports in the administrative view. This does not mean that reports cannot be pulled from the database. In a corporate setting, that is something that should be created as a separate module. Flexibility in setting up user roles may be a limitation with currently defined users limited to administrator, author, learner and guest.

Current User Community

Ilias's user base is mostly made up of universities in Germany. A list of them is provided on their web site. Judging from the discussion boards, there is a lot of interest in future improvements to the application – not just in Germany as the English language board is active as well.

Moodle

The screenshot shows the Moodle LMS interface for a course titled "Demonstration 101". The user is logged in as "Martin Dougiamas". The interface is divided into several sections:

- People:** Includes links for "Participants" and "Edit profile".
- Activities:** Lists various activity types: "Assignments", "Choices", "Forums", "Journals", "Quizzes", "Resources", and "Surveys".
- Search:** A search box with a "Search forums" button.
- Administration:** Includes options like "Turn editing on", "Settings...", "Facilitators...", "Grades...", "Logs...", "Files...", "Help...", and "Teacher forum".
- Weekly outline:** The main content area showing a weekly schedule. It starts with a "Hi!" message and a welcome to the course. The first week (21 April - 27 April) includes a list of activities: "A cartoon", "Welcome to the demo", "Outline of the course", "Research Consent", "Why am I here?", "Survey 1 - Online Learning Environment", "Survey 2 - Your attitudes to learning", and "Forum 1 - Introductions". The second week (28 April - 4 May) includes "Journey into Constructivism", "Interpretive analysis of a Moodle course", "Define social constructionism", and "Forum 2 - Social constructionism in practice".
- Latest news:** A section for course updates, including "Add a new discussion topic...", "11 Sep, 17:30 - Martin: Can you think of a good subject for a new version of this course? more...", "22 Aug, 21:08 - Martin: Restarting this course more...", and "6 Aug, 13:18 - Martin: Finally, updates to Demo 101 more...".
- Recent activity:** Shows the user's last login as "Thu, 1 May 2003, 01:44 AM".
- New users:** Lists new users: "Michael King", "Joel Matthew", "Kim Flack", "Joel Matthew", "Fernando Castro Garcia", "derek martin", and "Robert Parkes".
- Assignments submitted:** A section for tracking submitted assignments.

URL

<http://www.moodle.com>

Origin

Moodle is in many ways a one-man campaign by Martin Dougiamas. As this Australian native puts it himself: "Moodle is my perpetual work in progress." Having been a systems administrator on a WebCT installation, combined with advanced degrees in education and computer science, Mr. Dougiamas clearly has deep knowledge of what a mature LMS looks like. He, himself, admits that Moodle falls short in some areas compared to the big proprietary systems, especially in the area of scalability.

Features

- Suitable for 100% online classes as well as supplementing face-to-face learning
- Emphasis on strong security throughout. Forms are all checked, data validated, cookies encrypted etc
- Every user can specify their own time zone, and every date in Moodle is translated to that time zone
- Multi-language interface

- Choice of course formats such as by week or by topic
- Flexible array of course activities - Forums, Journals, Quizzes, Resources, Choices, Surveys, Assignments
- Advanced reporting features
 - Full user logging and tracking - activity reports for each student are available with graphs and details about each module (last access, number of times read) as well as a detailed "story" of each students involvement
 - Mail integration - copies of forum posts and teacher feedback can be mailed
- Assignment Module with due date and grade requirements
- Students can upload their assignments (any file format) to the server - they are date-stamped. Late assignments are allowed, but the amount of lateness is shown clearly to the teacher
 - For each particular assignment, the whole class can be assessed (grade and comment) on one page in one form
- Advanced Quiz Module with multiple answer formats and report options
- Built-in surveys (COLLES, ATTLS) have been proven as instruments for analyzing online classes

Strengths

Features is the main strength. The features listed above are only a sample. For full list of features, please go to the Moodle website. Language support is another strength. Currently, it is translated to 27 languages with more in development. Conceptually, Moodle is also very mature. Further, Moodle is the only open source LMS to truly address the issue of human resource information systems (HRIS) integration. The newest release has a GUI tool to hook into various external database formats.

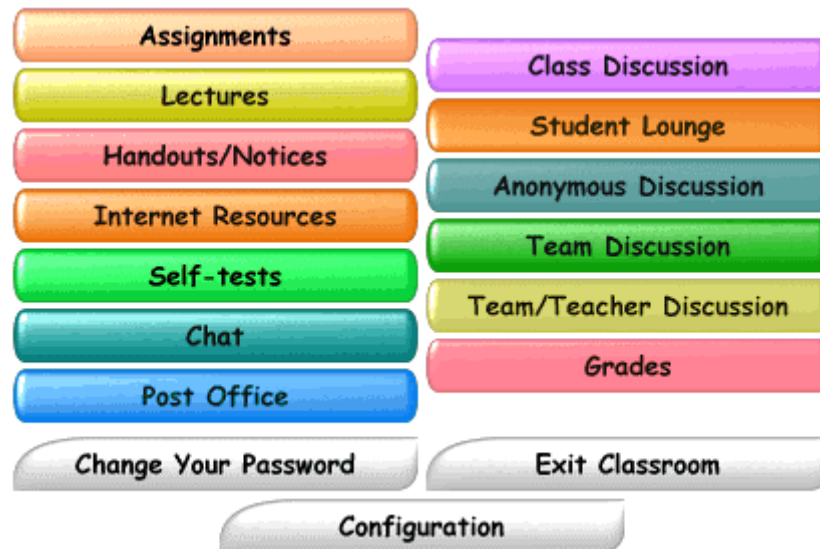
Weaknesses

Calendar features are absent, although there are plans underway to integrate a calendar feature. XML tagging and multimedia content support is not as strong as in other systems.

Current User Community

Moodle has been installed at universities and institutions all over the world. There are also some commercial users of Moodle. At a minimum, there are 500 organizations that are depending on it for learning management, meaning organizations that have installed Moodle and are actively participating in making improvements to it. Though it is difficult to know the exact number of users, it is likely much higher than 500 considering the application is downloaded at a rate of 50 to 100 times per day.

The Manhattan Virtual Classroom



URL

<http://manhattan.sourceforge.net/>

Origin

Manhattan was developed by Steven Narmontas and was first used at Western New England College in Springfield, Massachusetts in 1997. In October of 2000, the software was released in its entirety on the Internet for free. It is written in the 'C' programming language and only works on a Unix platform.

Features

- E-mail system designed specifically for 'virtual classroom' use
- Virtual syllabi, lectures notes and other handouts available to your students
- Quizzes for student self-assessment only
- Electronic discussion groups
- Live chat sessions for your class
- Post assignments, receive work from students, and provide feedback
- Provide a private list of World Wide Web links for your class
- Easily distribute grades to your students, while protecting their privacy
- Add interest to your classroom with multimedia
- Decide which modules to use and when

Strengths

Comparatively speaking, there are not that many strengths. The ability to grade students and submit those grades to individual student is not an attractive feature in the corporate setting.

Weaknesses

Using Manhattan is not completely intuitive, as evidenced by the 100-page teacher manual.

Current User Community

Some small colleges use this system, though the user community is much smaller compared to the other systems in this report.

Evaluation and Recommendation

Of the applications reviewed above, Moodle stands out as the one that has come the farthest in approaching the feature sets of a proprietary LMS. In fact, many corporations already use Moodle. Ilias and Ganesha are runners-up. The features that set Moodle apart are good reporting, robust security, and HRIS integration tools. Martin Dougiamas, Moodle's creator, believes that it is inevitable that one of the open source LMSs will one day rival the big commercial players. In order for broader acceptance and adoption among large companies to happen he believes corporate sponsorship is required.

One might think that there are philosophical differences between the open-source community and private industry that would make this difficult. Not necessarily so. There are countless examples of open-source systems at work in commercial settings. For a corporation to sponsor a university in order to develop a new product or service is certainly not unprecedented. In the case of the LMSs reviewed here, it would likely prove less expensive than buying a commercial LMS license. Ironically, the two most successful creators of LMS platforms for universities, Blackboard and WebCT, are commercial vendors.

From the perspective of learners and instructors, the open source LMSs described here provide great flexibility in both structural and methodological approach. Martin Dougiamas believes that because open-source projects are less constrained by trying to provide broad commercial viability they are often focused on particular educational needs, each of them promoting different ways of organizing and conducting education. He says: "A fundamental advantage of open-source LMSs is the flexibility they give educators to experiment with different systems offering different pedagogical techniques." This is particularly true in the evaluation stage of the LMS selection process when you can literally install all these systems locally and play with them. Theoretically, at least, you could take features from several different systems and customize your own system without violating any copyright laws.

In the end, corporations need LMSs that can provide competency assessment, blended learning, multiple levels of evaluation, HRIS integration, and strong reporting capabilities. Then there is one more thing that corporations want their LMSs to provide – return on investment. ROI is one area where open source has a step on proprietary systems.

So, are you ready to run out and download one of these systems right now? Stop! In the corporate environment there are several issues that you need to take into account before you move forward:

1. What are your needs?

Most likely, none of the systems described here fit your needs perfectly. Select the one that you like the best and make a list of features that are missing. It is possible to make customizations to these systems to make them work for you. Perhaps Moodle is your

preferred system. Still, you have to be impressed with how easy it is to use Claroline. And you also have to be impressed with how Ilias has integrated XML tagging and interactive content features. Ganesha has attendance tracking. There are PHP calendars, shopping carts and many other PHP tools that could be integrated into your LMS of choice with some development effort. Whether it is easy or not is a different question that you can address later. You should try to imagine what the system looks like and how it works before you move forward.

2. Your IT department

Make sure that your IT department is part of your decision. Some IT departments are more comfortable with open source platforms than others. There are large corporations that run their entire Internet and intranet activities on the technologies described in this white paper. Others would never even consider it.

Use this white paper as a starting point for discussions. Ask somebody in the IT department to read this white paper, for example. Considering that you would probably need customizations based on your training needs, ask intelligent questions, such as:

1. Do we have people with backgrounds in these technologies?
2. Is this a direction that you are comfortable with for our company?
3. Do we have the resources to make customizations in-house?
4. Could we maintain this kind of system in-house?
5. Are there any issues related to integrating an open source LMS with our HRIS system?

Your training department may have the authority to outsource its LMS needs without the approval of the IT department. That does not mean that you don't need the support of the IT department. The LMS will still need employee data to be useful. Ask your IT department to help you in finding and evaluating the right vendor. That way they will not get stuck fixing a mess that you created. If they are part of the decision to begin with, they will give you better support.

3. Resources (it is not free)

The source code is free, but there are other costs involved. Consider these:

1. Hardware costs
2. Time spent downloading and configuring the application
3. Developer time to implement customizations (whether in-house or consultant hours)
4. Hosting the application, if applicable
5. Customizing look-and-feel issues in the interface
6. Integrating the application with your HRIS infrastructure
7. Training your user community to get up to speed
8. Maintenance and training administration

4. Accountability

One of the main things that you get when you purchase a proprietary IT solution from an established vendor is accountability. You are buying a working tool. If it is broken, you have all kinds of legal ways to make sure that they fix what is wrong. Under the GNU license (which is the most popular one used in the open source community) you cannot hold the developers accountable for your down time. That does not mean that there is no support out there. It is a very good idea to get involved in reading and posting messages on discussion boards related to the open source applications in this report. You will be very pleased with the response that you will get. Further, there are ways to ensure that you will have acceptable up-time. In general, the Linux-Apache-PHP-MySQL platform is very stable. Everyone agrees on that. If in addition you select responsible vendors who back up their systems regularly and perform regular monitoring and maintenance, you should be fine. Keep the accountability issue in mind as you make the decisions, however. If it is your decision, and things don't work out, guess whom they will point their fingers at if things go wrong?

5. Approach

Knowing that you will make customizations to these systems to make them work for you, it is tempting to keep these enhancements to yourself and then try to sell your solution to others who have the same needs that you did. You can do that. An example is ClassFronter (http://fronter.info/index.phtml?set_lang=en) which is a proprietary LMS built in open-source PHP. One can assume that the Norwegian developers of ClassFronter borrowed extensively from one or several of the applications in this report.

The danger with this approach is that your application will become obsolete as the open source version continues to evolve. Talk it over internally and ask whether owning a proprietary LMS is part of your core business.

The preferred approach is probably to give your improvements back to the open source community. There are many things to gain from this, primarily goodwill from the originators whom you may need to help with testing out the new features and provide support along the way. In addition, you can expect more interest in your application by making it available for free, perhaps creating consulting opportunities to customize the solution for other companies.

Either path is acceptable. For additional information about licensing issues and playing by the rules in general, see the GNU General Public License links posted on any of the sites listed in this report.

Conclusion

Learning Management Systems are proliferating at an increasing pace. The 1997-98 Brandon Hall report (<http://www.brandon-hall.com>) reviewed 27 LMSs. In 2000, the report reviewed 59. The 2002 report reviewed 70 – all proprietary.

We can probably expect that there will be a freely available, open source LMS with features that are robust enough to satisfy most medium sized companies within the next few years. In order for that to happen, one or several corporations will have to be interested enough to provide funding to develop the features they need. There is precedence for this. osCommerce is a freely available website shopping cart that is used on nearly 1,000 online shopping sites. Its development is partly sponsored by an Internet hosting company.

If you want something for free, or at least for a lot less, you have to go out and find it and make it work for you. Now you know where to start looking.

About CUE

Corporate University Enterprise, Inc. (CUE) is one of only a few education consulting firms designed to bring a strategic approach to workforce education in both private and public organizations. The company was incorporated in 1998 and has since served clients and fulfilled speaking engagements throughout the United States, Europe and Asia.

CUE designs strategic approaches to workplace learning for client organizations, placing emphasis on running training like a business, value and impact studies, and professional advising for crafting learning missions and goals. Our goal is to encourage a cultural shift so that all employees, regardless of their rank and tenure, consider learning critical to your organization's competitiveness and performance.

For more information about CUE and its services, send e-mail to info@cuenterpise.com, visit <http://www.cuenterpise.com> or call 703-848-0070.

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